Glossary of research terms –version 8.1

A
Absolute risk difference – Also sometimes referred to as 'absolute risk reduction', the difference between the event rate in the intervention group and the event rate in the control group
Adjusted estimates – Estimates produced from a statistical analysis which allow for the presence of confounding factors (see also *crude estimates*)
Analysis and Interpretation- The process by which sense and meaning are made of the data gathered in qualitative research, and by which the emergent knowledge is applied to clients' problems. This data often takes the form of records of group discussions and interviews, but is not limited to this. Through processes of revisiting and immersion in the data, and through complex activities of structuring, re-framing or otherwise exploring it, the researcher looks for patterns and insights relevant to the key research issues and uses these to address the client's brief
Analysis of covariance; ANCOVA - a statistical method for analysing differences among two or more independent groups but allowing for one or more variable to be modelled as covariates.
Analysis of variance; ANOVA - a statistical method for analysing differences among two or more independent groups.
Allocation concealment - A way of preventing prevent selection bias by concealing the allocation sequence from those assigning participants to intervention groups, until the moment of assignment. This prevents researchers from influencing which participants are assigned to a given intervention group, either consciously or unconsciously
Allocation sequence – A sequence of interventions, usually randomly ordered, which are used to assign participants to these different interventions as they are recruited to a study (see also *randomisation sequence*)
Analytic study - A comparative study which identifies and quantifies associations and tests hypotheses
Ascertainment bias – A type of selection bias which occurs in observational studies when investigators have selected participants to be in a study in a way which means they will not be representative of the population they wish to generalise to.
Association – a quantifiable relationship between two measures
Audit –' a quality improvement programme that seeks to improve patient outcomes through systematic review against explicit criteria and the implementation of change' (NICE) it most usually takes the form of an investigation designed to provide data which measures the performance of an organisation or organisations, primarily for the use of those within the organisation. Audit is not usually considered to be research.

B
Blinding – A method used primarily in trials to prevent bias, by ensuring that some of those involved in the research process are not aware of the treatment or intervention that a participant is receiving. The three types of blinding that are common are: participant blinding, treatment deliverer blinding, and blinding of outcome assessors. The third is usually seen as the most important to prevent bias.
Blocking – A method used to try and keep the numbers of individuals in trial intervention groups balanced over time by randomising within blocks of a given size. For example, if blocks of size ten are used in a trial with two groups (intervention and control), then of the first ten patients that are recruited, exactly five will be recruited into the intervention group and five into the control group, and this will be true of the next ten patients as well etc.
Bradford-Hill Criteria – A list of criteria drawn up by Austin Bradford Hill to assess causality.
Bias - Any influence that distorts the results of a research study (see ascertainment bias, recall bias, non-response bias, observer expectation bias, participant expectation bias, selection bias, information bias, allocation concealment, blinding, randomisation).

C
Categorical variable - A variable which naturally falls into categories (e.g. a person's gender or a person's marital status).
Cases - Objects or entities whose behaviour or characteristics we study. Usually, the cases are persons. But

they can also be groups, departments, organisations, etc. They can also be more esoteric things like events (e.g., meetings), utterances, pairs of people, etc. In the context of sampling, cases are also called elements.
Case-control study – A study in which cases (usually persons – see above) are selected from the population because they have a particular attribute, usually a medical condition, and compared with controls selected from the population, who are individuals without this attribute, to see if there is any difference between the cases and controls in terms of something that has happened in their past, for example, their exposure to a particular substance such as tobacco, alcohol or industrial chemical.
Case study- A type of research which studies one or a few cases (people, organizations, groups, etc) in great detail. It is not a method of research as such because the data being offered can have been gathered using a variety of different methods (questionnaire, qualitative data, quantitative data). It is predominantly a description.
Causality – The mechanism whereby one factor *causes* another. While the goal of research is to understand what causes what, this is a very difficult goal to achieve. Strictly speaking, it is impossible. In fact, the notion of causality is just a theory itself. However, on a day-to-day basis, we assume that causality does exist and that we can discover it through a combination of inductive and deductive work. In general, laboratory experiments are the only way to ascertain causality, but in observational studies we often use the Bradford-Hill criteria to assess causality.
Central tendency - A measure of the typicality or centrality of a set of measurements; the three main measures of central tendency are mean, median and mode.
Clinically important difference – A difference in a quantitative variable which will be clinically important to those in whom the variable is measured
Clinical trial - An experiment designed to test the efficacy or effectiveness of a clinical treatment
Closed question – A question to which individuals are required to give one of several answers specified in advance by investigators. Questionnaires usually involve mostly closed questions, but these types of question are not suitable for qualitative research e.g. an in depth interview.
Cluster randomised trial – A randomised trial in which the units that are randomised are clusters (or groups) of individuals rather than the individuals themselves, for example general practices or hospitals might be randomised rather than patients
Cluster sampling - A multi-stage sampling scheme in which the population is first divided into clusters, then a sample of these clusters is chosen via simple random sampling, and then a simple random sample of population elements is selected within the chosen clusters. This differs from stratified sampling in that in stratified sampling, all strata are sampled, whereas in cluster sampling we take a sample of clusters, not all clusters. Cluster sampling is used when it is difficult to construct a sampling frame for the entire population, or when it is too costly to visit randomly chosen population elements.
Cohort study – A quantitative observational study in which a group of individuals (the cohort) are followed up over a period of time and measurements taken at several time points, to try and identify associations between attributes of the individuals and/or test hypotheses. Also called a longitudinal study.
Confidence Interval - A confidence interval identifies a range of values that includes the true population value of a particular characteristic with a specified probability (usually 95%). We can then say that there is 95% probability that our interval spans the true value. Less formally, one often hears people interpret this as being 95% confident that the interval spans the true value. Note that it is not correct to say that there is 95% probability that the true value 'falls' within the interval since the true value is fixed and not a random variable.
Confounding variable - A variable, other than the variable(s) under investigation, which is not controlled for and which may distort the results of experimental research because it is independently associated with both the outcome and the predictor variables.
CONSORT statement – A statement drawn up by those concerned with the reporting quality of cluster randomised trials to try and improve that quality
Control group –A group of participants in a quantitative experimental study (usually a randomised controlled trial) whose outcomes are compared with the outcomes for participants who receive the treatment or intervention that investigators are really interested in to see if the treatment is effective. The control group often receives 'usual care'. Note that in case-control studies the group that are not cases are usually referred to as 'controls' (see controls).
Continuous variable - A variable that can take on an infinite range of values along a specific continuum (e.g. weight, height).
Control - Processes employed to hold the conditions under which an investigation is carried out uniform or

constant. In a true experimental design, the control group is the group that does not receive the intervention or treatment under investigation. The scores on the outcome for the control and the experimental groups are used to evaluate the effect of the independent variable. In other experimental designs, this group may be referred to as the comparison group (see also control group).
Controls – The group of participants in a case-control study who do not have the attribute (usually a medical condition) which the cases have, and against whom the exposures and characteristics of the cases are compared to ascertain if there is any difference in these exposures and characteristics between the two groups.
Correlation - The degree of association between two variables. A tendency for variation in one variable to be linked to variation in a second variable.
Correlation coefficient - A measure of the degree of relationship between two variables. A correlation coefficient lies between +1.0 (indicating a perfect positive relationship), through 0 (indicating no relationship between two variables) to -1.0 (a perfect negative relationship).
Covariate – a variable which in and of itself is not of particular interest in terms of its effect on the dependent outcome, but that may be associated with the dependent outcome and other independent outcomes. Including covariates in modelling helps to prevent confounding (see *confounding variable*).
Cross – sectional study - A cross-sectional study is where we collect data only once from each case (usually a person) For example, if we want to examine the effects of age on attitude towards abortion, we collect attitude data from people of all ages, then see if there is a correlation between age and attitude. This different from a cohort study, where you take a set of young people, then measuring their attitude towards abortion every few years as they get older.
Critical appraisal- Interpreting the strengths and weaknesses of the research process and applying these judgements to assess how useful the research is for practitioners
Crude estimates – estimates of effects that have not been adjusted for potential confounders (see also *adjusted effects*)
Chi-squared test – $\chi 2$ test; a statistical test that may be applied when the sampling distribution of the test statistic comes from a chi-squared distribution, which is the square of the normal distribution. In epidemiology the chi-squared test is often used to compare goodness-of-fit in terms of observed and expected data. Pearson's chi-squared test for independence is often used to test for independence in 2x2 tables based on observed and expected cell counts. Fisher's exact test is recommended for use in cases where cell counts are less than five.

D
Data analysis- Processing, interpretation and analysis of findings
Deductive reasoning Reasoning in which we begin with a rule and move to an example In order to draw a conclusion. In the research context often gives rise to reasoning that starts with a hypothesis and moves towards evidence for rejecting or not rejecting that hypothesis
Dependent variable - In experimental research, the dependent variable is the variable presumed within the research hypothesis to depend on (be caused by) another variable (the independent variable); it is sometimes referred to as the outcome variable.
Descriptive statistics - Statistical methods used to describe or summarise data collected from a specific sample (e.g. mean, median, mode, range, standard deviation).
Differential bias – Bias that affects one group in a research study differently from another group

E
Ecological study - a study in which the unit of analysis is a population rather than an individual
Ecological fallacy – occurs when associations observed at population level are assumed to be present at an individual level
Effectiveness - the extent to which an intervention, when used under ordinary circumstances, does what it is intended to do.
Effect size - also referred to as the standardised mean difference (SMD), this is the mean difference divided by the standard deviation. It quantifies the size of the treatment effect (Cohen's d); 0.2 has been defined as small,

0.5 as medium and 0.8 as a large effect. It allows different outcomes to be compared on a standardised scale
Efficacy – the extent to which an intervention, when used under ideal circumstances, does what it is intended to do
Erickson's Framework – A framework designed to assist in the analysis and comparison of potential immunisation programmes. The framework includes 58 criteria classified into 13 categories, including the burden of disease, vaccine characteristics and immunization strategy, cost-effectiveness, acceptability, feasibility, and evaluability of programme, research questions, equity, ethical, legal and political considerations
Ethics committee - A committee of members who judge the appropriateness and merit of proposed research
Evidence based medicine - the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients
Experimental research - A research methodology used to establish associations between the predictors and outcomes by means of manipulation of variables, control and randomisation. A true experiment involves the random allocation of participants to experimental and control groups, manipulation of the independent variable, and the introduction of a control group (for comparison purposes). Participants are assessed before and after the manipulation of the independent variable in order to assess its effect on the dependent variable (the outcome). (see also quasi-experimental)
Explanatory trial – A trial conducted under ideal conditions in which a treatment (very often a drug, surgery or other therapy) is administered to a select group of patients in whom compliance with treatment is strictly monitored, to ascertain whether or not the treatment is efficacious (works in ideal conditions – see *efficacy*).
External validity – see *validity*

F
False Positive - Term describes when a subject has received a positive test result but actually does not have the disease
False Negative – Term describes when a subject has received a positive test result but actually does have disease
Frequency distribution – a function describing the range of values a variable may take. For example see *normal distribution*.

G
Gaussian curve – see normal distribution.
Generalisability – Also referred to as 'external validity'. The extent to which the results of a study are useful in settings other than the setting in which the research was conducted
Grey documents / grey literature – An umbrella heading for the paperwork which circulates around governmental and private organisations, such as committee minutes, internal discussion documents, planning papers and so forth. It is literature which is not 'published' in the conventional sense, but is usually available on request.
Gold-standard - in epidemiology, usually refers to a test that may be considered to be the currently best available (a yard-stick, or 'gold-standard') against which the performance of other tests should be judged.

H
Hard data - Precise data, like dates of birth or income levels, which is not open to interpretation by those providing the data, and which, as a result, can reasonably be subjected to precise forms of analysis, such as statistical testing.
Hazard ratio – A measure of how often an event happens in one group compared to another. Hazard ratios are calculated from Cox Proportional Hazards regression analysis but can be interpreted as the ratio of incidence rates assuming the increased risk is constant over time.
Helsinki (declaration of) - A declaration designed to ensure that research is conducted ethically

Heteroskedastic – An adjective describing a changeable variance of one variable , x as a function of another variable, y. Sometimes (incorrectly given the Greek roots of the word) spelled heteroschedastic. The opposite of heteroskedastic is homoskedastic.

Homoskedastic – see Heteroskedastic (opposite)

Hypothesis - A postulated relationship between a pair of variables. A statement that predicts the relationship between variables (specifically the relationship between the outcome and predictor variables). A hypothesis may be directional or non-directional: Directional hypothesis (or one-tailed hypothesis)

A hypothesis that makes a specific prediction about the nature and direction of the relationship between the independent and dependent variables.

Non-directional hypothesis (or two-tailed hypothesis)

A hypothesis that does not specify the nature and direction of the relationship between the independent and dependent variables.

I

Incidence–new cases of a disease occurring in a set time period

Incidence rate–number of new cases / person years at risk.

Incidence rate ration- the incident rate for subject with the risk factor divided by the incidence rate without the risk factor

Inclusion criteria – Criteria for including either individuals or studies in a study. Used in relation to individuals when quantitative or qualitative research is being undertaken. Used in relation to studies when a systematic review is being undertaken.

Independent variable - The variable (or antecedent) that is assumed to cause or influence the dependent variable(s) or outcome. The independent variable is manipulated in experimental research to observe its effect on the dependent variable(s). It is also referred to as the predictor.

Information bias – Bias that occurs because the data being collected in a quantitative study (usually an observational study) do not reflect what the investigator actually wants to measure. (see also recall bias, participant expectation bias, observer expectation bias)

Informed consent - The process of obtaining voluntary participation of individuals in research based on a full understanding of the possible benefits and risks.

Intention to treat analysis – Analysis in which data from randomised individuals are analysed with the individuals remaining in the groups to which they are randomised, regardless of the actually treatment/ intervention they received

Internal validity – see *validity*

Inter-quartile range – Two figures which indicate the range within which the middle 50% of measurements for individuals within the study lie

Intervention group – A group within a clinical trial (usually randomised) which receive a specified intervention. Very often in a clinical trial there are only two groups to which individuals are randomised; the control group and the intervention group.

J

K

L

Lead time – the time between the early detection of a disease and its usual clinical detection

Lead time bias – bias arising due to earlier detection of a disease in one group due to the use of a more sensitive test

Literature review – A narrative describing an appraisal of previous research or literature on a subject

Log-rank test – a non-parametric hypothesis test used to compare the survival distributions of two samples

Longitudinal study - A longitudinal study is where we follow the units of analysis (say, employees) over time, and measure key variables at different points in time. For example, we might measure morale before and after a promotion. Also called a cohort study.

M

Matching – A process by which units (usually individuals) within a quantitative research study are formed into pairs (or sometimes in case-control studies groups of three or four) within which some attributes of the units are identical. The procedure can be carried out in case-control studies or randomised controlled trials. The aim of matching is to reduce bias.

Median – A descriptive statistic used as a measure of central tendency. The middle value in a list of quantitative measurements when these measurements are ordered from smallest to largest

Mean - A descriptive statistic used as a measure of central tendency. All measurements in a set of measurements are added together and divided by the number of subjects.

Measurement scale - Measurement of a phenomenon or property means assigning a number or category to represent it. The methods used to display and/or analyse numerical (quantitative) data will depend on the type of scale used to measure the variable(s). There are four scales of measurement: nominal, ordinal, interval or ratio. The data associated with each measurement scale are referred to as nominal data, ordinal data, interval data and ratio data respectively

.Nominal scale (categorical)

the lowest level of measurement that involves assigning characteristics into categories which are mutually exclusive, but which lack any intrinsic order (e.g. classification by gender or by the colour of a person's hair or eyes)

Ordinal scale (categorical)

these categories can be used to rank order a variable, but the intervals between categories are not equal or fixed (e.g. strongly agree, agree, neither agree nor disagree, disagree, strongly disagree; social class I professional, II semi-professional, IIIa non-manual, IIIb manual, IV semi-skilled, and V unskilled).

Interval scale (numerical)

the categories are ordered and there are equal intervals between points on the scale, but the zero point on the scale is arbitrary so that a particular measure cannot be said to be 'twice as' large as another measure on the same scale (e.g. degrees Centigrade).

Ratio scale (numerical)

Measures are assigned on a scale with equal intervals and also a true zero point (e.g. measurement in yards, feet and inches or in metres and centimetres).

MeSH heading – Headings used within medical publications databases to categorise publications by medical condition and (to a lesser extent) type of study

Meta- analysis - A statistical technique for combining and integrating the data derived from a number of experimental studies undertaken on a specific topic.

Mode - A descriptive statistic that is a measure of central tendency; it is the value that occurs most frequently in a distribution of measurements.

Minimally detectable change - the level of change that is detectable beyond the measurement error of the instrument. This is inversely proportional to the number of measurements; either repeated measures on an individual or participants measured in the group.
Minimally Important Change; MIC - the smallest difference in score in the domain of interest which patients perceive as beneficial and which would mandate, in the absence of troublesome side-effects and excessive cost, a change in the patient's management. The term should be used to pertain to the individual, rather than to the group. For the population-level equivalent see *minimally important difference*.
Minimally important difference - the smallest difference between groups (i.e. population-level) which may be considered to be of clinical importance
Mulitstage sampling – Sampling carried out in stages, where at each stage units are sampled from within units sampled at a previous stage. An example would be sampling towns and then sampling residents within towns.

N
Negative correlation - A relationship between two variables where higher values on one variable tend to be associated with lower values on the second variable; sometimes referred to as an inverse relationship (e.g. age of non-vintage cars and their market value).
Negative *predictive value; NPV* - the proportion of patients with negative test results who are correctly diagnosed. It reflects the probability that a negative test indicates the underlying condition suspected is actually not present.
Non-parametric tests - Statistical tests that can be used to analyse nominal or ordinal data; they involve fewer rigorous assumptions about the underlying distribution of variables
Non-significant result - The result of a statistical test which indicates that the outcome of an experimental research study could have occurred through random variation (or chance) at a specified level of significance, rather than as a result of a genuine association between the variables under investigation.
Normal distribution – also known as the Gaussian curve, is a frequency distribution, the function of which is of a bell-shaped curve which describes the frequency distribution many natural phenomena.
Null hypothesis - A statement that there is no relationship between the independent and dependent variables and that any relationship observed is due to chance or fluctuations in sampling
Number Needed to Treat - this is the number of patients that, on average, must be treated with the intervention in order for one extra patient to experience an improvement or benefit as defined by an established threshold. A number needed to treat of one, would mean that everyone improved, and a number needed to treat of two would mean that half of the patients improved. The higher the number needed to treat, the less effective the treatment. The NNT is the reciprocal transformation of the (*absolute risk difference*).

O
Odds – in an experimental context: the number of times an event is observed divided by the number of times it is not observed.
Odds ratio – The ratio of two odds
One tailed test - Used by a researcher when testing a directional (or one-tailed) hypothesis, this type of test of statistical significance uses only one tail of an underlying distribution of scores/values to determine significance.
Open-ended - A type of question (also known as an open question) where it is left up to the respondent to volunteer an answer.
Observational study – A study in which investigators collect data, but aside from this data collection, do not intervene with the purpose of introducing processes or treatments which may affect the behaviour, attitudes or outcomes of participants. Observational studies may be qualitative or quantitative.
Observation - A method of data collection in which data are gathered through visual observations or measurements. In the context of qualitative research no measurements are collected, because these would be quantitative data. Qualitative observation can be classified as:

Structured observation

The researcher determines at the outset precisely what behaviours are to be observed and typically uses a standardised checklist to record the frequency with which those behaviours are observed over a specified time period.

Unstructured observation

The researcher uses direct observation to record behaviours as they occur, with no preconceived ideas of what will be seen; there is no predetermined plan about what will be observed.

Observer expectation bias – Bias that arises when an observer who is collecting data in a quantitative study has information about the individuals on whom the data are being collected which will make him/her record data in a different way for different participants

Outcome – the endpoint of a study which an investigator is most interested in. Used most often in relation to quantitative studies, particularly trials, in which there may be several outcomes, for example mortality, a clinical measurement such as blood pressure, or quality of life. An investigator will be interested in such a study in the way in which a treatment, or intervention, affects the outcome

Over-diagnosis – the tendency to diagnose a condition when the is no risk of the condition causing harm to the patient.

P

P value - p is the symbol for the probability that is associated with the outcome of a test of the null hypothesis (i.e. it is the probability that an observed inferential statistic occurred through chance variation). If the p value is less than or equal to the stated significance level - often set at 5% ($p < 0.05$) or 1% ($p < 0.01$) - then the researcher concludes that the results are unlikely to have occurred by chance and are more likely to have occurred because of the manipulation of the independent variable; the results are said to be 'statistically significant'. If the p value is greater than the significance level, the researcher concludes that the results are likely to have occurred by chance variation, and the results are said to be 'non significant'.

Patient Reported Outcome Measure; PROM - a questionnaire-based outcome measurement completed by patients or trial participants, usually validated by academic research (*e.g.* the SF-36)

Parametric statistics - A type of inferential statistic that involves the estimation of at least one parameter. Such tests require either interval or ratio data and involve a number of assumptions about the variables under investigation including the fact that the variable is normally distributed.

Participant expectation bias – Bias that occurs when participants in a quantitative research study are aware of some characteristics of the research study (for example, which intervention group they are in in an intervention study, or the purpose of an observational study) which makes them provide data which is different from the data they would have provided without this information

Person years at risk –The total time of observation prior to getting the disease summed over all people in the study. If the population is stable and the disease rare it will approximate to the population size x the number of years of observation.

Per-protocol analysis – An analysis of an experimental study in which units (usually individuals) are analysed according to the treatment or intervention they received (see also intention to treat)

Positive correlation - A relationship between two variables where higher values on one variable tend to be associated with higher values on the second variable (e.g. physical activity level and pulse rate).

Positive Predictive Value - the proportion of patients with positive test results who are correctly diagnosed. It reflects the probability that a positive test indicates the underlying condition is present.

Power – The ability of a quantitative study to detect a difference or estimate a quantity to a given precision. The power of a study is usually set by investigators, often to 80%

Pragmatic trial – A trial conducted under 'real world' circumstances which involves a wide range of participants, with little control over compliance with treatment, which aims to assess the effectiveness of a treatment or intervention (i.e. whether the treatment is effective in a 'real world' situation – see *effectiveness*; see also explanatory trial and *efficacy* for contrast)

Predictor- A variable that is assumed *a priori* to predict the outcome (or outcomes) in a research study, and that the researcher is particularly interested in investigating (see *independent variable*)

Prevalence – A quantitative measure which indicates how widespread a certain attribute (usually a medical

condition) is in a population
Primary outcome – The most important outcome that investigators want to investigate
Probability Sampling - Any sampling scheme in which the probability of choosing each individual is the same (or at least known, so it can be readjusted mathematically to be equal). Also called random sampling. Probability samples are more costly to obtain, but are more accurate, and they allow the researcher to calculate the amount of error she can expect. There are three major kinds of probability sampling: simple random sampling (SRS), stratified sampling, and cluster sampling.
Purposive sampling - As its name would suggest, purposive sampling is about selecting a particular sample on purpose. Often used in qualitative research. The dimensions or factors according to which the sample is drawn up are analytically and theoretically linked to the research question(s) being addressed.

Q
Quantitative data – Information gathered in numeric form (e.g. prevalence rates, proportions, means etc)
Quasi-experimental study – a study which is not truly experimental in the sense that it does not involve randomisation but there is some attempt to compare two groups. The term is used quite loosely and means different things to different people.
Quantitative analysis – Analysis, usually statistical, in which numerical variables are summarised, related to each other and hypotheses about their relationships with each other are tested
Quality adjusted life year; QALY - a year of life adjusted for quality. A year in perfect health is considered equal to 1.0 and the value of poor health is less than 1.0.
Quantitative research –Research which primarily involves the collection and analysis of quantitative data, is often set within a positivist framework, and often uses deductive reasoning
Questionnaire - A formal, written, set of closed-ended and/or open-ended questions that are asked of every respondent in the study. The questions may be self-administered, or interviewer-administered. A source of data.

R
Randomisation - The random assignment of subjects to experimental and control groups (i.e. the allocation to groups is determined by chance).
Randomisation sequence generation – The method used to generate a randomisation sequence
Random sampling - A process of selecting a sample whereby each member of the population has an equal chance of being included.
Randomised controlled trial – An experimental study design in which units (usually people) are randomised to different intervention groups
Random variable – a variable in which values are hypothesised to occur according to a given frequency distribution.
Recall bias – Bias which occurs because participants cannot accurately recall events, behaviour or dates
Regression - A type of statistical analysis in which the predictors and outcomes that the investigators are primarily interested in are related to each other, but other predictors and confounders are also taken into account to try and reduce bias
Relative risk – The ratio of two risks
Reliability - Reliability is concerned with the consistency and dependability of a measuring instrument, i.e. it is an indication of the degree to which it gives the same answers over time, across similar groups and irrespective of who administers it. A reliable measuring instrument will always give the same result on different occasions assuming that what is being measured has not changed during the intervening period. A number of techniques can be used to ensure the reliability of a standardised measuring instrument such as an attitude questionnaire, personality test or pressure sore risk calculator. These include test-retest, split-half and alternate forms.
Reproducible – The extent to which an intervention is defined clearly enough for others to be able to use it in their own setting outside the research context in which it was originally used
Research – There is no one accepted definition of research. All definitions contain elements which suggest that

research is adding to knowledge by some systematic and rigorous process
Research ethics committee – A committee which assesses the ethical considerations in relation to research proposals and gives ethical approval (or not) for a piece of research to go ahead
Research governance - A framework for researchers which exists to improve the quality and transparency of research programmes and procedures
Research methodology - Different approaches to systematic inquiry developed within a particular paradigm with associated epistemological assumptions (e.g. experimental research, grounded theory, ethnomethodology).
Research process - The process undertaken by researchers to answer research questions/hypotheses.
Research question - A clear statement in the form of a question of the specific issue that a researcher wishes to answer in order to address a research problem. A research problem is an issue that lends itself to systematic investigation through research.
Research proposal – A detailed description of a piece of research that a researcher or researchers propose to carry out
Response bias – a type of bias seen in epidemiological studies where the responses of the participant may be influenced by the researchers or interviewers; i.e. when their responses differ from their actual beliefs.
Response rate - The proportion of those people originally drawn at random from the population who actually end up taking part in a survey. This will help indicate whether the data being collected accurately reflects the views of the population being interviewed. If the response rate is low it is important to examine the profile of the sample and assess whether weighting or other methods would help to improve the quality of the data.
Risk – the chance of an event occurring. In frequentist terms: the number of observed events, divided by the number of opportunities an event has to occur.

S
Sample - A subset of population elements which are the focus of the research.
Sample size calculation – A calculation appropriate to quantitative research which aims to determine the sample size needed in advance of the research in order that the investigators can achieve their primary aim, for example to detect a difference between two groups
Sampling Frame - The sampling frame is a specific list of names (or other identifying codes) of the cases to be sampled. Ideally the sampling frame is a list of the entire population eligible to be included within the specific parameters of a research study. A researcher must have a sampling frame in order to generate a random sample.
Sampling - The process of selecting a subgroup of a population to represent the entire population. There are several different types of sampling, including: Simple random sampling this probability sampling method gives each eligible element/unit an equal chance of being selected in the sample; random procedures are employed to select a sample using a sampling frame. Systematic sampling a probability sampling strategy involving the selection of participants randomly drawn from a population at fixed intervals (e.g. every 20th name from a sampling frame). Cluster sampling a probability sampling strategy involving successive sampling of units (or clusters); the units sampled progress from larger ones to smaller ones (e.g. health authority/health board, trust, senior managers). Convenience sampling (also referred to as accidental sampling) a non-probability sampling strategy that uses the most easily accessible people (or objects) to participate in a study. Purposive/purposeful sampling a non-probability sampling strategy in which the researcher selects participants who are considered to be typical of the wider population (sometimes referred to as judgmental sampling). Quota sampling

a non-probability sampling strategy where the researcher identifies the various strata of a population and ensures that all these strata are proportionately represented within the sample to increase its representativeness.

Snowball sampling

a non-probability sampling strategy whereby referrals from earlier participants are used to gather the required number of participants.

Theoretical sampling

the selection of individuals within a naturalistic research study, based on emerging findings as the study progresses to ensure that key issues are adequately represented.

Search terms – Words and/or phrases used by a researcher to try and identify relevant publications within a database of publications

Selection bias – Bias which occurs in a quantitative study when the sample is not representative of the population that the researcher wishes to generalise to. Ascertainment and non-response bias are types of selection bias

Sensitivity – the number of true positives divided by the number of true positives and false negatives. The probability of a positive test given that the patient has the condition of interest.

Specificity - the number of true negatives divided by the number of true negatives and false positives. The probability of a positive test given that the patient has the condition of interest.

Significance level - Established at the outset by a researcher when using statistical analysis to test a hypothesis (e.g. 0.05 level or 0.01 significance level). A significance level of 0.05 indicates the probability that an observed difference or relationship would be found by chance only 5 times out of every 100 (1 out of every 100 for a significance level of 0.01). It indicates the risk of the researcher making a Type I error (i.e. an error that occurs when a researcher rejects the null hypothesis when it is true and concludes that a statistically significant relationship/difference exists when it does not).

Standard deviation - A descriptive statistic used to measure the degree of variability within a set of measurements.

Standardised mean difference - also referred to as the effect size (ES), this is the mean difference divided by the standard deviation. It quantifies the size of the treatment effect (Cohen's *d*); 0.2 has been defined as small, 0.5 as medium, and 0.8 as a large effect. It allows different outcomes to be compared on a standardised scale.

Statistical analysis - Most statistical analysis is based on the principle of gathering data from a sample of individuals and using those data to make inferences about the wider population from which the sample was drawn.

Statistical significance - A term used to indicate whether the results of an analysis of data drawn from a sample are unlikely to have been cause by chance at a specified level of probability (usually 0.05 or 0.01).

Statistical test - A statistical procedure that allows a researcher to determine the probability that the results obtained from a sample have arisen by chance rather than reflect genuine differences or relationships within the data

Study hypothesis – The hypothesis that has driven the investigator(s) to undertake a quantitative study

Subjects - A term most often used in positivist research to describe those who participate in research and provide the data.

Survey research - A research approach designed to collect systematically descriptions of existing phenomena in order to describe or explain what is going on; data are obtained through direct questioning of a sample of respondents.

Survival curve – a plot showing the proportion of the sample who have not yet had an event, as a function of time

Systematic review- Review of the literature based on a systematic method of searching for and identifying relevant literature, and extracting data from the included literature.

T

t-test – any statistical hypothesis test which follows a t distribution. Can be applied to continuous data that is normally distributed, but different tests are used to compare treatment groups depending on whether variances are equal or data are paired. The test was developed in 1908 by William Sealy Gosset whilst he worked for Guinness. Due to company policy, Gosset published under the pseudonym Student, and the test came to be known as Student's t test.

True Positive – Term describes when a subject has received a positive test result and also has the disease

True Negative– Term describes when a subject has received a negative test result and does not have the disease

Type I error- An error that occurs when a researcher rejects the null hypothesis when it is true and concludes that a statistically significant relationship/difference exists when it does not.

Type II error - An error that occurs when a researcher accepts the null hypothesis when it is false and concludes that no significant relationship/difference exists when it does.

U

V

Validity - In research terms, validity refers to the accuracy and truth of the data and findings that are produced. It refers to the concepts that are being investigated; the people or objects that are being studied; the methods by which data are collected; and the findings that are produced. There are several different types of validity:

Face validity

the extent to which a measuring instrument appears to others to be measuring what it claims to measure.

Content validity

Refers to the extent to which the separate items included in a measuring instrument are those which should be included. It is similar to face validity. The researcher deliberately targets individuals acknowledged to be experts in the topic area to give their opinions on the validity of the measure.

Criterion-related validity

requires the researcher to identify a relevant criterion or 'gold standard', which is itself reliable and valid, to provide an independent check of the new measure (i.e. to compare the results from a well-established and a new measuring instrument).

Construct validity

refers to the degree to which a research instrument measures a theoretical concept (or construct) under investigation.

Internal validity

refers to the extent to which changes in the dependent variable (the observed effects) can be attributed to the independent variable rather than to extraneous variables.

External validity

refers to the degree to which the results of a study are generalisable beyond the immediate study sample and setting to other samples and settings.

Variable - An attribute or characteristics of a person or an object that takes on different values (i.e. that varies) within the population under investigation (e.g. age, weight, pulse rate).

Variance - A measure of dispersion or variability (spread), calculated by squaring the value of the standard deviation.

W

Wilson-Jungner Criteria – Ten item list of criteria for appraising a screening programme:

1. The condition being screened for should be an important health problem
2. The natural history of the condition should be well understood
3. There should be a detectable early stage
4. Treatment at an early stage should be of more benefit than at a later stage

5. A suitable test should be devised for the early stage
6. The test should be acceptable
7. Intervals for repeating the test should be determined
8. Adequate health service provision should be made for the extra clinical workload resulting from screening
9. The risks, both physical and psychological, should be less than the benefits
10. The costs should be balanced against the benefits