projeto EMPODERA

Ergonomics and usability testing in the design of applications for chronic condition management and health promotion

NUGEAS · Enfermagem UFMG · LETRA 15 anos · FALE Faculdade de Letras · ICEx Instituto de Ciências Exatas · NUPAD Faculdade de Medicina UFMG · UFMG · PUCPR · Grupo Santa Casa de Belo Horizonte

Background

- **Chronic conditions (e. g. diabetes mellitus and sickle-cell disease) - challenge to public health services and private health insurance companies**
- **Goal of primary health services - to promote *adherence* to treatment and user *empowerment***

Adherence

- **“self-initiated action to promote wellness, recovery and rehabilitation, following the guidelines without deviation, engaged in a set of actions or behaviours” (CIPE, 2011, p.38).**
- **Self-care behaviour**

  diabetes - home glucose monitoring; adjustment of food intake; administration of medication; regular physical activity; foot care; regular medical monitoring visits, dental care, appropriate clothing (WORLD HEALTH ORGANIZATION, 2003)

  sickle-cell disease – regular check-ups; body temperature regulation; hydration; proper nutrition; physical activity; infection prevention; stress management (CDC, 2016)

Correlations with adherence

- **chronic condition itself - complexity of treatment, duration and delivery of care**
- **intra-personal factors - age, gender, self-esteem, self-efficacy, stress, depression, substance abuse**
- **inter-personal factors- relationship with care providers, social support (family, friends, colleagues)**
- **environmental factors - high-risk situations (overeating / under-eating according to social context, time and place; social pressure; availability of inexpensive fast foods; mechanization of transport systems; changes in composition of families and food selection and preparation; sedentary life**

(WORLD HEALTH ORGANIZATION, 2003)

Empowerment

process designed to

- **facilitate self-directed behavior change**
- **develop internal motivation (e.g., “monitoring blood glucose is really important to me.”) rather than external motivation (e.g. “My doctor wants me to monitor my blood glucose.”)**
- **make informed self-management decisions by adequate understanding and awareness of aspects that influence decisions**

(ANDERSON; FUNNELL, 2010)

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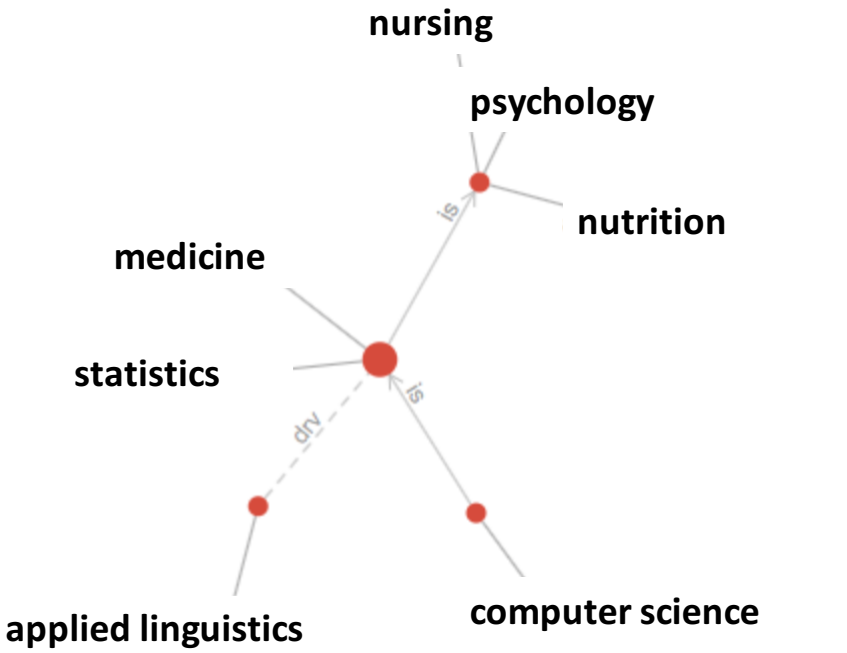
Aims

- to develop a conceptual and methodological prototype for the design of tools to assess educational interventions oriented towards self care and empowerment

- to resource personnel – researchers, healthcare providers, healthcare users



Ergonomics in Empoder@

Development of app for DM1 teenagers

Application design

- **to promote adherence to treatment e.g. to self administer insulin, to count carbs, to measure glucose**
- **to motivate users**
- **to deal with intra- and inter-personal conflicts**

User needs analysis

interdisciplinary meetings discussions

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DM1 teenager

- **pressure from parents & family (concern about teenager's capacity to monitor glucose & self-administer insulin)**
- **desire to take part in social activities entailing risk (hypo / hiperglycaemia - partying, drinking, staying up late, sleeping in)**
- **self-esteem problems**

App features

- **Reminder for glucose testing and insulin administration**
- **Report tool to show responsible behaviour & capacity for self-management**
- **avatar**

User needs analysis

Interviews with DM1 teenagers

- **Carried out with 12 outpatients diagnosed with DM1 at Hospital Santa Casa and an endocrinology clinic in Belo Horizonte in March 2016**
- **Script used to guide interviews**
- **Recordings transcribed and answers fed into a structured questionnaire on web platform eSurv.org**
- **11 closed questions + contingency questions (If yes, then...) & 6 open questions**

Results

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DEMOGRAPHICS

12 subjects

Age: 12 – 18 years old

Sex: 8 female, 4 male

Education: 5 attending elementary school

7 attending high school

Reported health problems:

11 none

1 hypercholesterolemia

QUESTION	%	RESPONSES
1. Do you own a smartphone/tablet?		
yes	100	12
no	0	0
2. Do you get an internet connection on your smartphone/tablet?		
yes	100	12
no	0	0
3. How do you navigate the web at home?		
3G/4G mobile connection	25	3
Wi-Fi connection	75	9
4. How do you navigate the web when you are not home?		
3G/4G mobile connection	50	6
Wi-Fi connection	50	6

QUESTION	%	RESPONSES
5. What do you use your smartphone for		
Games	41.67	5
WhatsApp	58.33	7
Instagram, Facebook		
Listening to music		
6. Do you use your smartphone for reading?		
yes	58.33	7
no	41.67	5
If yes, what do you usually read on your smartphone?		
Any type of text		
School assignments		
The Bible		
Posts in Facebook		

QUESTION	%	RESPONSES
7. Do you use your smartphone/tablet at school?		
yes	66.67	8
no	33.33	4
8. Have you ever used a web app to monitor your blood glucose?		
yes	0	0
no	100	12
9.Have you ever use a web app featuring an avatar?		
yes	66.67	8
no	33.33	4
If yes, which web app? What was the avatar like?		
Minecraft		
Angela – a kitten		
Pou		
Mr Poo		

Teenager statements

A2: “I like an app called *Ângela, it is a kitten and I have been taking care of her for two years.”*

A9*: “ I have already used a first person app. I like that kind of apps because they draw your attention. Ever since I was very young I have always liked games, I also like information.”*

QUESTION	%	RESPONSES
10. Do you like avatars?		
yes	75	9
no	25	3
If yes, what kind of avatar do you like?		
Pet like		
Virtual friend		
Photo modelled		
Extra-terrestrial beings		
Avatars in general		
Dubsmash		
11. What do you prefer the most -		
talking avatar	81.82	9
text avatar	18.18	2

Teenager statements

A9: *“ I like speaking avatars ‘cos it’s easier to listen to them than having to read their words, they’re better too, they make you feel closer. But if you don’t have a pair of earphones, you will have to read what they say; it would be good to have subtitles too, that would be essential”.*

QUESTION
12. If you were asked to design an app for teenagers like you to take care of your diabetes, which features would you like to include?
Glucose monitoring
Nothing about diabetes information
Several things: an avatar giving suggestions and explanations about diabetes care
Diabetes Care guidelines
Nutrition information
Possibility of creating your own avatar going through the same experiences as you are
Games

Teenager statements

A7: *"I'd like to have an avatar to talk to, 'cos there's a lot of people who are the target of prejudice. I don't like talking about diabetes with my friends. Everybody knows I have diabetes, but I don't like to talk about that, like when I am sad 'cos I cannot eat something. It's very upsetting, 'cos people will feel pity for me. An app would be good, 'cos when I feel there is something I cannot keep to myself, I could let it out"*

Teenager statements

***A9**: It would be good to have an app connected to my daily rut, like to work out, telling you the number of hours per week, something to remind you to test your blood glucose, a schedule to monitor your glucose. Something to warn you if you haven't worked out the necessary number of hours. Or if you have spent a long time without eating."*

Teenager statements

***A9**: "If there was a game in the app, that would be cooler. If you wake up in the morning and there is a first person avatar waking up with you. And then you tell the avatar everything you have eaten. For instance, I have had a bread roll and coffee with milk. And you tested your blood glucose and the result was such and such, and then you make a record of that. And then there is a record of everything and at the end of the day you could see everything you have done throughout the day. It would be cool to get a prize if I could meet my goals at the end of the day"*

QUESTION
13. What would you like the avatar to be like?
Ordinary human being
Somebody created by myself
A fat avatar
A pet avatar – a kitten
An avatar of myself
No avatar at all
Animal avatar
14. What would you rather NOT have in an app?
Nothing in particular
Something on diabetes
Fake identities
Games and entertainment

Teenager statements

A8: “It would be good to have an app with a carbs table, like I do on paper, and when I need to be reminded I just set an alarm. I have never heard of an app like that. Besides reminding me, the app could also calculate insulin doses I need to take.”

QUESTION
15. How would you like an app to remind you of blood glucose testing times, insulin injections, having something to eat every 3 hours, etc.?
I would certainly like that
I would not like that
That would be helpful, as I sometimes forget about taking my insulin
I would certainly like that – I need to take insulin 5 times a day
I would not like that, I can do that on my mobile
That would be helpful especially for insulin
That would be cool with an avatar
I would like that, I have done that with my mobile

Teenager statements

A9: “I think it would be a nuisance to have an app beeping every 3 hours, but I need that to take care of my diabetes. Anyway, everybody at school knows I am diabetic *and then I sometimes need to leave the classroom 3 or 4 times a day to test my blood glucose.”*

QUESTION
16. What would you like an avatar to chat with you about?
How to inject insulin; sports
All topics - family, friends, going out, sports, body, sex, school, drugs, my feelings
Sports and professional career
What my day was like today
Would like the avatar to play games and get prizes

Teenager statements

***A8**: "I would like the app to ask me how I feel, 'cos that has a big effect, like when you are worried, anxious, glucose tends to be higher. The app could give you some suggestions to deal with your feelings for blood glucose not to get so high. It would be kind of a therapist".*

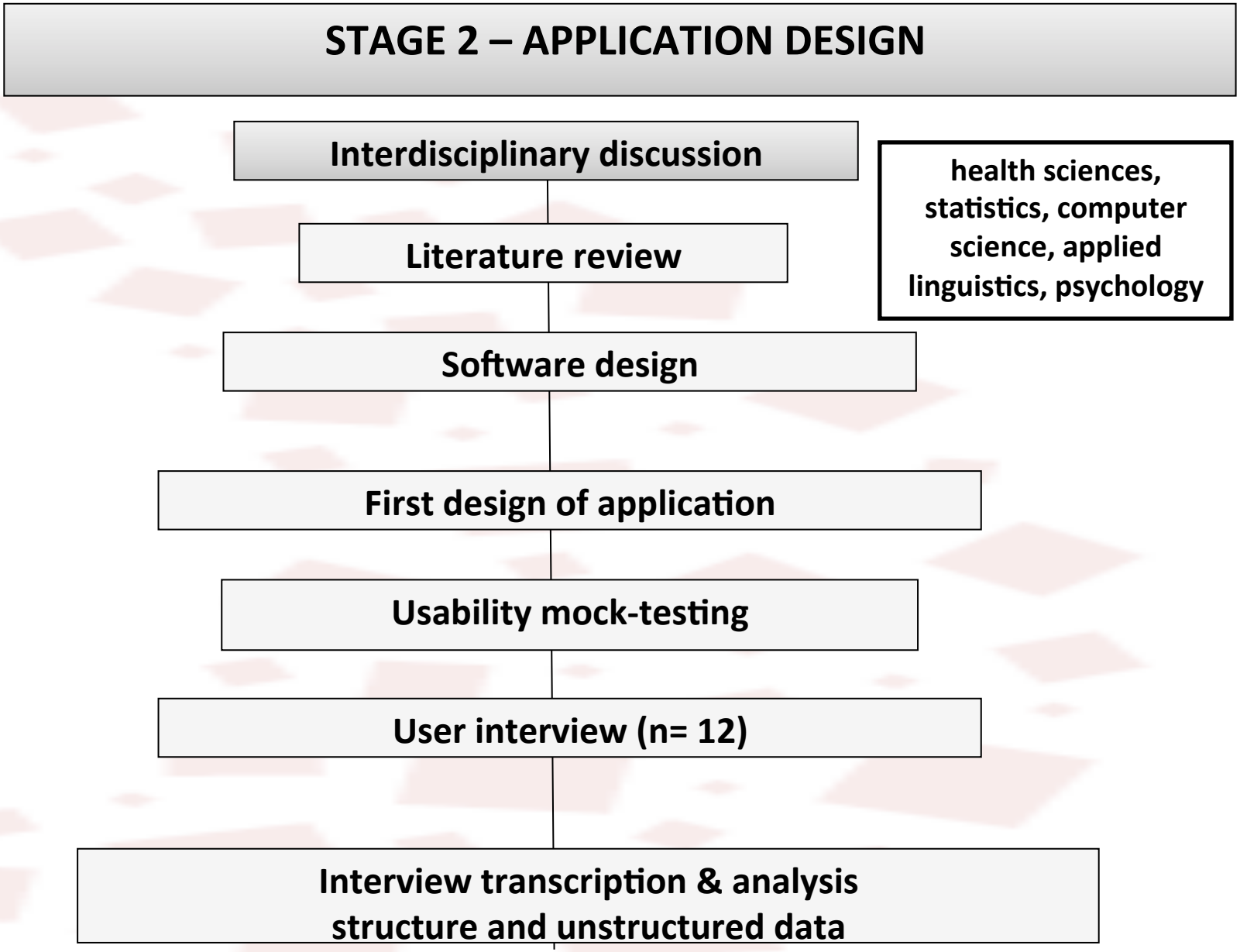
QUESTION
17. How would you like an app to help you?
Providing information, making you feel more confident
Allowing you to have some sweets and playing games with you to try to win a prize
Helping you to take care of you
Allowing you to ask questions and get answers
Playing games with you and rewarding you

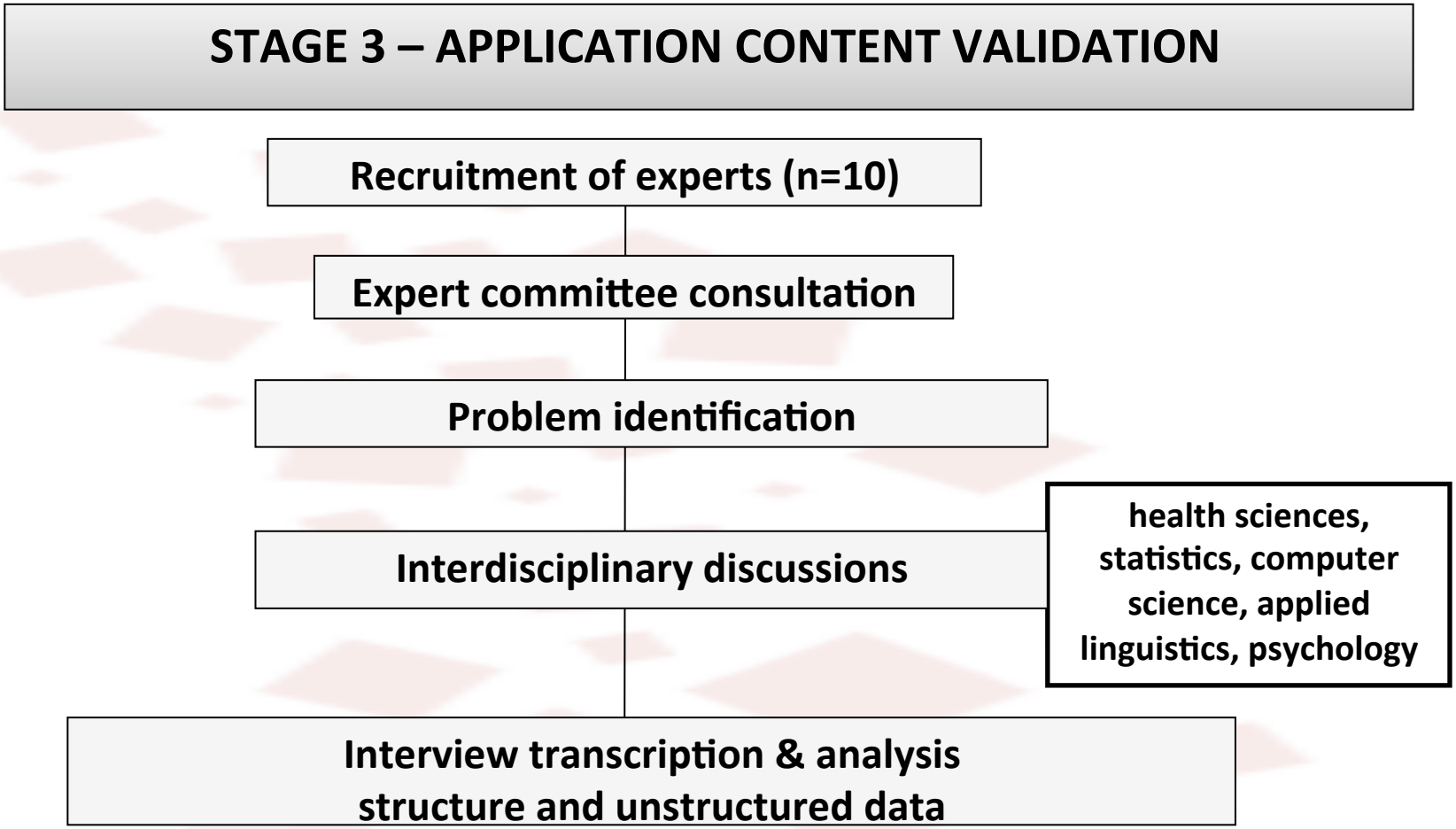
Teenager statements

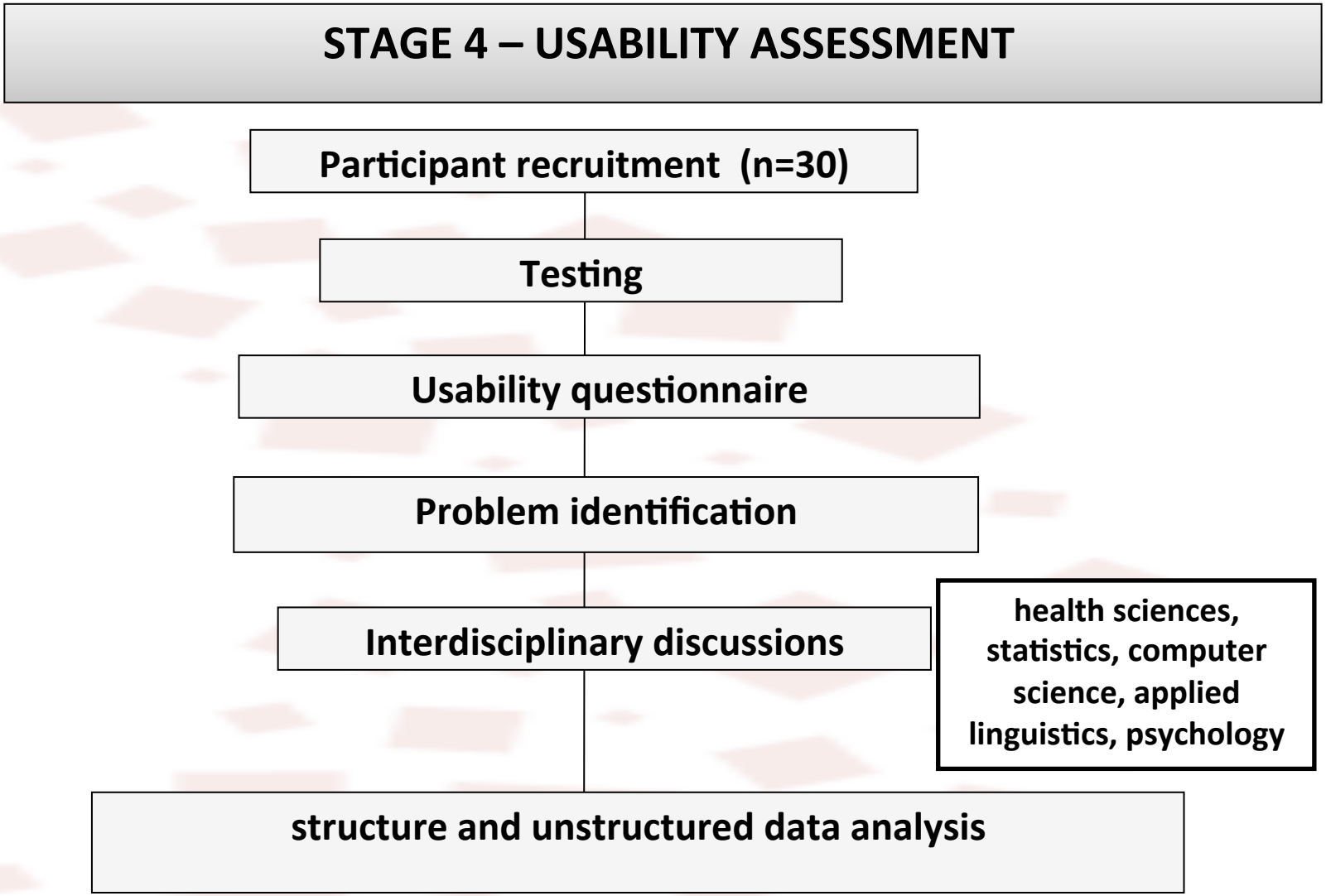
A8: *“I would like an app so that people who have recently learned they have diabetes do not feel so shy or ashamed to tell others they have diabetes, ‘cos diabetes is normal, diabetes is not that bad, you can lead a happy normal life”.*

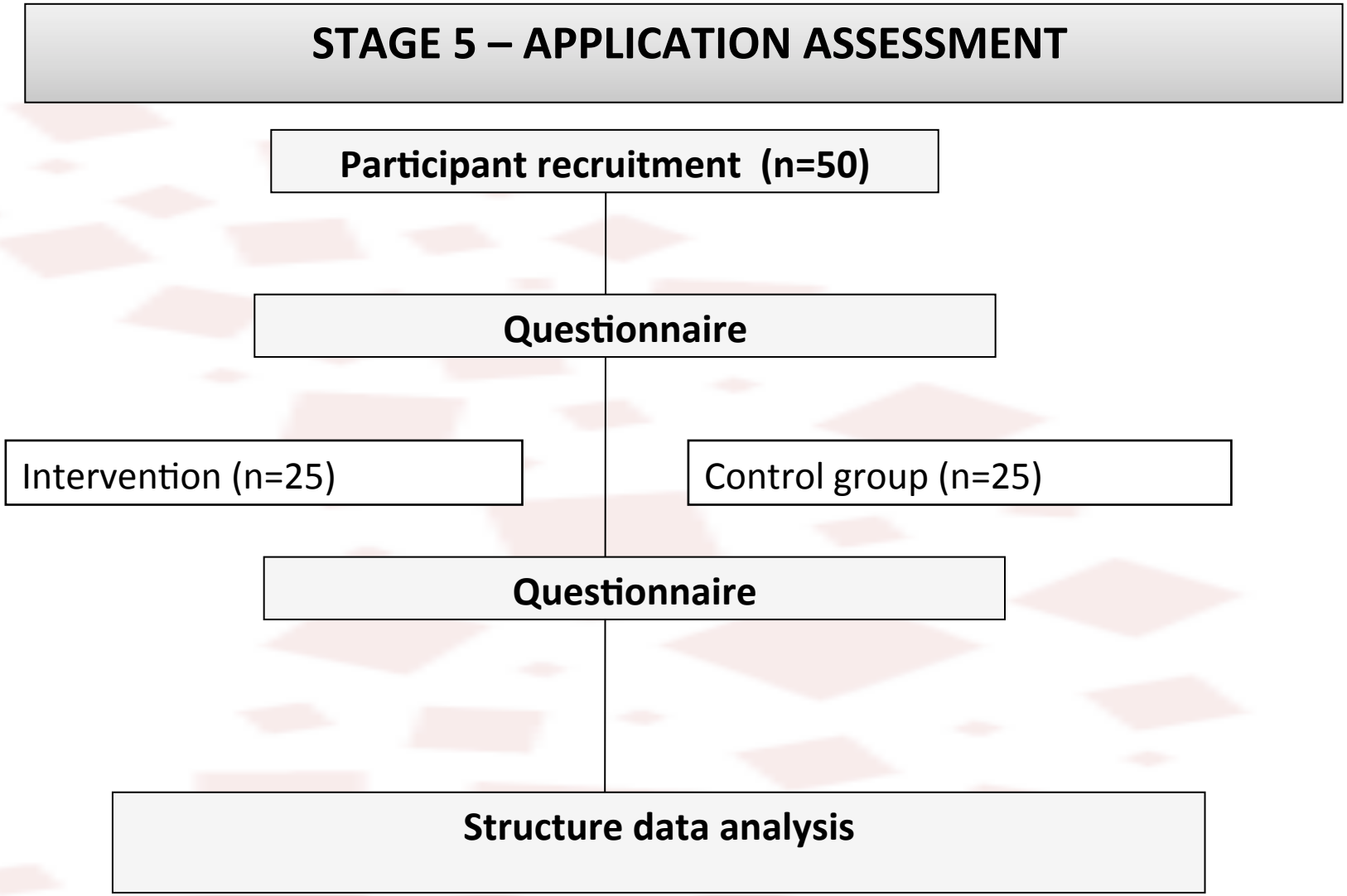
Discussion

- **All subjects own a smartphone/tablet with an internet connection;**
- **Most of them navigate the web via a wi-fi connection home and outside home; take their smartphones to school; use their smartphones for whatsapp and games and most read on their smartphones**
- **Most like avatars and would like to have an app with an avatar & most prefer a talking avatar**
- **None have ever used an app to monitor blood glucose; some would like to have one & some have mixed feelings about that**
- **Those who would like to have an app would like to have it for glucose monitoring, suggestions and explanations about diabetes care; nutrition information; to play games; to design an avatar for emotional support and management of feelings**


STAGE 2 – APPLICATION DESIGN
Interdisciplinary discussion
health sciences, statistics, computer science, applied linguistics, psychology
Literature review
Software design
First design of application
Usability mock-testing
User interview (n= 12)
Interview transcription & analysis
structure and unstructured data


STAGE 3 – APPLICATION CONTENT VALIDATION
Recruitment of experts (n=10)
Expert committee consultation
Problem identification
Interdisciplinary discussions
health sciences, statistics, computer science, applied linguistics, psychology
Interview transcription & analysis structure and unstructured data


STAGE 4 – USABILITY ASSESSMENT
Participant recruitment (n=30)
Testing
Usability questionnaire
Problem identification
Interdisciplinary discussions
health sciences, statistics, computer science, applied linguistics, psychology
structure and unstructured data analysis


STAGE 5 – APPLICATION ASSESSMENT
Participant recruitment (n=50)
Questionnaire
Intervention (n=25)
Control group (n=25)
Questionnaire
Structure data analysis

Empoder@ team members

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