Basics of Health Promotion and Education Intervention
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Lecture-35
Technology-Based Approaches to Health Behaviour Change

Hello, so we come to the terminal lecture, the final one of this week. Today I will be discussing on technology-based approaches to health behaviour change. Now as you can see our main motto here is to discuss how technology can help us in bringing about behaviour change in terms of health-related events and health related aspects.

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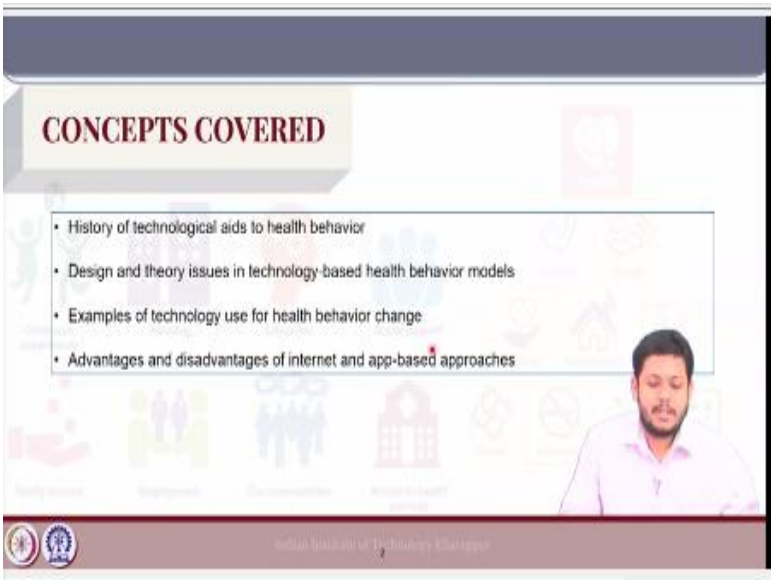

So, what are the concepts that we are going to cover? The first one that we will be dealing in a very brief mode will be the history of technological aids in bringing about health behaviour change. Next, we will be moving on to design and theory issues in technology based health behaviour models. Then a bit about examples of technology used because examples are very important because we have to understand how the design and theory are working in terms of health behaviour change.

And finally, we will be concluding with the advantages and disadvantages both in terms of relative and absolute in case of internet- and app-based approaches. Because they are the major

technological advances that we are having in terms of health behaviour change. See the internet and app-based approaches.

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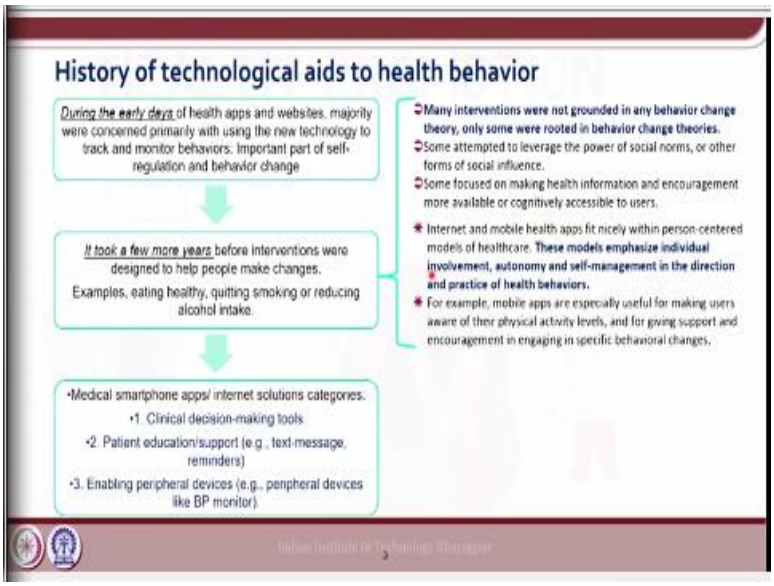

So, now we start our discussion with the history of technological aids to health behaviour. During the early days that is, say in the early 2000s the apps and websites they were the majority that concerned primarily regarding the use of newer technologies, newer technologies like tracking and monitoring behaviours. And they were very much important because they were kind of bringing about self regulation and behaviour change.

Because since we were discussing about this health behaviour models and health promotion education interventions you are already aware that this self regulation part is very important in terms of behaviour change. So, during the early days these apps and websites they were very much important for bringing about self regulation and thereby behaviour change. But you see it was not the end, it kept evolving, it took a few more years before the interventions were designed to help people make changes.

See in the first part we were having some technology that were targeted to bring about behaviour change. And next in a few more years in suppose the timeline will be around 2009 – 2010 in that decade they were primarily designed to make people change their behaviour. The most important

examples were eating healthy and certain quitting behaviours like smoking and reducing alcohol intake.

And with this healthy eating behaviour; another important issue is regarding physical activity. That we will be discussing about those later on, so these were the basically you can call it a second-generation technology in bringing about health behaviour change. So, finally what evolved was a 3-tier system, I mean you can call it a 3 tier system you can call it a 3 tier classification.

Because these are basically the medical smartphone apps or the internet-based solutions, it is not only the smartphone apps or typically the smartphone devices that you use using the apps that how many steps have you have you taken, what is your heart rate that is integrated in your smartphone device. It is not only that there are also the internet solutions, now these are classified in 3 basic parts.

First one is the clinical decision-making tools: you see the clinical decision making tools these are primarily used in clinics, they are used for making decisions based on certain parameters that are the input or plugged in to the software and it gives you some decision that the clinician or the treating physician is taking. The second one is the patient educational support system. You can say the text messages or reminder-based systems these are patient education.

And support system one example can be that what we are using in the TB program is that the patient has to call a certain number, this is also kind of a patient education and support system app. And the third one is enabling peripheral devices. Now the concept of enabling peripheral devices it was already there when this technological journey of health behaviour change started.

So, the third one it mainly encompasses devices like BP monitor, you know you wear it in your arm up here and you can see what is your BP going on or you can wear a bracelet kind of a thing and you can see what is your pulse and BP. So, what we will be discussing is regarding how this technological devices or the use of technology is going about in terms of health behaviour change.

See I have pointed out 2 major things: that many interventions were not grounded in any behaviour change theory, only some where rooted in the behaviour change theories. This is one of the major issues related to these kinds of technology-based interventions and also a very important factor behind failure of many of such intervention. Now another issue is that how advantageous are these?

Now you can see that the internet and mobile apps they fit nicely with the person-centered models of health care. That means when you particularly say develop a model or develop a kind of a system where the individual person who is seeking the health care is the center of attraction or the main target. In that case these kinds of mobile and internet devices they help very well. Now you see these models emphasize individual involvement, autonomy and self management in the direction and practice of health behaviours.

So, basically what happens is we were discussing that some of the models were not grounded in health behaviour theory and then there is this issue of individual involvement autonomy and self management. See these 3 issues are very important in bringing about health behaviour change that I mean we were discussing about health behaviour models. You already know that there are certain aspects of health behaviour change that we need to take care of before we devise a certain intervention.

So, the technology-based interventions are no exception to that theory and that is why I have highlighted these 2 parts. Because remember whenever we are trying to do technology-based health behaviour intervention we have to think of certain health behaviour models. Because without grounding in any health behaviour models we cannot bring about these kind of changes because we will not be able to target the constructs, that are there for bringing about that particular change in behaviour.

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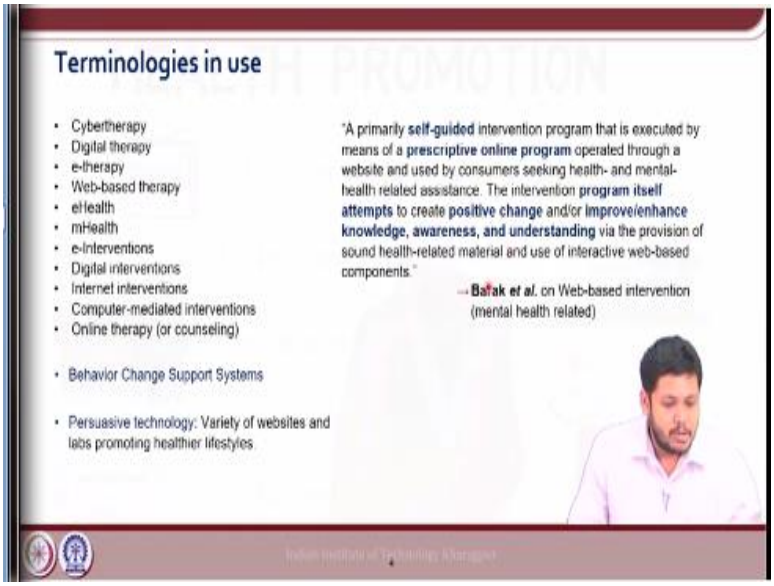

Now we move on to certain terminologies. In terms of technology-based interventions in health promotion education, see the terminologies, the authors, the researchers everywhere there is no certain consensus about what kind of terminology to use. Now these preliminary dotted points, the points that are in black these are mainly used in terms of mental health the psychological interventions.

Or see eHealth, mHealth these kinds of terminologies you can see in general health intervention as well not only in mental health interventions. But interventions like cyber therapy or digital therapy these kinds of terminologies are used mostly in mental health interventions. And in this context I would emphasize that the technology based or the technological advances in health behaviour change they were mostly brought about in terms of mental health issues or psychological issues.

See when we are discussing about the health behaviour change of regarding healthy diet and physical activity the issue is again related to some psychological aspects. Because the whole concept of health behaviour change is rooted somewhere within the psychology of an individual when the individual is interacting with himself or herself only and also when the individual is interacting with the environment and the peer group.

So, with this the diversity of terminology we should keep in mind. The concept that this particular lecture will center upon is behaviour change support systems and also the persuasive technology. See these 2 concepts are the newer ones or you can say these 2 concepts are more rooted ones in terms of technology-based health behaviour change. You can see on your right side Barak et al., they define web based intervention.

There are certain keywords like self guided then there is another keyword prescriptive online program. Why I have highlighted these portions is because we need to remember these points, whenever we are devising any kind of technology-based health behaviour program. See another issue is the intervention program itself attempts to create a positive change. You will see again I have highlighted the issue of positive change in subsequent slides.

And also improve or enhance knowledge awareness and understanding. Now knowledge awareness and understanding, these were the basic issues that were primarily targeted during the first phase of the interventions. Because these were believed or in fact these are believed to be the rooting cause of a person taking up a certain behaviour and persisting with it, there are certain other factors but these are also the prerequisites.

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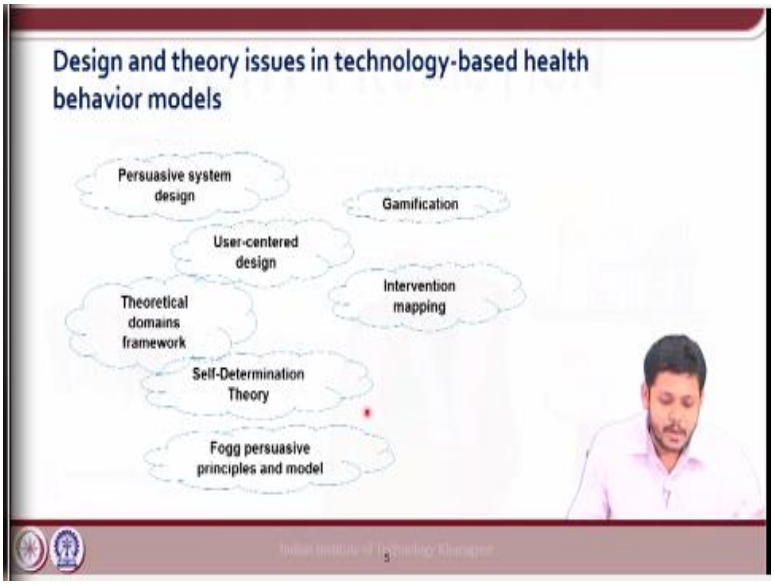

So, now after we have heard about the terminologies we move on to the core of design and theory issues in technology-based health behaviour models. I will not go into the details… of the

detailed theories of technology-based health behaviour because for that we will be needing a separate kind of a course. But in this lecture what I will be emphasizing on what there are certain you can see specific designs that we use when we devise a health technology or a technology-based health behaviour.

Among these the self determination theory and the Gamification these two are kind of …. on a high stake at this moment. Now what happens with Gamification is suppose we are using intervention to promote healthy diet or to promote suppose physical activity. What we can use is… We can use certain kind of incentives like what we have in games, we have in game certain kind of achievements, you will get rewards, you get awards.

Like that we can use certain kind of incentives and we can gamify the whole event. It is like simply a game that you have achieved this much. Suppose in simple terms a step calculator will show you, you have achieved 100 steps and then it will congratulate you, a simple congratulation can be an incentive for a person, so this is what basically happens with gamification. Regarding self determination theory we have to remember that self determination itself implies that the person or the beneficiary we must say is self determined to bring about the change.

That is why the term self determination, there are certain other what you can call is constructs involved in the self determination theory and linked with this is the Fogg persuasive principles and models. The Fogg behaviour models are also very interesting and intriguing part in devising this health behaviour and health promotion interventions when you are using technology.

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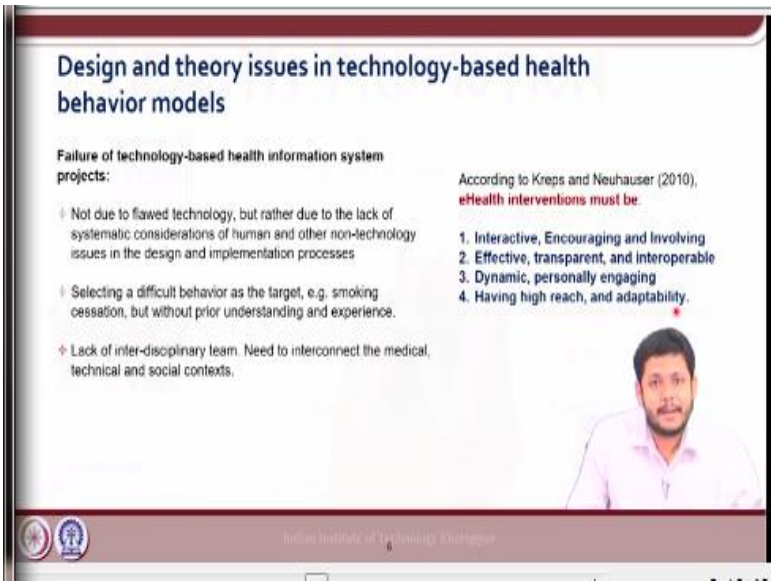

See we were discussing about the reasons behind failure, now we go into a bit detail. The major issue of technology-based health interventions being failing is not due to flawed technology, it can be due to flawed technology but the major reasons are not due to flawed technology. But they are rather due to lack of systematic consideration of human and other non-technology issues in design and implementation process. So, what does this mean… human and non-technology-based issues? This means mainly where the person is in or the environment that we are situated in, we must consider the environment, we must consider how the person is interacting with the peer, we must consider what are the social determinants of health for that particular person or the person when the person is situated inside a particular society or community. So, these are usually not considered when we are discussing about the technology-based health behaviour models.

Also, what can be there this is also a derivative of the first point is selecting a difficult behaviour as the target. For example, smoking cessation but without any prior understanding and experience, what happens is see these are called quitting behaviours, these kinds of quitting behaviours are very much difficult to control or difficult to get around. Example you can take is a person who is having beedi… suppose he is from a very low socio-economic status and is having a packet of beedi every day.

Now you are going to the person… you have devised a smartphone app, you are going to the person and you are saying that okay you have to quit this, these are the features of the app. And

the person who is also having a smartphone despite being in a lower socioeconomic status is again looking into the app but is not complying. So, the major issue behind non compliance is firstly related to the human and non technology issues.

The person may not be feeling well accustomed to the app, the person may not be feeling at home when using the app and there may be certain other behavioural factors, the routing factors that are primarily causing the person to get into the behaviour itself, the behaviour here is smoking. Similarly, you can take the example of alcohol and other drug abuse like this kind of addictions.

The third consideration again failure of this kind of technology-based health information projects is lack of interdisciplinary team. Because as we can understand it is not only about the intervention proper purse or about the psychological issues purse it is about the amalgamation of technology, medicine, psychology into a single umbrella. So, usually what happened during the earlier days were the technology people they were developing the apps.

But mostly they were developing in a company-based manner or a single unit manner, so that led to failures of these kind of projects. But it is good that nowadays the amalgamation that I am speaking about is happening, so interdisciplinary teams are indeed important. Now we must remember these 4 points, these are the key points regarding eHealth interventions. When devising an eHealth interventions we must remember that it must be interactive, it must be encouraging and it must be involving, that means it has to be people centric.

Then it has to be effective, transparent and interoperable, that means it has to have certain kind of proven effect. Because without proven effect the beneficiaries will not be interested to take up the particular app or the intervention and also the industry partner may not be willing to promote that particular app. Thirdly it must be dynamic and personally engaging, now the third point involves a more deeper understanding of an individual.

And fourthly it should be having higher reach and adaptability because the adaptability is not only in terms of the person who is using the app, adaptability should be also in terms of what you

can say is the suppose the technology that is being used, suppose an app has been developed in a smartphone but after certain days a new device comes in and you have to switch the app to the new platform, so there should be the issue of adaptability.

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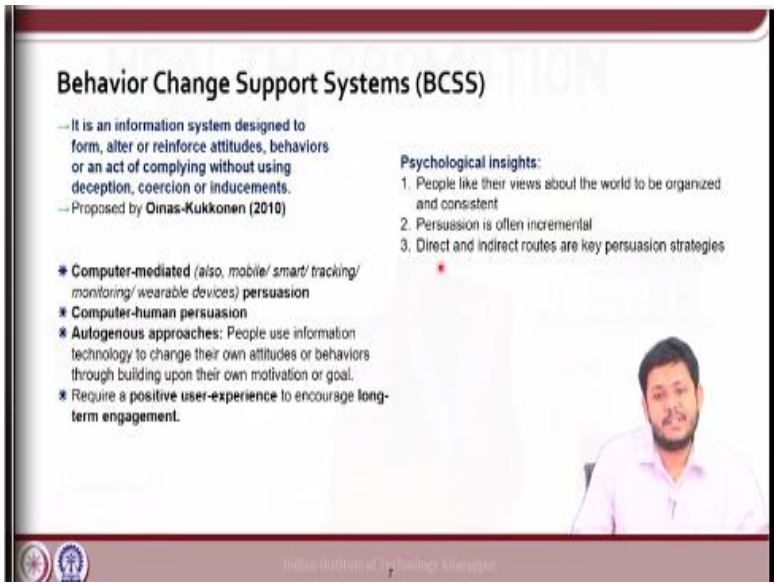

Now what I was discussing is about behaviour change support system, the BCSS is one of the engaging and interesting parts in technology-based health behaviour. It is an information system designed to form, alter or reinforce attitudes and behaviours or an act of complying without using deception, coercion or inducements. So, the last part is important. What are the features? These are basically, see… computer mediated or what you can say… not only computer mediated, mobile, smart tracking monitoring, wearable device these are all used in persuasion.

It can also be computer human persuasion, not only computer based or technology based human component should be integrated to account for that human part. The autogenous approaches are there that means people use information technology to change their own attitudes or behaviour through building upon their own motivation or goal. That means the people is focused, the people or the person or the beneficiary is developing his or her own goal and thereby using the app.

In most of the cases where at autogenous approaches are used the people must have understanding about what is the situation or what are the risks, what are at stake and how to use

the app? When these 2 understandings are combined then autogenous approaches work best. These also require a positive user experience that I was discussing in the previous slide that the positive user experience is a mandatory thing for any technology-based app to succeed and to encourage a long term engagement.

Because you cannot leave a person using an app only once, you must involve or you must engage the person using that app for a longer time. Because otherwise you cannot achieve reinforcement or you cannot achieve quitting behaviour for certain difficult issues. So, now the psychological insights that we must be having when discussing BCSS are people like their views about the world to be organized and consistent.

The consistency issue is very important and persuasion is often incremental. See I was discussing about long term engagement, so you can have that incremental effect when you have the long-term engagement. Now the direct and indirect routes are key persuasion strategies. The direct and indirect routes that we were discussing regarding the materials and methods of health promotion education interventions. These are all applicable in terms of BCSS also but in a more technology driven manner.

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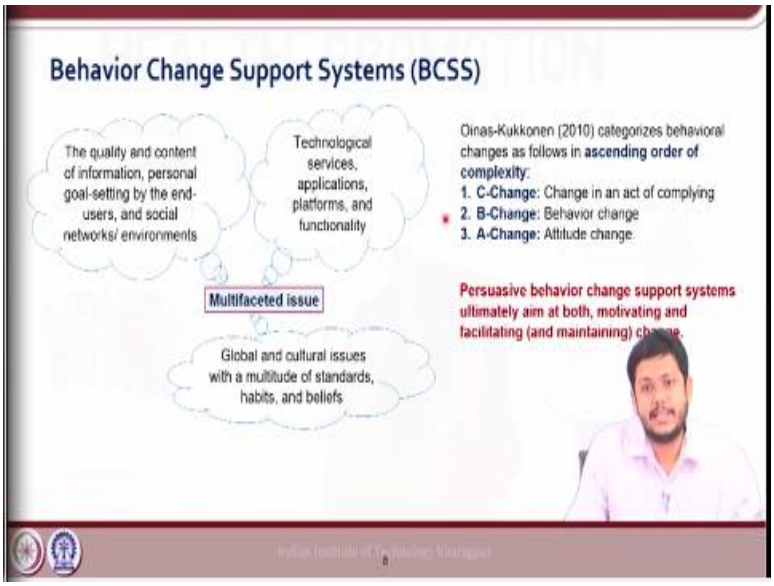

As I was discussing… this is a multifaceted issue. The all 3 issues should come in one place to address a proper BCSS system or a proper technology-based system to succeed. In this regard we

must admit there are 3 levels of change, the person who devised the BCSS theory they also advocated for these 3 levels of change. First one is the C-change, then is the B-change and third is the A-change these are in the ascending order of complexity.

What is C-change? C-change is compliance, that I was discussing the person is still not compliant to whatever intervention we are proposing, this comes under the C-change part. B-change means behaviour change and A-change means attitude change. The attitude change when it is brought about it usually accompanies certain other changes and usually you can say recommends reinforcement phenomena, it also brings about certain long-term changes.

So, all the good things happen when you bring about all these 3 changes together but remember these are bit complex. So, what happens with persuasive behaviour change support system that is BCSS is ultimately it is aimed at both. Motivating and also facilitating and maintaining the change, it not only brings about the change it also facilitates and maintains the change that means the reinforcement is there.

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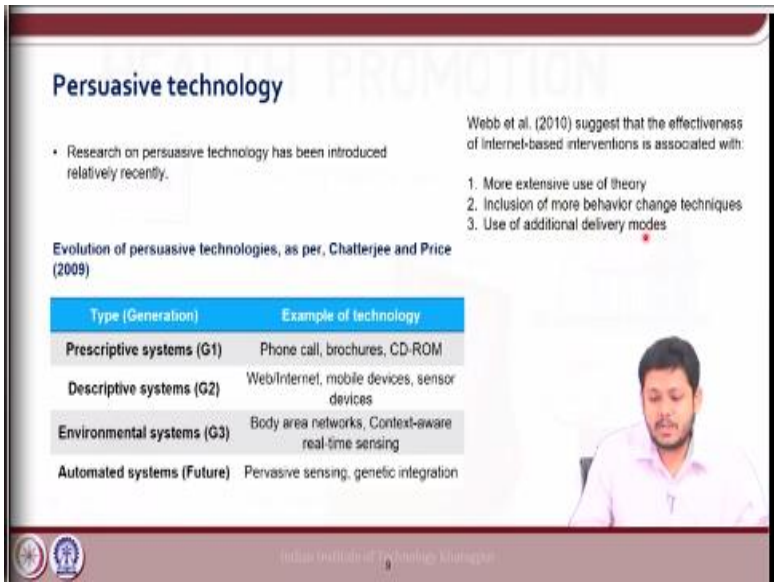

Now we move on to persuasive technology. See the persuasive technology the term “pursue” and the interventions that are there the research on these are relatively recent. These are the 4 generations that I have outlined but these are not only limited to… I have given only some

examples… the G1, G2, G3 and this is the futuristic part the automated systems. What happened with the first generation was?

These were the prescriptive systems; these are the systems that happened during the early 2000, the early days of health behaviour change through technology. These were simple phone calls, brochures and CD-ROMs or other kind of device even then floppy disks were there, so these were all used. Then there were descriptive systems, these were the second generation, that means these devices or these technologies they described the problem and they described the solution regarding how to handle the problem.

The web on internet based, website-based apps or website based interventions that were there, the mobile devices, the sensor devices, the sensors were also important. Then there is the environmental system the third generation. These are body area networks and context-aware real time sensing. You can see these are the upcoming issues and these are already there in nowadays we can find all these systems.

So, currently the environmental systems and the descriptive systems are combined together to form a more harmonious and more effective system. And we propose an automated system that will be probably coming up in the near future. So, what we can see is that the effectiveness of these internet based or app-based interventions, not only internet based the app-based interventions as well these are associated with more extensive use of theory.

The inclusion of more behaviour change techniques, the behaviour change techniques that we were discussing, the materials and methods that we were discussing but in a technology driven way and use of additional delivery modes.

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Now there are certain examples of technology used in health behaviour change. Since we have understood the BCSS and the persuasive technology, now we can utilize the principles in curbing alcohol consumption, curbing tobacco consumption, there is the newer issues regarding mindfulness and technology aided smoking suggestion. Not only smoking suggestion you can have mindfulness training for a lot other issues in mental health training.

In fact, in the case of mental health issues regarding the child you can utilize the mindfulness training part only. And also, there is changing physical activity and diet that I was mentioning frequently during my previous slides. See these are the most common issues that we encounter when we use health behaviour change in a technology driven way. These were the oldest ones and these are even prevalent nowadays.

The alcohol consumption the tobacco use… the quitting behaviours regarding these in terms of technology based, these are more gaming based solutions nowadays coming about. So, how it happens is alcohol consumption? Regarding the mental health issue in terms of alcohol consumption and tobacco use we use the gaming approach, we give certain incentives, we focus on regret, we focus on loss these kind of aversion complexes.

So, this helps in fact to bring about the behaviour change through use of those apps only. But remember if the problem is more deep rooted only simply apps may not even suffice. So, what

we need to have is… we need to have the understanding of the problem, so situation analysis regarding the problem is also a very important part before we devise a particular strategy using the technology.

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Now we come to the terminal part of this presentation and this lecture. What are the advantages and disadvantages of internet and app-based approaches? There are several approaches and I will not go into detail because all these things will be having in the supplementary materials with this week. The major issues are that these are the reach is higher with internet-based approaches.

Now they can bring about change at any time, they are very good means of encouraging people, they are usually low cost because affordability you see is a very important issue and for policy respect the potential cost effectiveness is also very important part because in our settings in low resource and this kind of setting these are very much important.

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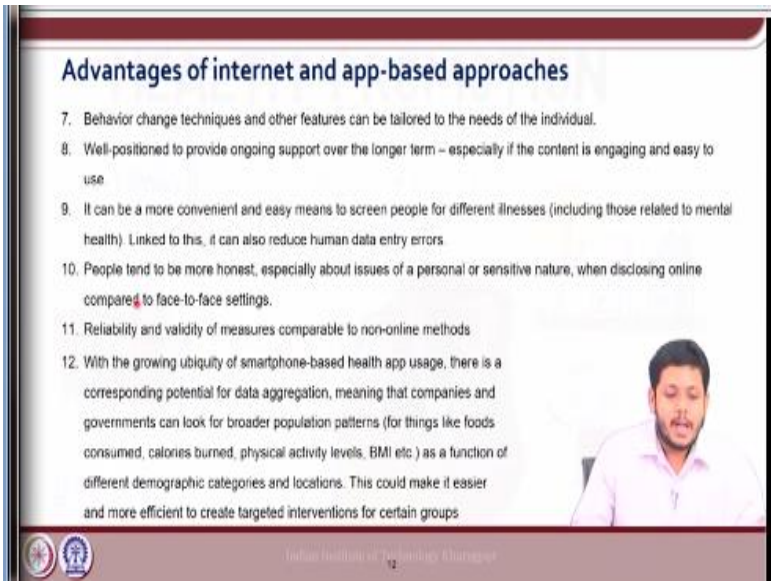

See there are other tailored methods, these are very much important because using internet you can use the tailoring part. And to be very honest people tend to be using point number 10, people tend to be more honest and especially about the issues of a personal or sensitive nature when disclosing online compared to face to face settings. So, this is another important part because in terms of quitting behaviours this divulging of fact or what is being done is very important.

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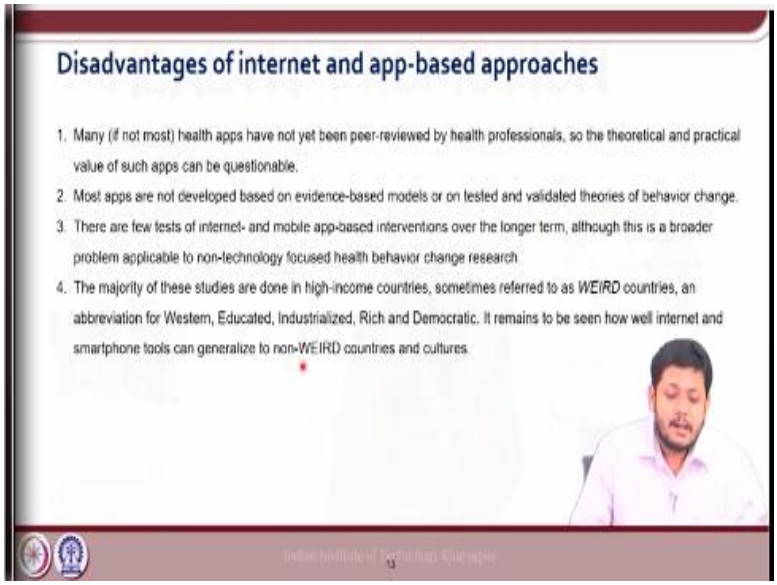

Disadvantages are also manifold because you see the major interventions regarding technology they are mostly done in the developed part of the world. They are not that much prevalent in this suppose a developing part of the world. So, that needs to be checked and that needs to be tested.

Also, another important part is that the intervention that are proposed not all are peer reviewed or standardized you can say. So, that is why an implementation challenge is there already.

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Certain apps they are not very much user friendly, you can see I have mentioned in point number 6 that it needs to be well designed and user friendly because not everybody is that much chevy with all the apps, all the smartphones and all the internets.

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So, basically what happens because of lack of standardization… is you can have sometimes the inaccuracy in information that is provided from the app. The risk of false positives and false negatives these are all there, so the standardization part of app is very important. And that is in

fact in nowadays is the disadvantages of those apps which are not standardized and not peer reviewed.

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So, finally what we can say is the use of technology for health behaviour change is multifaceted, that I was discussing. And it calls for an interdisciplinary team of expert that thankfully is now being done. The failure of technology-based interventions are mostly due to lack of grounding in any behaviour change theory. Because behaviour changes theories are the basic of bringing about any change in health behaviour in a positive way.

The technology-based health interventions are most commonly observed in diet and physical activity related health promotion practices. And these are engaging low cost and far-reaching solutions but they have the disadvantage of technology affordability in the lower resource situations. So, this part we must reconcile while devising certain apps for beneficiaries in a low resource setting.

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What I would recommend is this resource is very good regarding technology-based apps and everything. So, if possible please go through this book and also take a look at this review article on Bibliometric analysis, basically, this gives you the understanding of how the behaviour change theories they are coming about in the literature. So, all the materials that I have presented in the slide are already there in the supplementary material for this week.

Please go through them and I hope you can have certain innovations in this technology-based health promotion and health behaviour interventions. So, that is it for this week and also for this lecture, thank you.