Lecture - 3
Research Methods

Namaskar. In this series, our next topic is research methods, some of you may be non-psychology students, so for you, it is very important to know how do we do research in psychology because I will share number of research findings. So, if you don't know about the research journey then that could be incomplete story - how certain results have been concluded, how has the data been collected and how we are discussing about those results. On the other hand, for psychology students, its just a revision.

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Psychological information is based on empirical evidence. When I am saying empirical evidence, it means we go in the field and collect data and after analyzing data, we have certain results and then we share certain findings. So empirical research methods include first of all - collection of data, then we do analysis of this data and there are various techniques to analyze this data as per quantitative research methods and as per qualitative research methods which I will discuss in today's class. Interpretation of the data - then we have, and then we have results, discussion and particular conclusions and then we share final research findings. So, if we talk about even definition of psychology, we have focused on science as well as on scientific method. If you could recall definition of psychology it was psychology is a scientific study of behaviour and cognitive processes. It means we focus on science as well as

on scientific methods. When I am saying scientific methods, it means a set of assumptions we follow, rules and procedures that scientists use to conduct empirical research.
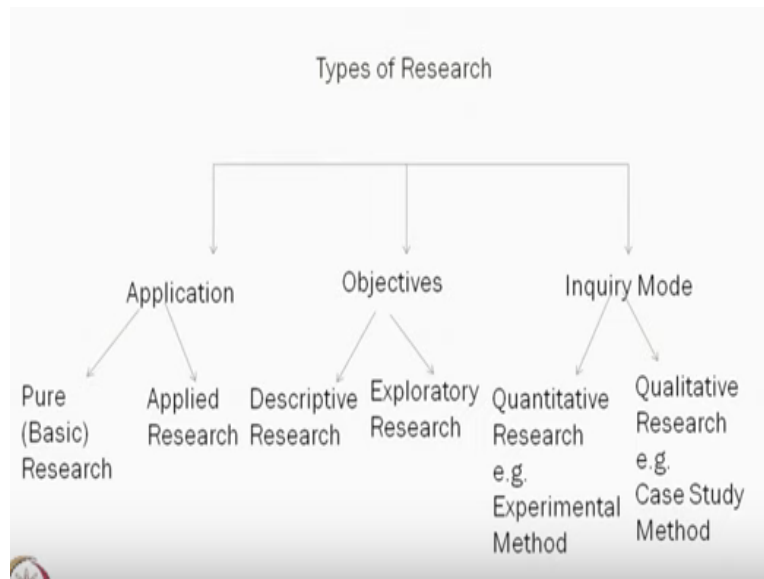
So, some special set of assumptions, rules, and procedures we follow during empirical research. There are various basis of scientific research or scientific research method - making observation in a systematic way, where we follow certain patterns or certain steps to do our research or very systematic plan we have here; following strict rules of evidence, and we collect data on the basis of evidences, we are saying this is the way of analyzing our data or these are the results, so there is no scope of subjectivity.

Most of the time, we follow certain you know data collection techniques. We collect data and very objectively we observe what is happening in these results. Then critically thinking about evidence, these are not simple patterns, but we critically analyze this data as well as, you know, these evidences and then only we talk about our results. Broadly if we just say different researches in psychology, then psychology has four basic goals. We do research to describe human behaviour and cognitive processes or mental processes.

So, in some of our researches, our focus is to describe human behavioral and cognitive processes. Sometimes, we again test to explain certain behaviour or cognitive process or mental processes. In other researches, our main agenda or objective could be to predict human behaviour and cognitive processes. So, on the basis of theories, on the basis of various principles as well as our obtained results, we can predict human behaviour or can say what kind of behaviour would be displayed by the participants in the given situation.

As you know in confirmatory research, such kind of hypothesis as well as plans we have. In some cases, we study changes in behaviour and mental processes, especially if we have some say counseling sessions or psychotherapeutic sessions or may be intervention programmes. So, in all these cases, we had something special in between, i.e., between pre and post-testing and that is why we are interested to observe certain changes in behaviour. We document in our research what kind of changes or effectiveness we observed in our research.

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Types of Research

Application

Objectives

Inquiry Mode

Pure (Basic) Research

Applied Research

Descriptive Research

Exploratory Research

Quantitative Research e.g. Experimental Method

Qualitative Research e.g. Case Study Method

There are various types of researches and on the basis of applications; on the basis of objectives as well as on inquiry mode, we can have a various sub-division or type of research.

Let us take first application. When we say application, then there could be 2 types of researches, one basic research or pure research in which our objective is to understand human behaviour as well as to establish certain principles, certain models, certain theories to describe human behaviour.

On the other hand, in other type of researches, we may focus more on applications. When I am saying applications, it means we go in the field and try to find out certain psychological problems in the society and may be in another research, we are trying to find out what are the solutions of these problems. So, our main focus in such kind of researches are to explore solutions of the problem or identify certain problems in the society or in a community.

Another type is objectives. On the basis of objectives, researches can be divided into two parts, one descriptive research and second exploratory research. In descriptive research, we describe particular research and our interest is to understand human behaviour in the given situation or in our research question that is the main agenda. On the other hand, in exploratory research, our objective is to explore some new ideas. For example, broadly there could be 2 types of researches, I will discuss this point once again in next slides.

Confirmatory versus exploratory researches - when I am saying exploratory researches, our hypotheses are more based on hunches, more based on certain ideas, we are not very much

confirmed about the hypothesis. We are exploring them for the first time, so exploratory research design we could have in such type of researches.

On the basis of inquiry mode, there could be two type of researches - quantitative research as well as qualitative research. In quantitative research, for example, experimental method and various other methods we have.
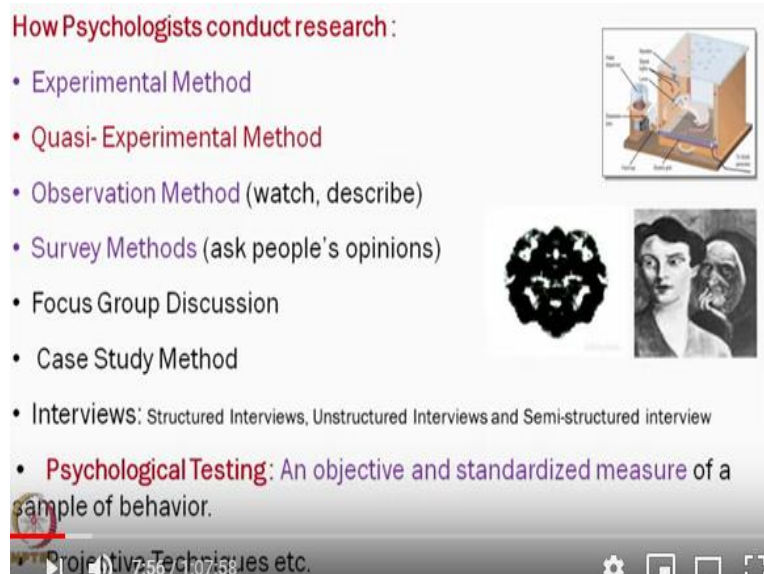
In such kind of researches, we convert human behaviour into numbers and then we play with numbers by using certain statistical techniques like t-test, ANOVA, correlation, regression and various other statistical techniques and then we define human behaviour and sometimes even we predict about human behaviour as well as we study effectiveness of certain programmes through such kind of techniques. On the other hand, in qualitative research, for example, case study, interview method, focus group discussions - in these types of researches, we focus more on qualitative data and in such kind of researches we do in-depth research or in-depth analysis of certain phrases help us to define human behaviour.

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Let us know how psychologists conduct research. There are various research methods like experimental method, quasi-experimental method, observation method, survey method, focus group discussion, case studies, interviews, psychological testing, projective techniques, etc. If I compare first 3, experimental method, quasi-experimental method, observation method, then all these 3 methods have their own merits and demerits. Let us talk first about experimental method.

The goal of the experimental research is to provide more definitive conclusions about the causal relationship among the variables in the research hypothesis. This is most rigorous research method and here we are able to study in terms of cause and effect because we manipulate a variable called *independent variable* and see its impact on *dependent variable* and all other variables especially if they may have impact on dependent variable, we are supposed to control all those variables in the experimental setting and that is why this effect is purely in terms of cause and effect. So, cause is because of the independent variable's impact on the dependent variable. This is most scientific research method as I mentioned earlier also and here its rigor is higher than correlational method or correlational studies in which we are just saying that there is correlation between 2 variables. I will discuss this point once again in next slide. So first let us know about independent variable and dependent variable.

The independent variable is the causing variable that is created or manipulated by the experimenter. So mainly, in experimental designs or experimental methods, experimenter manipulates a variable an independent variable and sees its impact on dependent variable. So dependent variable is that which is influenced by the experimental manipulations and this is again, I am repeating, most scientific research method in psychology.
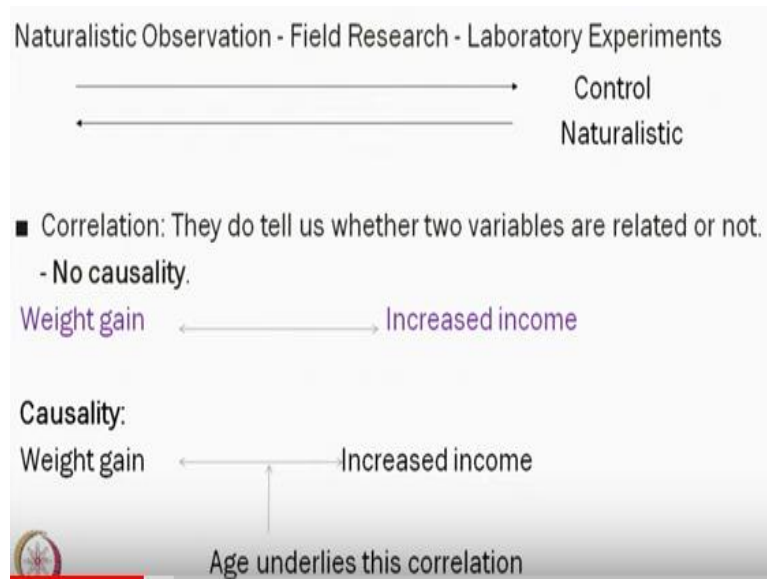
On the other hand, in field research we do experiments but in the natural situation. It means if I am delivering a particular intervention programme in the classroom setting or in a community or in a society or in an organization, so in all these settings, the settings are natural and independent variable manipulation is there. So that is why field experiments are experiments conducted in the real situation or in natural situation. On the other hand, in naturalistic observation, we just observe the situation and then describe human behaviour.

There are 2 very important variables or factors which can be counted in terms of advantages as well as disadvantages, one is control and another is naturalistic because these are the variables which may be counted as advantages as well as disadvantages of a particular study. So, if we talk about control, it means in naturalistic observation, we can't control anything, and because this is actually a very natural situation. On the other hand, in field research or field experiments to some extent we can. On the other hand, in laboratory experiment because it is happening in a lab, so whichever factors or variables or *extraneous variables* we want to control, we can control them easily. Its merits demerits are discussed later.

On the other hand, in naturalistic setting because that is also very important variable for us (the extraneous variable) because the research conducted in a particular setting, but we can't apply it when an experiment happens in a particular natural setting, so we are not saying it (i.e., control of extraneous variable) happened like in an experimental setting, we are only describing human behaviour like we observed in the natural settings.

So that is why this (i.e., extraneous variable) is also very important factor for us. In laboratory experiments, it is the least present one (because we can control it here). On the other hand, in field research, middle one, and natural situation in naturalistic observation, very much present at high level.

One more point which I discussed in last slide also, once again there is difference between correlational studies and in terms of cause and effect studies. In terms of correlational studies, we are able to say these 2 variables are correlated with each other positively, negatively or there is no correlation. On the other hand, we are not able to say that first variable is cause of another one or not impacting it negatively or positively because in correlational studies, we don't have any causality. For causality, we have to have another type of research design in which we are able to study in terms of cause and effect or in experimental setting. So, for example, suppose in a correlational study, we observed that weight gain and increased income - these are highly correlated with each other. On the basis of this correlational study, we are not able to say, or we should not say weight gain is cause of increased income or increased income is cause of weight gain, that is faulty understanding. On the other hand, we are able to say and we are, you know, definitely we can say that weight gain and increased income - these are highly correlated with each other because when we do in-depth research, we could find certain variable which is contributing to both of them and cause of both of them and that is why these 2 are correlated. For example, in this research, age is the factor and with age, weight is increasing as well as increased income is there and because of this variable, these 2 variables are highly correlated with each other.

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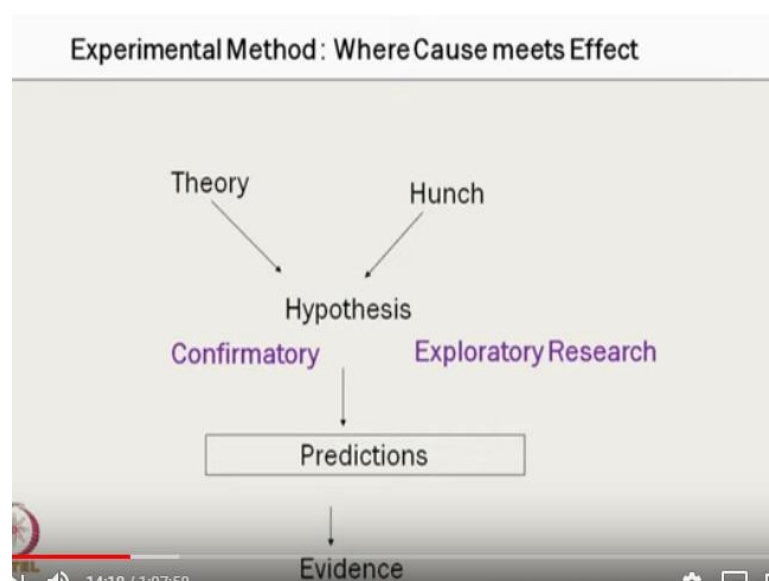
Similarly, when we do experiments, there are 2 important factors here. In some cases, we do exploratory research. Exploratory research means we have hunches only, we are not much confident on our hypothesis and exploring it for the first time that is why we are not much sure on our hypothesis and this hypothesis's proved or disproved level will give certain message to us and then in future, we may have more confirmation. On the other hand, in certain researches we have on the basis of confirmation, confirmatory factor research.

When I am saying confirmatory research, it means study is based on particular theory, theory that is well established, and that is why we are more confident when we have our hypothesis and on the basis of both type of studies or researches, we do prediction and then finally you know evidence based research we have, but it applies on psychological testing also. In exploratory research when we develop first psychological test, then we do exploratory factor analysis because we don't know which factors would be revealed in this particular study, which is designed for psychological test construction. So that is why we do exploratory factor analysis. On the other hand, if we just in the series of the researches - doing next level research, then that is confirmatory. So, we do confirmatory factor analysis and in confirmatory factor analysis, we just go with this theoretical interpretation and we are just confirming whether this factor solution is confirmed in the next study or not. So, I think that this point should be very clear to you there is 2 agendas or 2 points which are different on the basis of exploratory research as well as confirmatory research.

Observation method, quasi-experimental method, and experimental method are quite clear to you now as well as their comparison. Next method is survey method. In this survey methods, we ask people's opinion and on the basis of these opinions, we write our research and these opinions are based on our research question. You must understand clear-cut difference between simple questionnaires, surveys, and psychological tests because psychological tests are actually standardized tools, and objective and standardized measure of a sample of behaviour. On the other hand, in survey or in simple questionnaires, we have series of questions and these questions are not standardized first before doing research. So, this is difference between surveys, questionnaires, and psychological test. Next method may be focus group discussion. In focus group discussion we ask certain questions to a group on the basis of our research question and in this case actually it goes to and from. So you are asking some questions, in between participants interacting with each other as well as in between they may ask something to the experimenter or researcher and that way actually this focus group

discussion that is going on and may be recorded or, you know, data has been collected using certain other ways and then finally we analyze this focus group discussions and then we write our research report. In some cases, we also have case studies, however, it is more applied in clinical psychology in which our interest is to understand a particular case.

So for understanding this case, we may use number of research methods, say psychological testing, projective techniques or may be some other techniques can be used or the data which is with this person, for example, his life history, academic record, or , you know, information from parents or friends or any other ways which we find these are valuable to collect this information or which can help in interpretation of this particular case.

Another method is interviews. In interviews, we follow broadly 3 type of interviews, structured interviews, unstructured interviews, and then semi-structured interviews. In structured interviews, we have structured way of doing interview and we are not able to make certain changes in between if we want. On the other hand, in unstructured interviews, we have free floating interview, whatever we want to ask we can ask. These two are extreme and middle path is semi-structured interview. In this type of interview, we know what are our main agendas or questions and we have liberty to mold them as per the requirement, so that is why in interviews, semi-structured interviews are identified as best option because this option has least limitations of structured as well as unstructured interviews.

Next two methods are psychological testing and projective techniques. In projective techniques, we just provide certain pictures to the participant and ask them to write a story. So, when we are asking to write a story, then we think or that is our hypothetical assumption. This person is or participant is writing about his personality, writing about his anxieties, depression, or negative emotions as well as positive emotions, his emotions and various other things. So broadly in the story, it is his personality that is reflecting and that way we analyze these stories and try to find out about this person's personality, motivation, desires, needs, etc.

Similarly, sometimes we have meaningful pictures and in these meaningful pictures like TAT, we ask certain questions again. Broadly, these questions are what is past, present and future of this scene. So, in this case, again we assume person is writing about his past, about

his present as well as his future as well as his interpersonal relations with other people and this is the way to analyze this data.

However, these projective techniques which are quite important especially in psychoanalytic approach or psychodynamic approach, which use the projective techniques for data analysis as well as sometime for treating or to identify clinical patient's problem. So, these are quite common and popular in clinical setup. On the other hand, if we compare with psychological testing, I think these are less reliable and less valid comparatively.

So next technique is psychological testing, in psychological testing, objective and standardize measure of a sample of behavior we obtain Let us discuss a little bit more about psychological testing because psychological testing is very important for us. You would find in positive psychology maximum researches are based on psychological testing. So, in next classes when I will say you know happiness level is higher in particular group or may be in some cases, we are saying that this type of personality has higher level of happiness compared to other one, you should understand that this is based on psychological testing

So, most of the time we use various psychological tests to capture these factors or these constructs and then we do statistical analysis and after doing this analysis, we say what kind of research findings we had in this research.

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Let us know a little bit about psychological tests and objective and standardize measure of sample of behaviour it is as Anastasi stated in 1990. It means it is an objective way of

collecting data, we have certain statements and person has to respond these statements, so it is very objective way. There is no scope of subjectivity when we are using psychological test, and these are standardized measures of a sample of behaviour which we collect during psychological testing.

What is meant by standardization? Standardization is uniformity of procedure in administering and in the scoring procedure. So, we have very uniform style or procedure when we administer a psychological test as well as when do scoring of the psychological test. Psychological tests can be systemically scored, administered and used to measure individual differences, so this is another definition which can be counted for psychological testing.

They are supported by a body of evidence and statistical data which demonstrate their reliability and validity, this point I will discuss once again in the next slide. Three main characteristics of psychological tests should be - high level of *reliability*. Reliability means consistency and temporal stability of the scores so that we can rely on these results. On the other hand, *validity* – the degree to which a test procedure accurately measures what it was designed to measure or can say mainly it is construct validity. There should be clear-cut connection between this particular construct or operation definition of this construct and nature of items, this point again I will discuss in next slide. Next, *norms* because you just see in terms of say percentile we compare particular score with the norms which we have already developed at the time of test construction and that is why we are able to say what does it mean, the score which you have obtained.

For example, say on intelligence you had 90 IQ, so if you don't have norms from your culture, from your group, from your age as well as gender, then we are not able to understand what does it mean, 90 score means we don't know much about it, but if we have norms and able to convert it in IQ, then immediately we can say oh your level is below average or average or above average. So, it means when I am saying norms, you are compared with your age group, gender group, culture group, and then we are saying that what is your level as per this particular group.

So, these 3 (reliability, validity, norms) are very important for us. Next point is how do we construct a psychological test? As I mentioned it is not like surveys or not like questionnaire, so these are actually standardized tools, when I am saying standardized tools, it means we do

separate research to develop a psychological test and at the end of this course, I will discuss a number of psychological tests which we have developed here in Indian setting.

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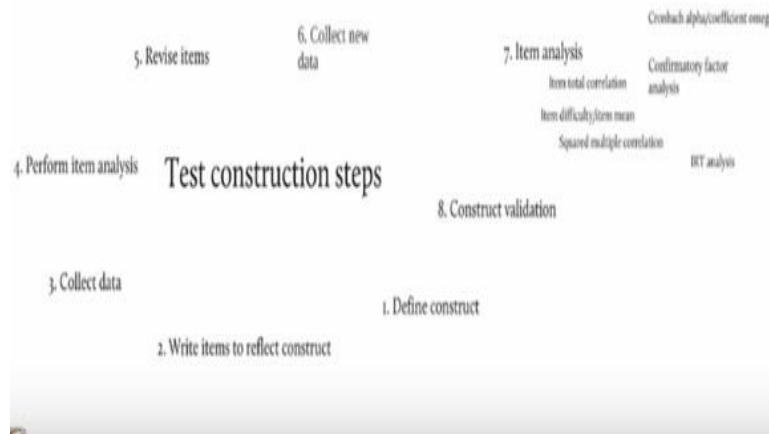
So, when I am saying various steps for test construction, let us revise or let us understand them one by one. First is to define construct. This is very interesting in psychology because there could be number of definitions when we say personality or when we say happiness or when we say intelligence, number of definitions are available. So, first of all, you have to decide what is your operational definition, and if you know your operational definition, then only you could start your research journey to develop a psychological test.

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For example, let us understand this point with this example. There are various models of happiness which I will discuss in later classes, but here just to understand when we say define

constructs what does it mean. It means there are various models or theories to describe particular construct in psychology, so with which construct or theory, you are moving on to develop a psychological test that is our first point.

For example, in this case as I discussed with you, I will explain all these models later in happiness class, but here we should know one model is which is saying that happiness is cognitive and affective component, another saying that it is combination of 6 factors, another saying that this is combination of 5 factors. On the other hand, mental health continuum, this is another model of happiness which is saying that it is a combination of emotional well-being, psychological well-being, and social well-being

So in all these models, these definitions are totally different and that is why we should know what is the operational definition of this construct based on which we are going to develop a psychological test, that is very important for us, and you would find say for example say 50 research papers on happiness, so first step when you are reading this research paper is to know what is operational definition in this particular research. If you know operational definition, then you can understand it in better way.

One another point which again I will discuss you know in application of psychological testing, we would be having 'scale' of, you know in psychological testing, we have force-choice answers. Force-choice answers means say 5-point Likert scale or say 7 point or 9 point or 11 point. Let us take example of 5 point and how in some psychological test, we are saying that low score is higher happiness (direct scoring) or in other scales, we can say high score is lower happiness (reverse scoring) because it dependent what is our scaling pattern and what does it mean.

For example, in this case when I am saying say our scaling is 'not like me at all' to 'very much like me', 1 to 5; 5 for a statement which is positive, so I usually feel happy. If you are saying very much like me and my scaling is 1 to 5, so then high score means more happiness. On the other hand, in another research, this scale has just reversed scaling, say 1 is very much like me, so if you are selecting positive statement of happiness, 'very much like me', it means you denoted 1 score.

So, it means in such kind of psychological test, low score means more happiness, I think this point is very clear to you. To some extent, it depends on what is our scaling pattern. In some psychological tests as per this scaling pattern, low score may be high level of happiness or high score may be higher level of happiness, it depends what is our scaling pattern. I think this point should be very clear to you.

That is why when we describe particular psychological tests, we usually write that higher score means or lower score means, so that reader could understand for considering higher level what does it mean, whether it is low score, or it is higher score.

In this series, step to define construct that is very clear to you now. Next point is to write items that reflect the construct. When I am saying write item to reflect construct, it means your items should be highly correlated and exactly reflecting your operational definition.

So, for your operational definitions - main focus of these definitions as well as its factors and in all these items, this (operational definition) must reflect in factor's definition as well as this construct's explanation. So once again second point, you have pooled items. For example, you have number of items or questions which you want to validate here for a psychological test. Next is data collection, then we collect the data and most of the time we collect quantitative as well as quantitative data. Quantitative data has to do with statistical analysis and qualitative data to know how these items or questions have been pursued by the participants.

Fourth is to perform item analysis. Then we do item analysis and in this item analysis, we have item total correlation, skewness of the items, mean, standard deviation, and various other statistical techniques that we use. Once we get final results, after getting these results, then we rethink about these items, how many items are working, how many items are not working. If not working, then we revise some of these items or questions.

So, then we have reviewed psychological test and on this revised psychological test, once again we collect new data, and after data collection, we do rigorous statistical analysis. Rigorous statistical analysis means we do item total correlation, we study reliability, validity, you know exploratory factor analysis and if we have already certain level of exploration of

the data, then even confirmatory factor analysis; we have item analysis and by using various statistical techniques, we document final step for our final psychological test.

So then after using all those steps, this finally revealed psychological test is like standardized tool and once we know reliability, validity, and norms of these standardized tools, this particular tool can be used again and again in next researches and you will find that these researches are actually happening in this manner only, and in next classes, I will just talk about some psychological test and then the results.

So, you should know these psychological tests are different from simple questionnaires or surveys and these are actually standardized tools and we have rigorous statistical analysis as well as research to establish a particular psychological test.

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Let us know a little bit more about how do we have different research questions in different settings and how these research questions actually deal with particular research or particular research design. However, all of them have their own advantages and disadvantages. By comparing these 3 research designs, you could easily understand how our research question is important to decide which result design will be important for us and which goals should be fulfilled by a particular research design. What are the advantages as well as disadvantages of all 3 these research designs and final message through this particular comparison is your research question would decide what is your research design and how you have to land your research.

First one is descriptive research design. Descriptive means to observe and record specific behaviours that is our goal if we are doing descriptive research design or having descriptive research design. What are the advantages of such kind of a research design? Provides relatively complete picture of what is occurring at a given time and itself is describing the situation as well as its results but does not assess relationship among variables as per this research design. On the other hand, when we are taking correlational research design, then to assess the relationship between and among two or more variables. So, our main aim or you know objective is to study correlation between two variables or among various variables and then our research design is as per that requirement. What are the advantages? Allows testing of expected relationship between and among variables and the making of predictions, so we can talk about correlation between these variables as well as if we use regression analysis, then in terms of predicted and predictor variables, we can assume what is the percentage of variance which is shared among these variables, so that is another point which is contributed here, but through this research design we can't talk about cause and effect as I discussed earlier also. So, cause and relationship we can't, we should not, you know, infer here.

For causal relationship, experimental method and experimental method must be used. In experimental method, goal is to assess the causal impact of one or more experimental manipulations or independent variables on a dependent variable. So, in this case, actually we are quite clear, we have independent variables and independent variables are which can be manipulated by an experimenter.

What is the impact of these independent variables on dependent variable or on the participant's behaviour that is our objective and in this case actually as I mentioned earlier also, we control all other variables or potential variables which may have impact on the dependent variable. So that is why it is very important to understand what is our research design and what kind of research findings we will be getting. So, in this case, advantage is allow drawing of conclusions about the causal relationship among variables and we can share our findings in terms of cause and effect. So, then you know experimental method, it is more scientific and most rigorous research method, but it has also certain limitations or disadvantages. Number one, we cannot experimentally manipulate many important variables that is one, another limitation is we actually do lab testing, lab testing means testing in artificial situation and we generalize results in natural settings. So, this is actually topmost limitation of experimental method. So, I think through this slide, these 3-4 points clear to us.

Number one, what is your research question? This research question as well as research plan would provide you which research design would be best for you. Second point here is almost all methods have their own merits and demerits and that is why we use mixed research methods or mixed research plan which I will discuss later.

What is our research process, let us know one by one. So this is one long journey.
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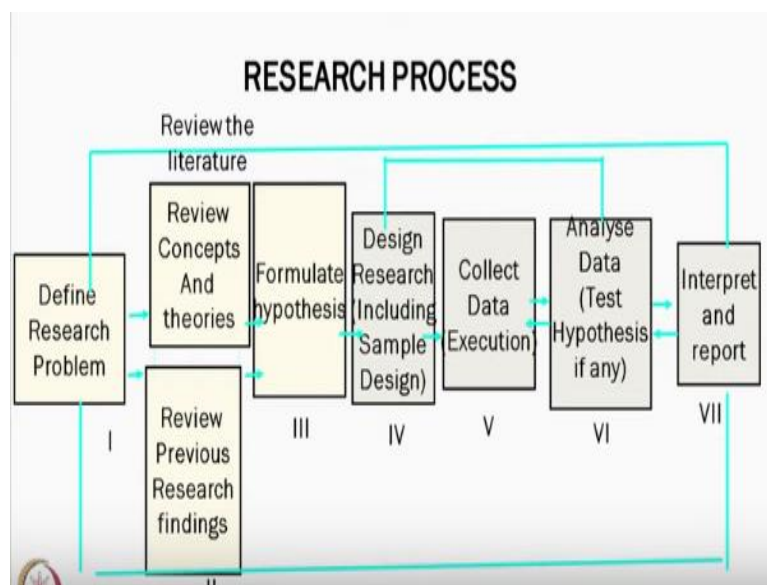
So, when I am saying research process, it has various steps and these steps are almost common for all research designs. First of all, we define research problem, what is our research problem, and as per this research problem we review concepts and theories as well as previous researches on the topic. So, once we know all past history through concepts, explanation as well as theories of all previous researches, it means we know each and everything about this research question, how it has been explored, how it has been studied in previous researches.
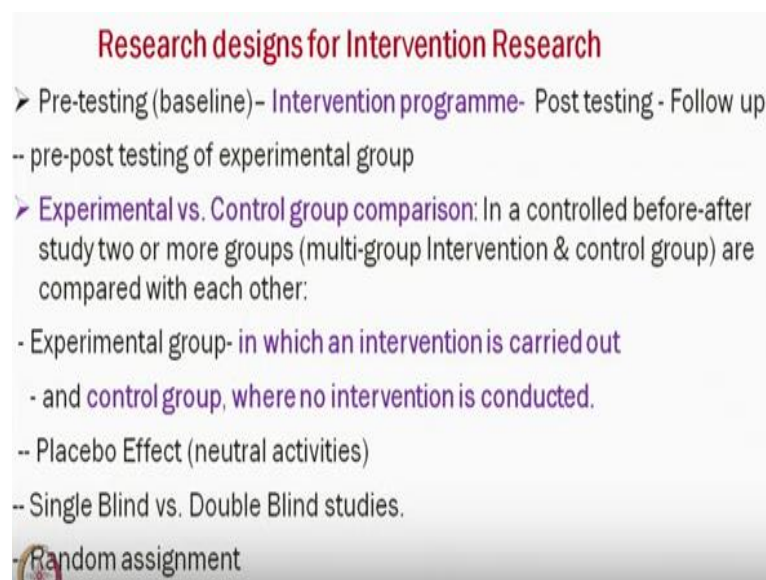
Then next step is to formulate hypothesis or hypothesis formulation. So, on the basis of previous theories, models, research findings, we have hypothesis, we develop a hypothesis. Hypothesis means a tentative solution of the problem, i.e., what do you think, what would be the solution of this problem. So, you assume, you tentatively decide it should be or it is actually you know solution of this problem. Then, we do research and we design research for

these purposes like sample, which research method we need to use, how this study would be conducted, so can say we need to have rough sketch of our research here.

Then, we execute this research. During execution, we collect data, and after collecting this data, we analyze this data and try to find out whether our hypothesis was proved or disproved and then we write our results or do interpretation or results and we write report. So, this is the whole journey of doing a research. When you will find sentences in next classes where for example, scholars saying that emotionally stable extroverts are happier than emotionally unstable introverts, so for this statement or for this conclusive line, there was a whole story or long journey to derive this simple conclusion.

So, I think one must understand how do we research before just thinking that oh it seems obvious, it is simple you know findings, but for these simple findings, we cover long journey of research because we rely on objectivity, you know collect the data and then its analysis, rather than we are just thinking subjectively and talking about particular results or particular findings or particular hunches. So, in next researches you must understand that this story has been, you know, step by step covered to have certain simple findings.

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In this course, I will discuss number of intervention programmes and their effectiveness. So that is why it is very important to know how we do such kind of researches, so that you can easily understand results. So, let us know research design for intervention researches. In intervention researches, we do pre-testing or baseline and then post testing and follow-up and in between we have the intervention programme.

So here simple point is for example, I am interested to study effectiveness of a particular say meditational practice, so our journey would be first of all pre-testing or baseline before entering for this particular meditational practice. Then second point is participants are going through this intervention practices, in this course I will discuss number of intervention programme as well as researches based on intervention programmes. So, I think we should know which methodology we used to study effectiveness of intervention programmes.

In intervention programme's effectiveness, there are three four phases. Phase number one pre-testing. In pre-testing, we do testing of participants before entering in this intervention programme. Then intervention programme means during this period, they go through certain strategies or certain sessions and then after completion of this programme, post-testing and then to see stability of results, sometime we have follow-up data also. So it means the journey is pre-testing, then intervention programme, then post testing, and then follow up. Once again data collection on the same measures, so that we can compare pre-testing results with post testing and post testing result with follow up as well as with pre-testing.

So, in a simple research it may be pre-post testing of experimental group. Second one is in further researches, sometimes we use experimental as well as control group comparison and here objective is whether it is due to intervention programme or it is just because of you know you are doing post-testing after certain period and this period other way also was effective and that is why it happened.

So in this case, there are 2 groups, control, before-after study, two or more groups, multi-group intervention if we have - then we have, may be 2 to 3 groups in such kind of interventions and then its comparison with control group. Control group means there was no intervention programme for them and by comparing experimental group in which an intervention is carried out and control group where no intervention is conducted, then we compare results of these 2 groups and if experimental group is significantly better, then we say this intervention programme was effective.

I will discuss this point once again in next slide once more. In some cases, along with experimental and control group, in some studies, we have placebo group also. In placebo group, we just have neutral activities and we want to see if this impact is psychological or it

is in real way, in real way means it is because of pure intervention programme, this point once again I will discuss with you in the next slides, especially when we compare experimental group, control group and placebo group.

Then what kind of results we have – is it significant manner or non-significant and then what does it mean, what are the findings meaning when we are comparing these groups. So then, I think it will be clear to you. One more point here, which is very important, sometimes we think there could be psychological impact on results and that is why we design single-blind or double-blind studies. Single-blind study means participants don't know in which group they are. On the other hand, in double-blind studies, even experimenter does not know what does it mean or in which group these participants are. So, if we have single or double-blind studies, then we want to actually reduce psychological impact on our results and random assignment is also very important, I will discuss this point once again with different research designs on this matter.

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So, I think here you would get a more clarity. There could be various researches in this direction. One is one group study. One group study is we are just having pre-testing, post testing and in between treatment or intervention programme. So, we don't have any comparison group and we are just saying that our objective is to use effectiveness by comparing pre-testing and post testing.

Second type of experimental designs may be in which two group, nonrandom selection, pretest, post testing could be there.

So, when we have say participants, these participants are not selected in a particular group on the basis of random selection, these are actually on the basis of convenience sampling. For example, if I am interested to do a research in particular school and I am counting one class as control group and another class where I am delivering my intervention programme that is experimental group. So, in this case, the classes have been selected for control group as well as experimental group, so there is no random sampling here.

On the other hand, more rigorous research method or research design could be, that is we have random selection. So, we have 2 groups and we have random selection. So for example, 50 participants were there and we randomly assigned them in experimental group or in control group and on the basis of this random selection and assignment, we have 2 groups, experimental as well as control group, and then we conduct our research. So, I think this point is very clear to you.

Control group means there is no treatment or there is no intervention programme in psychological terms. In experimental group, we have particular programme for them and we want to study whether this programme has been effective or not. Then we have comparison of these 3 groups. Then we may get various emotions and I think it will be very clear to you what does it mean if we get significant difference between two groups and what does it mean if we don't get significant differences in these 2 groups and through this, there are various points which would be clear to you.

Number one, why do we have different groups and what does it mean if results are showing significance or non-significance results, let us compare.

Groups Comparison	Sig. difference	No Sig. difference
Control vs. Experimental group comparison	Programme is effective	Programme is not effective
Control vs. Placebo group	There may be Psychological effects	No Psychological effects
Placebo vs. Experimental group	No Psychological effects (Significant changes have been observed in the Experimental group only.)	There may be Psychological effects or Programme is not effective.

First, control versus experimental group comparison. You know experimental group means where we have treatment or intervention programme. On the other hand, in control group there is no activity in between. So, if we get significant difference between these 2 groups, then we can say programme is effective because whatever happened, it happened in experimental group only. On the other hand, if there is no significant difference between control group and experimental group, it means programme is not effective and there is no significant changes as per this experimental or this intervention programme.

Second, comparison could be control versus placebo group. You know control group means no activity. Placebo group means certain neutral activities which are neutral but not like experimental group where we are saying that these would be very effective and have positive impact or enhance happiness or maybe you know mindfulness or resilience. So, I think at this point of time, you simply need to understand the difference between these groups in terms of significance level and non-significance level.

These intervention programme will be discussed in next classes. So, when I am saying control versus placebo group, control group means no activity, placebo group means neutral activities. So, if there is significant difference, then there may be psychological effects because you participated or participants participated in certain activities, that is why psychologically they are thinking that there should be some impact and that is why they are showing change score.

It is just like you know no medicine or sugar-coated medicine. So, if it is sugar-coated medicine and has impact, it means it is not because of medicine because that was not medicine, but that was because of psychological effects. You thought you took medicine and that is why it should have impact on it. Non-significant difference is no psychological effects are there. So, if you get no significant difference between control group and placebo group, then we compare placebo with experimental group - no psychological effects are there then it means. So if good impact or influence only in experimental group, it means it is because of real one or real intervention programme, on the other hand if it is say no significant difference, it means there are 2 options - psychological effects are there or programme is not effective. So, then you have to do some further research. If we just understand this phenomenon in medical science, so placebo group means sugar-coated medicines and experimental group means real medicine.

So, if there is significant difference between two, then we are saying that there is no psychological effect, but it is because of the real medicine, it is not because of the sugar-coated one but it is because real medicine impact is there. On the other hand, when we say no significant difference, it means this medicine was not effective or there was you know psychological effect in this study and that is why this between placebo or sugar-coated medicines, versus real medicine, there is no significant difference between the two and we need to reveal these factors further.

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Mixed Methodology in Research

- Each method has its own advantages & disadvantages.
- Use of different research methods : Parallel vs. sequential mode (e.g. use of quantitative and qualitative research methods in a single study)
- We also prefer to use mixed methodology in research to get more reliable & valid results.

Ethical issues in research with Humans:

Ethics Committee Approval- Informed Consent, Withdrawal, Confidentiality, Deception, Debriefing, Protection of Participants etc.

After knowing all research methods, what would you say, which one is best one? My answer is no one, each method has its own advantages and disadvantages and it depends which is your research plan and as per this plan, which is best research method for you, but all these methods have their own advantages and disadvantages. That is why in some researches, we prefer to use mixed methodology, this mixed methodology is in terms of parallel versus sequential mode. Parallel, when I am saying parallel, it means you have some questions for capturing qualitative level, qualitative data, and others for quantitative data, and I will discuss this kind of research in future and then I will discuss with you whether this is parallel or sequential mode. In sequential mode, in your research plan you have 3 to 4 studies. Study number one, best explored by one research method, second one by the another one, and third by the next one. This way we use quantitative as well as qualitative research methods in a single research and through this mixed methodology, we get more reliable and valid results because they are overcoming each other's disadvantages.

Another very important point for us is ethical issues in researches with humans. We are supposed to follow various ethical guidelines as well as now-a-days before starting research, we should get approval from Ethics Committee and we present our research plan there and they assure that we are following ethical guidelines.

Mainly there are 5-6 points which we should consider when we are doing research. Number one informed consent, you should take consent, you should describe your research a little bit, main objective of your research, what is your research agenda and then take participant's consent and they know what are you doing, how you are collecting data, how this data will be used in future and then they give consent to use for your research purposes.

Second point is withdrawal, any point of time your participants can withdraw from this research and you also assure at any point they are able to and they could do if they want in future. Confidentiality of the data is also very important, you can use it only for research purposes, but you cannot give it to the other people. There are some dilemmas in which they are saying, for example, psychological testing was done for research purposes and now employer asking to put in their personal files but that cannot be happen because confidentiality is there and one must do as per this confidentiality and there is no scope to leak the data.

Deception, in some researches, we observe that if participants know about the objectives of these researches, then there could be negative impact. For example, if we are testing someone's anxiety level, stress level, depression level and we think if we are saying that your anxiety, stress, or tension level would be measured, then may have negative impact on our results, so then we could hide actual message. But at the end of the study, it should be debriefed, you are telling about the research and then you are taking once again their consent to use this data in your researches.

Next point is protection of participants. So, during experiments, one has to protect the rights, their protection is very important, and researcher must take care of this protection.
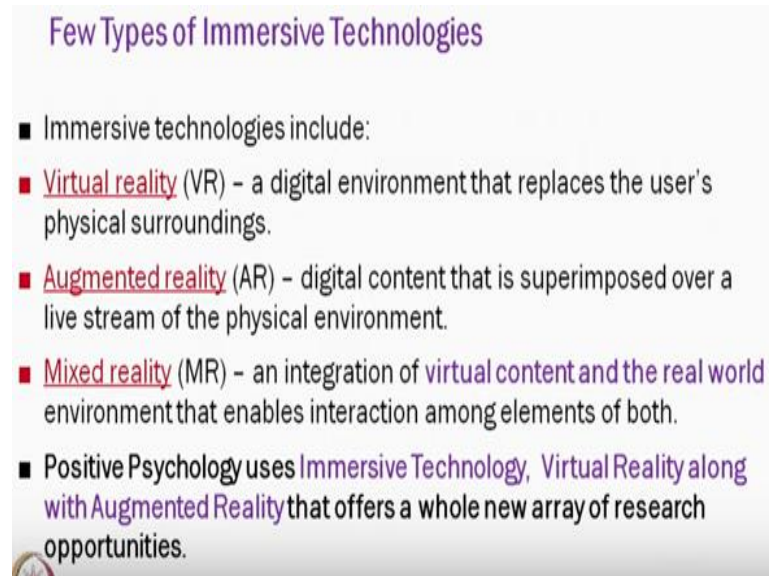
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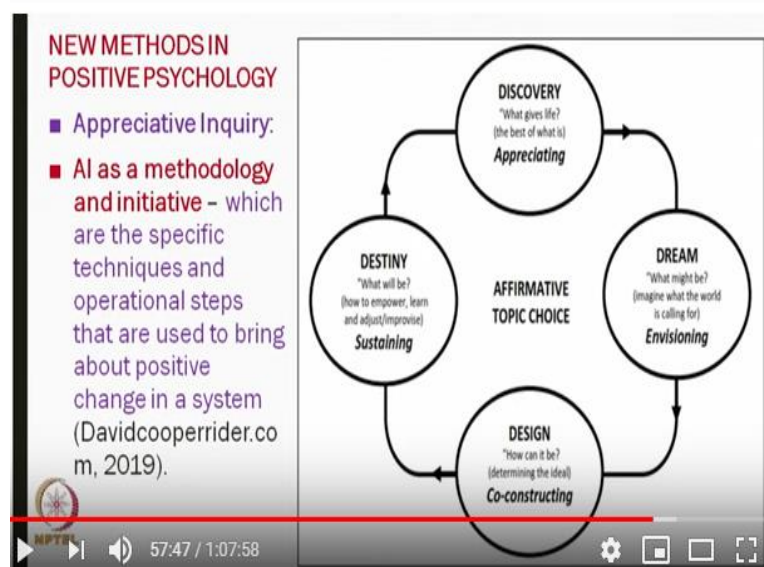
In positive psychology, we have borrowed some new methods also. These new methods help us to understand human behaviour in positive manner. One of them is appreciative inquiry. Appreciative inquiry is specific technique with operational steps that are used to bring about positive changes in a system and for this purpose, we explore appreciative inquiry in positive manner. It has 4Ds. First D is discovery. When we say discovery, it means what gives life, the best of what it is, appreciating and with this motion it starts. The next is dream, what might be, imaging what the world is calling for, envisioning, so that is next step. Third is design, how can it be done, determining the ideal or it means co-constructing in positive direction and fourth is destiny, what will be, how to empower, learn, and adjust or improvise or sustaining. So broadly, it is focused on positive directions in terms of appreciating,

envisioning, co-constructing, and sustaining the patterns and this technique has been borrowed from the existing psychology and we are using it in positive psychology also.

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Few Types of Immersive Technologies

- Immersive technologies include:
- Virtual reality (VR) – a digital environment that replaces the user's physical surroundings.
- Augmented reality (AR) – digital content that is superimposed over a live stream of the physical environment.
- Mixed reality (MR) – an integration of virtual content and the real world environment that enables interaction among elements of both.
- Positive Psychology uses Immersive Technology, Virtual Reality along with Augmented Reality that offers a whole new array of research opportunities.

There are few types of immersive technologies, modern techniques I should say. For example, virtual reality, a digital environment that replaces the user's physical surroundings and through virtual reality, we are trying to give better quality of life, higher education, higher happiness and higher way of living. Another one is augmented reality. In augmented reality, digital content is superimposed over a live stream of the physical environment and sometimes, we use mixed reality - an integration of virtual content and the real-world environment that enables interaction among elements of both.

So positive psychology uses immersive technology, virtual reality along with augmented reality that offers a whole new array of research opportunities and such kind of opportunities help us to understand higher level of well-being with the help of technology.

BIG DATA: MACHINE LEARNING PREDICTIVE ALGORITHMS :
Predictive algorithms are perhaps most frequently encountered
as continuously improving decision and suggestion systems that
decode patterns from millions of user interactions.

- A large impact on well-being intervention and measurement
  can be done using these algorithms.

- Social robot, mobile apps. AI etc.: Health coaching algorithms
  will be able to give tailored advice on how to increase one's
  well-being (e.g., apps might send messages to users like:
  "sleep more!" "Your correspondence with someone increases
  your stress levels!" Apps message – "calm you down and lift
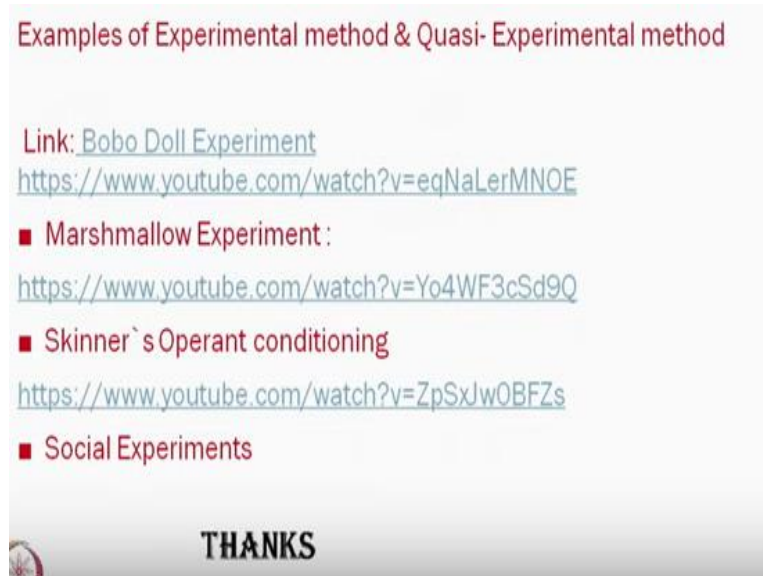 your mood").

In some cases, we use big data sets also. You know big data in various researches or in various fields doing well and having a very strong impact. So, machine learning, predictive algorithms are important to learn even human behaviour and human behaviour in positive direction. So predictive algorithms are perhaps most frequently encountered as continuously improving decision and suggestion system that decode patterns from millions of user's interactions and such kind of interactions are being used in positive psychology also.

A large impact on well-being intervention and measurement can be done using such kind of algorithms, and now you must have observed there are various applications, mobile applications, applications on computer, even social robots are there, you know artificial intelligence is being used for having a better well-being. So, in all these techniques, we are also trying to understand how we can have positive psychological changes in future by using technology.

For example, health coaching algorithms will be able to give tailored advice on how to increase one's well-being and there are some applications. For example, if you had disturbed sleep and then message through this application is 'sleep more'. Your correspondence with someone increases your stress levels and you are quite stressed and mobile applications sending message to you to calm you down and lift your mood. So, these are certain you know biofeedback or feedback which is helping us to have better well-being.

I hope you must have learnt about various research methods and this learning will help you to understand next classes messages in terms of different researches as well as effectiveness of intervention programmes.

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Examples of Experimental method & Quasi- Experimental method

Link: Bobo Doll Experiment
https://www.youtube.com/watch?v=eqNaLerMNOE
- Marshmallow Experiment :
https://www.youtube.com/watch?v=Yo4WF3cSd9Q
- Skinner`s Operant conditioning
https://www.youtube.com/watch?v=ZpSxJw0BFZs
- Social Experiments

THANKS

To know a little bit more, you may watch some videos in which some experiments are available on YouTube. For example, Bobo Doll Experiment in which it has been focused how aggression can be learned through modeling - through social modeling; Marshmallow experiment in which researcher has focused on immediate versus delayed gratification. You can watch some more Skinner's Operant conditioning experiments as well as some other social experiments which are available on YouTube to know more about psychological experiments as well as testing.

I have selected here Marshmallow experiment for you because it is very interesting, I hope you would enjoy it. Thank you very much.