Tailored Digital Health Interventions

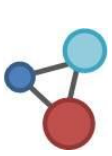*Hein de Vries, Professor Health Communication*

Kei Long Cheung, Research Fellow Digital Health Interventions

Maastricht University

Wednesday 25th October 2017
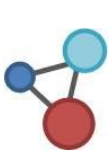**Session 18 Room 1.06**
14.30-16.00

Structure

- Presentation: 30 minutes
  - Hein de Vries
- Demonstration: 15 minutes
  - Kei Long Cheung
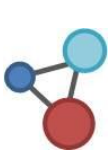- Training: developing tailored messages: 45 minutes
  - Group

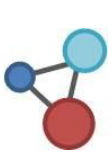# E HEALTH FOR BRASSO!!

Background

- Experience with developing:
  - eHealth programs?
  - Computer tailored programs?
  - Applying social cognitive models?

eHealth effective??

- eHealth & web based interventions
  - Using Internet will change the world……..Magic buzz words…..
  - Will a car run without a good engine?
  - eHealth; mHealth; dHealth

- eHealth effectiveness is dependent on sound health communication models
  - Everybody can make public health messages
  - Who can make effective public health messages?

- Computer tailoring:
  - A way to make health communication more personalized and (cost) effective
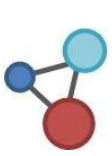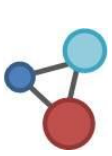
Computer Tailoring

- General folder:
  - General information
  - Some elements may not be relevant for the receiver

- Computerized tailored information (De Vries & Brug, 1999)
  - Information adapted to the characteristics of the receiver
  - All elements are relevant for the receiver
  - Using computers and questionnaires advices to large populations

- Advantages of Computer Tailored Technology
  - Highly individualized feedback for many people
  - Large populations
  - More attractive and better processing of information
 - Effective and Cost effective

Targeting or Tailoring

- Targeting:
  - market segmentation
    - which segment or group to reach? (Peppers and Rogers, 1993)
  - You want to reach one particular group
    - male adolescents aged 15-18 years
    - Messages are the same for that segment

- Tailoring
  - Based on principles to assess relevant individual characteristics
  - Aimed at reaching a large set of persons
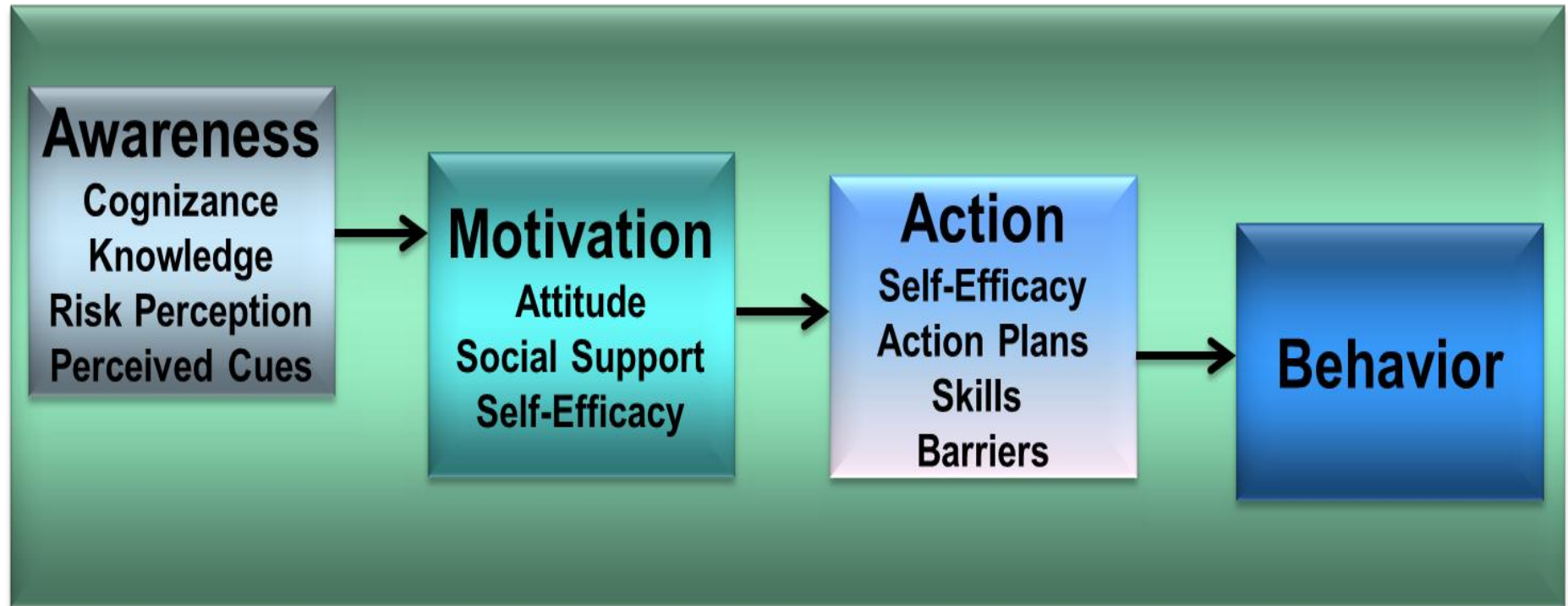 - Each (set of) message is different
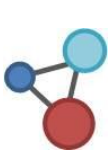
The Computer Tailoring Process
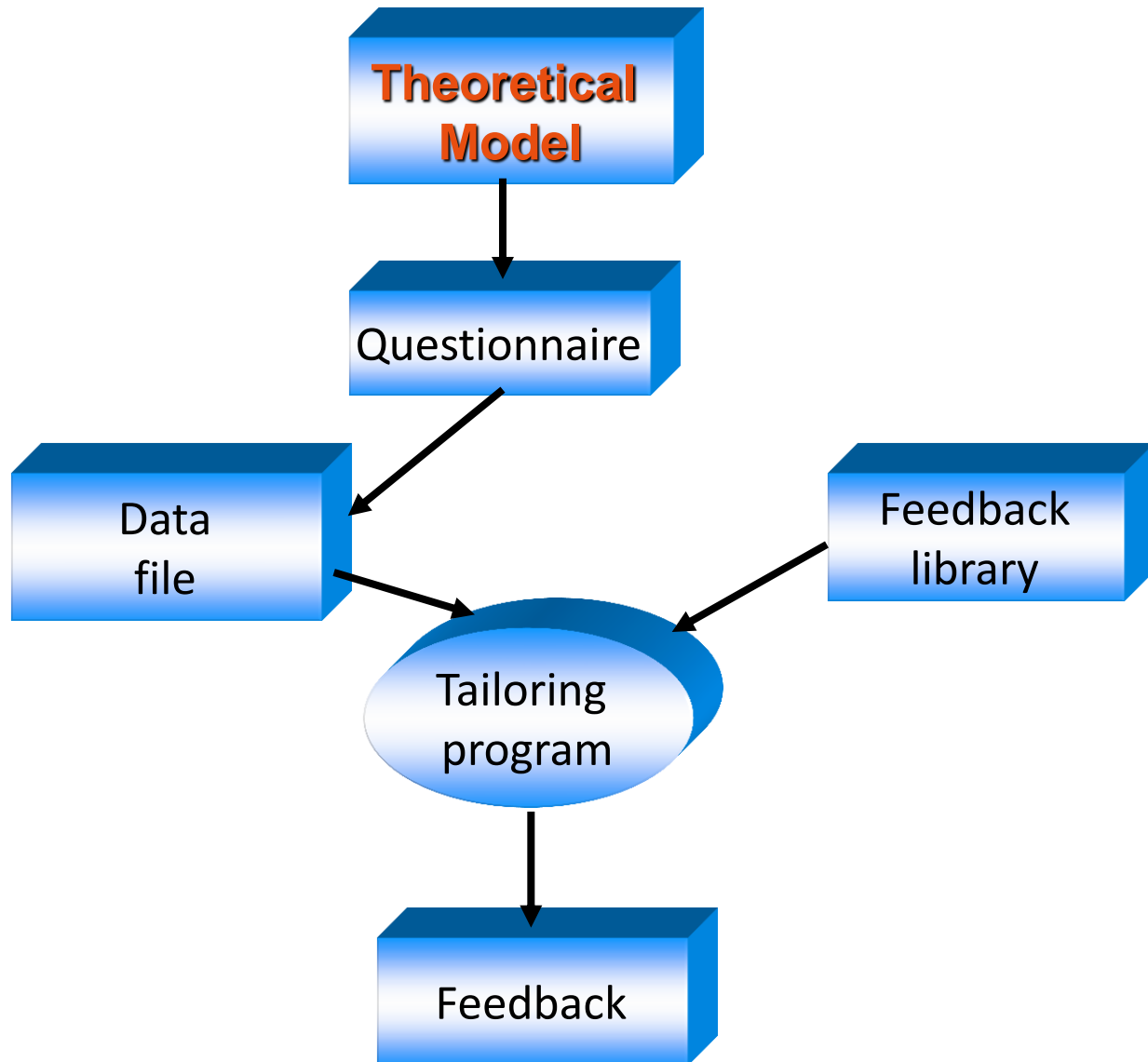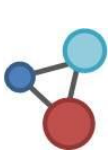
The Integrated Change Model

The I-Change Model (De Vries, 2003; 2017) simplified
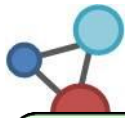
Algorithms

```
IF (OVVOYDAG = 8) THEN OVVOYDAG : = 0
PROCEDURE P090_PLAATS_CODE
(CODE : STRING);
PROCEDURE P094
BEGIN
            SELECTCH.ADVCODE [T] := '   ';
            T := T-1;
EN;
PROCEDURE P100_VERWERK_BLOK1
BEGIN
            WITH RESPONSH DO
                    BEGIN
                                IF ((SEXE = 1) AND (NVV) > 26))
                                OR ((SEXE =2) AND (NVV) > 23))
                                P090_PLAATS-CODE ('A1010')
                    ELSE
                                P090_PLAATS_CODE ('A1012');
```

Tailoring program

Structure Personalized eHealth

1. Assessment of name, socio-demographic variables (age, gender, other relevant Factors), and health risk behaviors and motivation for adopting healthy behavior

Health Risk Behavior Feedback

2. Assessment of reasons for health risk behavior:
    -awareness, risk perceptions, attitudes, social influences, self-efficacy

Motivational Feedback

3. Assessment of goals and action plans:
    -action plan, preparatory plan, coping plan

Feedback on goal and plans

Optional: repetition later of 1, 2, 3 or combination

Determinants Awareness

```
Behavioral
Cognizance

Knowledge                    Awareness

Risk Perception

Cues to Action
```
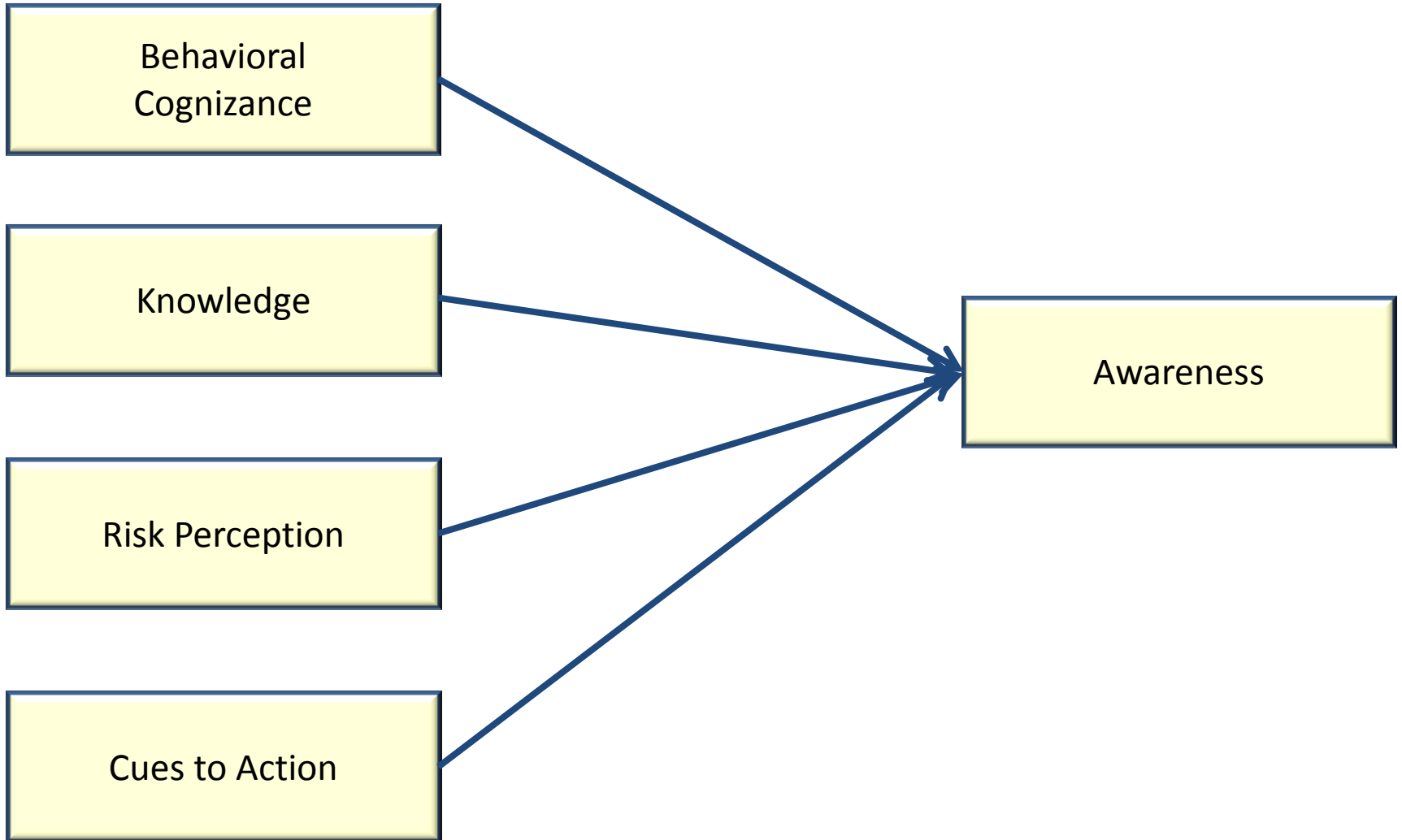
Awareness

- Cognizance

  – Dear Maria,

  – In your questionnaire you said that you think that you are not drinking too much alcohol.

  – The data on your alcohol consumption, however, show that you are drinking 3 glasses of alcohol during the week and 6 glasses on Fridays, Saturdays and Sundays.

  – Did you know that the Dutch recommendations are to drink not more than one glass per day?

Cognizance via Behavior Feedback

- Dear Hein,
  - From your responses on our behavior questions, we have now calculated how you are doing with regard to the following health behaviors. Let's have a look!
  - The green traffic light means that you are meeting the Dutch recommendations for this behavior.
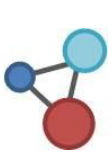 - The orange traffic light means that you almost meet the Dutch recommendation. Yet, some improvement would be wonderful for you.
  - The red traffic light means that you are not meeting our national public health recommendations. In this case it is recommended to change this behavior into a more healthy pattern.
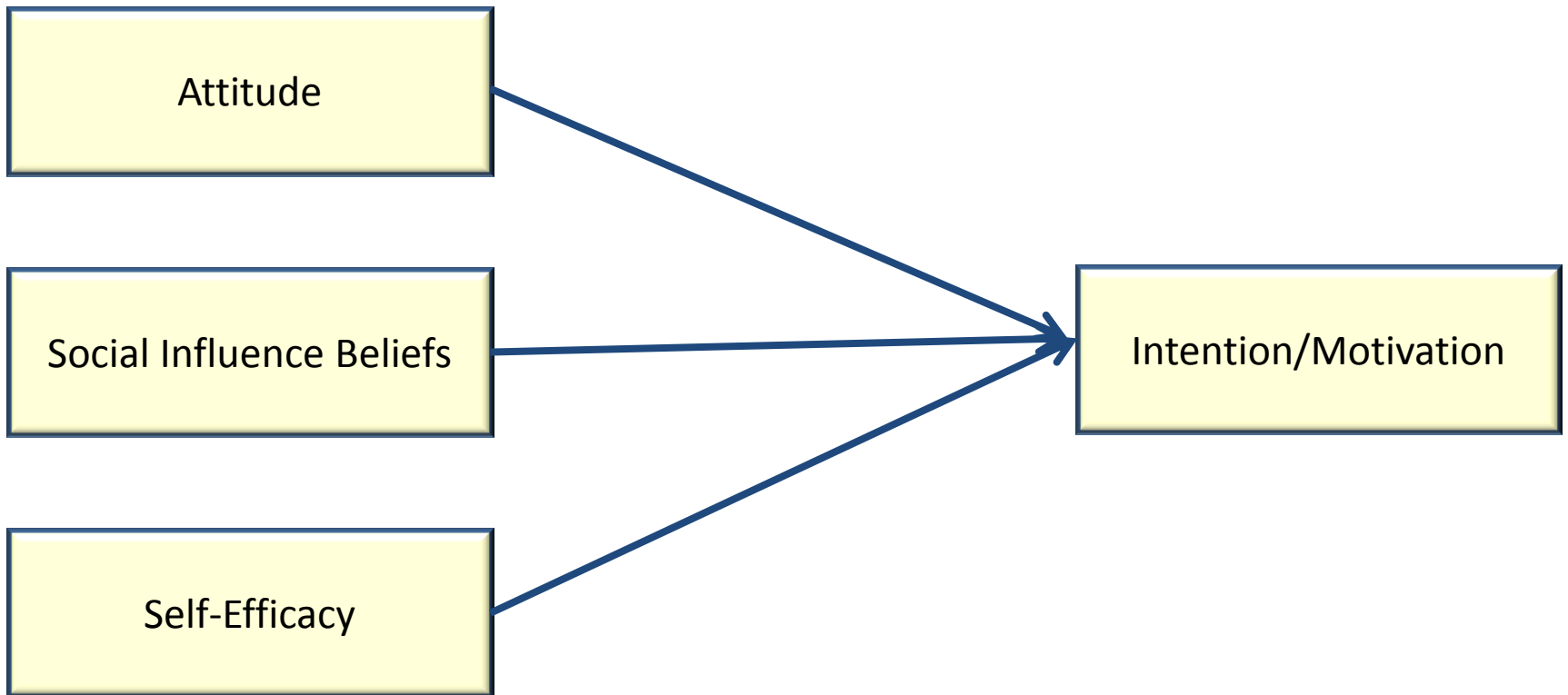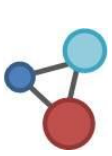
Smoking	Alcohol	Fruits	Vegetable	Activity

Determinants Motivation
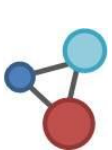
Attitude: social advantages smoking for adolescents

- Imagine 1 item is about smoking and getting friends
  - A: agree
  - B: neutral
  - C: disagree

- A. Message A could be:
  - Dear John, you said that smoking will help to get friends. There are more people that hold the same idea. However, in practice smoking actually does not help to get friends. In reality people choose their friends because of their personal qualities, and smoking is mostly not a selection item.

- Message C could be:
  - Dear John, you said that smoking will not help to get friends. Indeed, you are very right! While some people state this, in practice smoking has not to be shown to help to get friends. In reality people choose their friends because of their personal qualities, and smoking is mostly not a selection item.
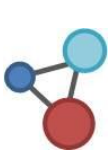
Low Self-efficacy
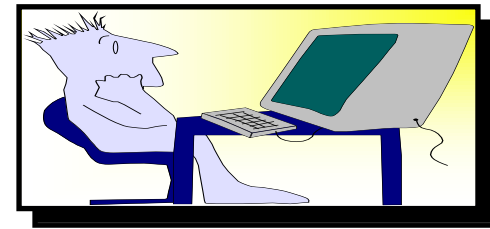
- I find it …. not to smoke when being offered a cigarette
  - A. Easy
  - B. Somewhat difficult
  - C. Difficult
- Dear John, —————————————————— **Personalization**
- In your questionnaire you said that you find it difficult not to smoke when offered a cigarette. ———— **Repetition of answer**
- We hear this more often. It can be quite challenging to say yes, just to try out, or to get rid of the pressure. Many smokers may otherwise keep on trying. ———— **Empathy**
- So, you may find it helpful to look at the box below where we indicate some ways how you still can say no. You may already tried them. ———— **Self-efficacy enhancing**
- You may even have some other strategies that we did not mention that work even better for you. ———— **Prompt own resources**
- Anyway, you may find it interesting to have a look! Hopefully some of them may help you to say no and to make you feel more confident! ———— **Prompting feelings of self-efficacy**
- You will see, by the way, that once you have said no, it is often not that difficult after all and that smokers will respect your opinion. You probably will be able to manage to say know!! ———— **Self-efficacy enhancing conclusion**

Determinants Action
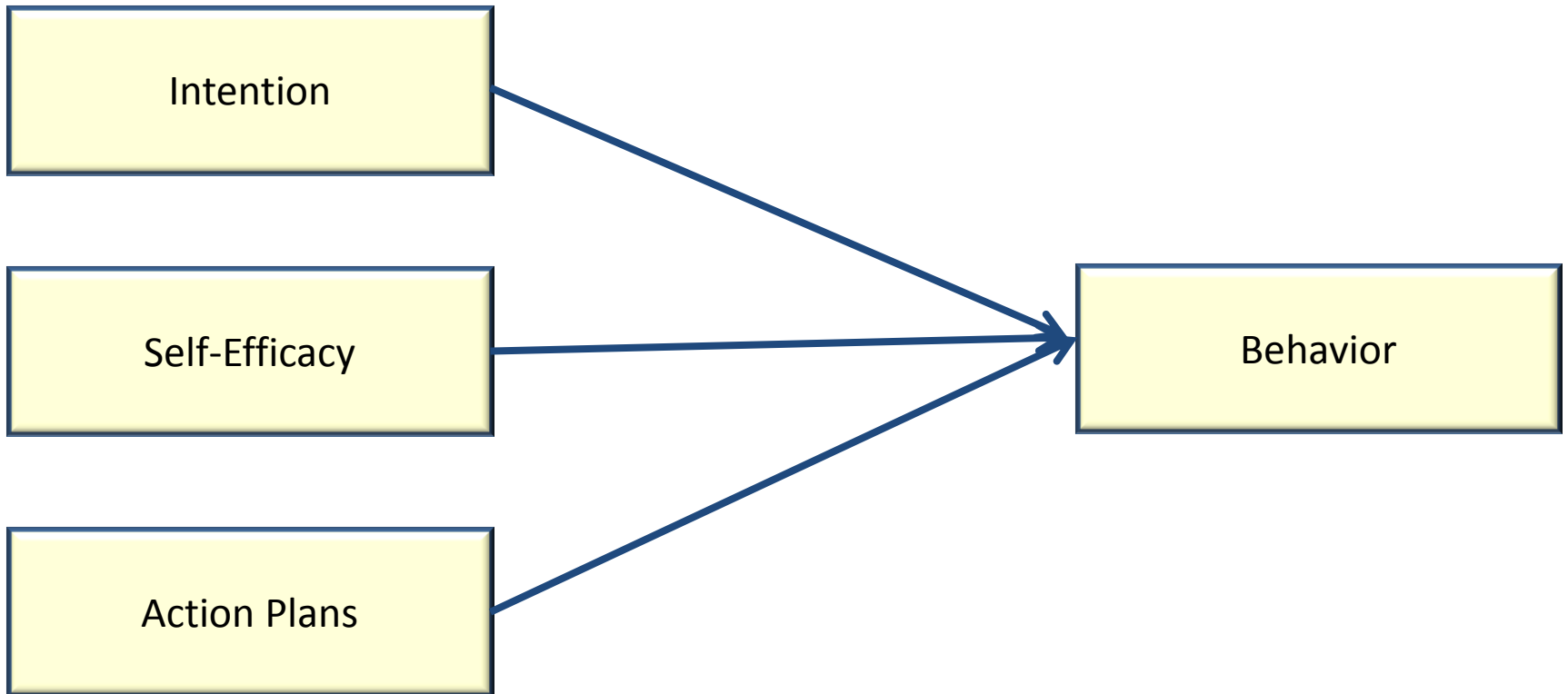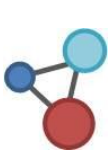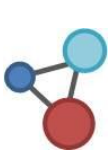
Action Planning

- Action Planning
  - Setting a behavioral goal combined with actions that are needed to reach and maintain the goal
    - planning and executing several specific actions facilitating successfully adoption and maintenance of a new health behavior (De Vries et al., 2013)
- Action planning
  - I will be physically active by engaging in running at least 30 minutes per day
- Preparatory planning
  - Making plans to prepare your new behavior
    - I will read about new activities that I can do every day
    - I will discuss with a colleague whether we can do lunchwalking
- Coping planning:
  - Making plans to cope with difficult situations
    - When it is raining……..
    - When it is raining I will do my lunch walk at the end of my work
    - When I feel tired I will…..
    - When I feel tired I will tell myself that I have made a commitment to be PA and will then do it

De Vries, H., Eggers, S.M. & Bolman, C. (2013). The role of action planning and plan enactment for smoking cessation. BMC Public Health, 13 (1), 393
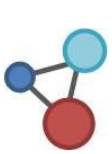
Action Planning

- Preparatory planning
  - Dear Luisa,
    - You indicated that you did not have any plans on how to prepare your quitting. Many people have found it useful to prepare themselves. Maybe you could think of some things that can help you to prepare your quitting. Below is a list from the plans that may be usefull for you.
    - Could you indicate which ones you might find useful?
      - Talk with your doctor on how to best quit
      - Talk with your partner how he/she can help you to quit
      - Talk with your friends how they can help you to quit
      - Avoid places where people smoke
      - Learn about how to best say no
      - Read about how to best quit
      - Get pharmaceutical help such as nicotine gum or buproprion

Coping Planning

- Coping Planning
  - Dear Luisa,
    - You indicated that you find it difficult not to smoke when you feel stressed. There are more people like you. We have found that it helps to already prepare yourself on how to deal with difficult situations like this. We have found a couple of strategies that have been found to be useful. Please choose one or several of them.
      - To drink a glass of water
      - To go for a walk
      - To listen to music
      - To chat with friends
    - Maybe you have your own plans already, that is also good! If so, please make your plan below:
      - When I feel stressed I will not smoke a cigarette but I will………..

Effects of Computer Tailoring
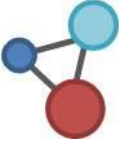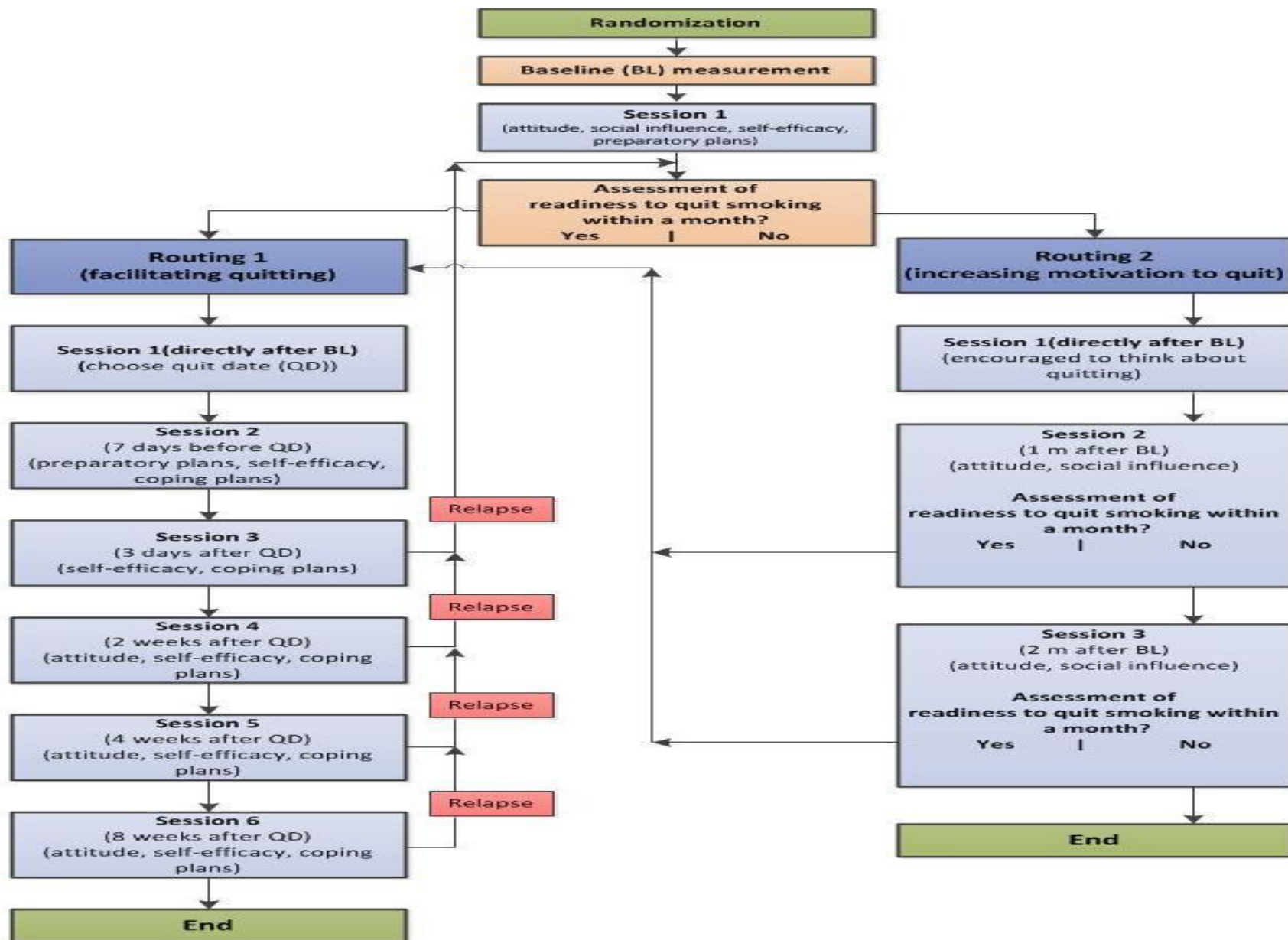
CT Smoking Cessation: Text or Video

- Researchers:
  - Stanczyk, de Vries, Bolman, van Adrichem, Muris
- Goal:
  - To compare video messages with text messages on smoking cessation
- RCT:
  - 2106 smokers willing to quit within 6 months
  - Control Condition (N=721):
    - One general advice for smoking cessation
  - Video Condition (N=670):
    - Video tailored messages on smoking behavior, attitude, perceived social influence, perceived self-efficacy, action planning
  - Text Condition (N=708):
    - Text tailored messages on smoking behaviour, attitude, perceived social influence, perceived self-efficacy, action plans
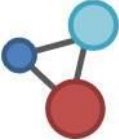   - Content of feedback messages was the same in both conditions

1. Stanczyk, N., Bolman, C., van Adrichem, M., Candel, M., Muris, J., & de Vries, H. (2014). Comparison of Text and Video Computer-Tailored Interventions for Smoking Cessation: Randomized Controlled Trial. *Journal of Medical Internet Research*, *16*(3), e69.
2. Stanczyk NE, Smit ES, Schulz DN, de Vries H, Bolman C, Muris JWM, et al. (2014) An Economic Evaluation of a Video- and Text-Based Computer-Tailored Intervention for Smoking Cessation: A Cost-Effectiveness and Cost-Utility Analysis of a Randomized Controlled Trial. PLoS ONE 9(10): e110117.
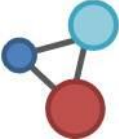
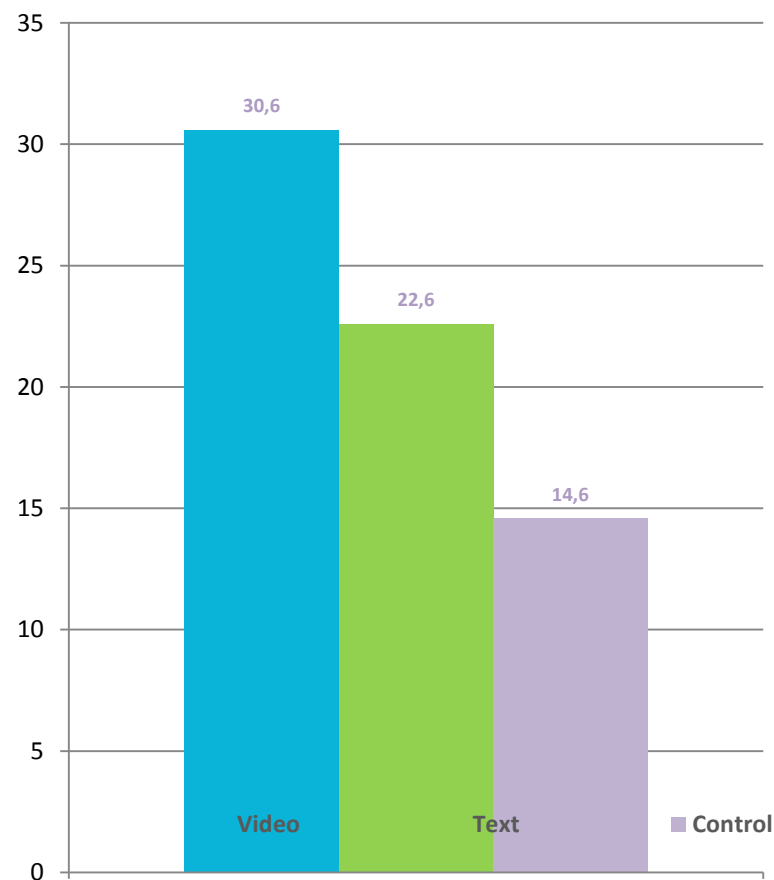# CT Smoking Cessation: Text or Video

CT Smoking Cessation: Text or Video

- Results after 6 months:
- 7 day point prevalence abstinence
  - Video tailoring resulted in significantly more quitting than the text and control
  - Text tailoring also better than the control
  - Video tailoring most cost-effective
- No educational differences

7-day point prevalence abstinence 6 months

1. Stanczyk, N., Bolman, C., van Adrichem, M., Candel, M., Muris, J., & de Vries, H. (2014). Comparison of Text and Video Computer-Tailored Interventions for Smoking Cessation: Randomized Controlled Trial. *Journal of Medical Internet Research*, *16*(3), e69.
2. Stanczyk NE, Smit ES, Schulz DN, de Vries H, Bolman C, Muris JWM, et al. (2014) An Economic Evaluation of a Video- and Text-Based Computer-Tailored Intervention for Smoking Cessation: A Cost-Effectiveness and Cost-Utility Analysis of a Randomized Controlled Trial. PLoS ONE 9(10): e110117.
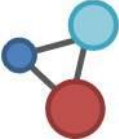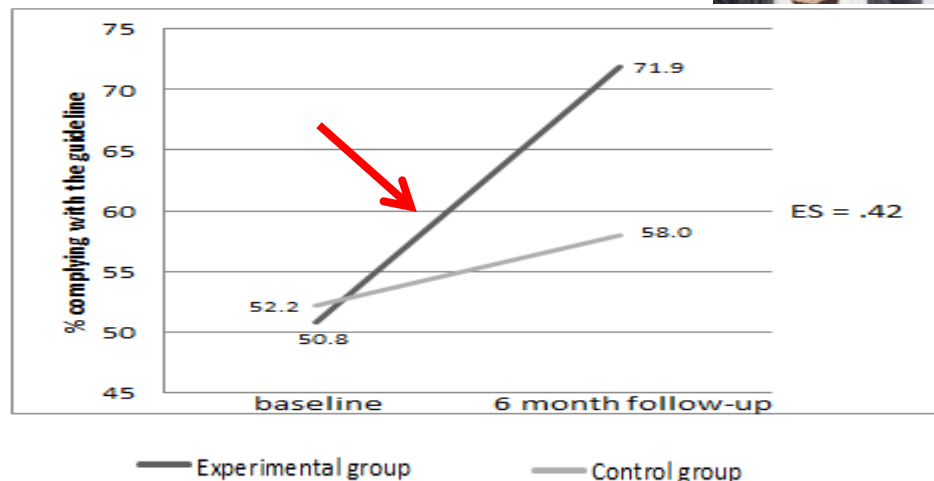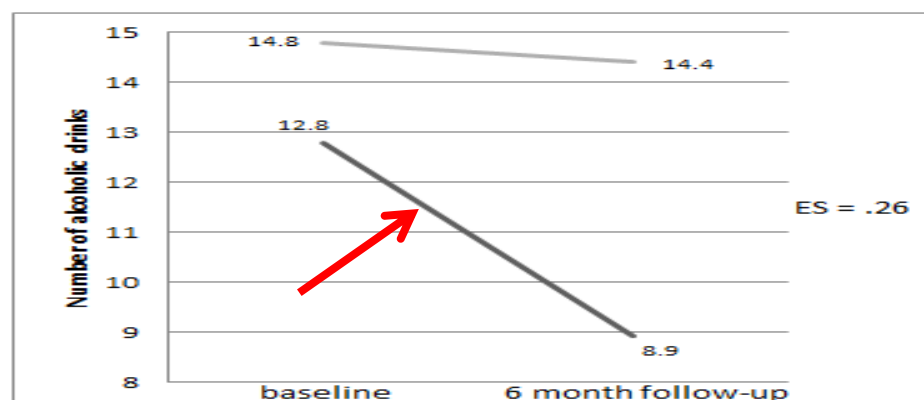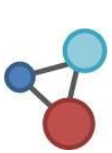
CT & Alcohol Consumption

- Researchers:
  - Daniela Schulz; Stef Kremers; Dominique Reinwand, Astrid Jander, Math Candel, Hein de Vries
- Design
  - Control condition:
    - Only questionnaire
  - Experimental condition
    - 3 tailored feedback sessions
- Results
  - Web-based tailored feedback effective
    - Schulz et al., 2013, JMIR
  - No condition x education interaction

Compliance with Dutch norms

Number of glasses

Schulz, D., Candel, M., Kremers, S., Reinwand, D., Jander, A., de Vries, H. (2013). Effects of a Web-Based Tailored Intervention to Reduce Alcohol Consumption in Adults: Randomized Controlled Trial. *J Med Internet Res*;15(9):e206
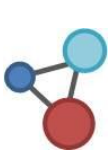
Binge drinking & Gamification

- Researchers
  - Astrid Jander, Liesbeth Mercken, Rik Crutzen, Math Candel, Hein de Vries
- Goal:
  - To prevent binge drinking in Dutch Adolescents
- Method:
  - Integration of Computer Tailored Technology in a game on binge drinking
  - I-Change Model
- RCT :
  - CT game vs control
  - 34 Dutch schools of either lower secondary education and vocational training or higher secondary education,
    - randomized into an experimental (N=1622) and a control condition (N=1027)
- Experimental group:
    - 3 games on most frequent drinking situations:
      - At home; at a party; in a pub
      - Feedback on behavior, attitude, self-efficacy, action plans
    - 2 booster sessions at home
  - Participants in the control condition only received the baseline questionnaire
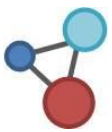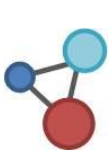
Gamification

Let's check Facebook first. Perhaps I will recall something
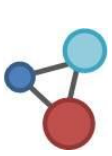
When I drink 4 or more glasses of alcohol I feel that I lose control

Results

- Response rate 31.1% (N=824)
  - schools dropped out

- Results:
  - Effective for adolescents 15-19 years (OR=2.53; p=.01)
  - A significant interaction effect between condition and age (*P*=.08)
  - Most effective for 15-16 year olds

Age	OR	p=	95% CI
Age 15	2.13	.03	1.10–4.12
Age 16	1.80	.07	0.96–3.38
Age 17	1.51	.22	0.78–2.92
Age 18	1.28	.52	0.61–2.65
Age 19	1.07	.87	0.46–2.50

Conclusions

- Personalization via computer tailoring
  - Co-creation
  - Attractive
  - Better processing of information
  - Better appreciation
  - Effective
  - Cost-effective

- Collaborative efforts are needed to further fine tune and implement these methods
  - Consortia
  - International collaboration and comparison of strategies

Support to Quit

Maastricht University

Example of computer-tailoring

- Tobacco smoking leads to more than 5 million deaths

- Several Dutch computer-tailored interventions are effective

- Support-to-Quit (STQ), most recent program (text-based and video-based)

- Video: 20.2% quitters after 12 months and shown cost-effective [1, 2]

[1] Stanczyk, N. E., Smit, E. S., Schulz, D. N., de Vries, H., Bolman, C., Muris, J. W., & Evers, S. M. (2014). An economic evaluation of a video-and text-based computer-tailored intervention for smoking cessation: a cost-effectiveness and cost-utility analysis of a randomized controlled trial. PloS one, 9(10), e110117.
[2] Stanczyk, N. E., de Vries, H., Candel, M. J. J. M., Muris, J. W. M., & Bolman, C. A. W. (2016). Effectiveness of video-versus text-based computer-tailored smoking cessation interventions among smokers after one year. Preventive medicine, 82, 42-50.

Maastricht University

Support-to-Quit

- Baseline questionnaire: smoking behavior, attitude, perceived social influence, perceived self-efficacy and several preparatory action plans

- Users receive tailored feedback on to effectively plan their quit date

- Personal data collected during the questionnaire is matched with feedback messages from a file, consisting of all possible feedback answers

- A software program (Tailorbuilder) combines the relevant feedback messages with the personal answers given in the questionnaire

Support-to-Quit

- At the end of the first session, users are asked to set a quit date within the following month

- Depending on users' readiness to quit smoking within the following month, they receive personalized feedback during multiple sessions
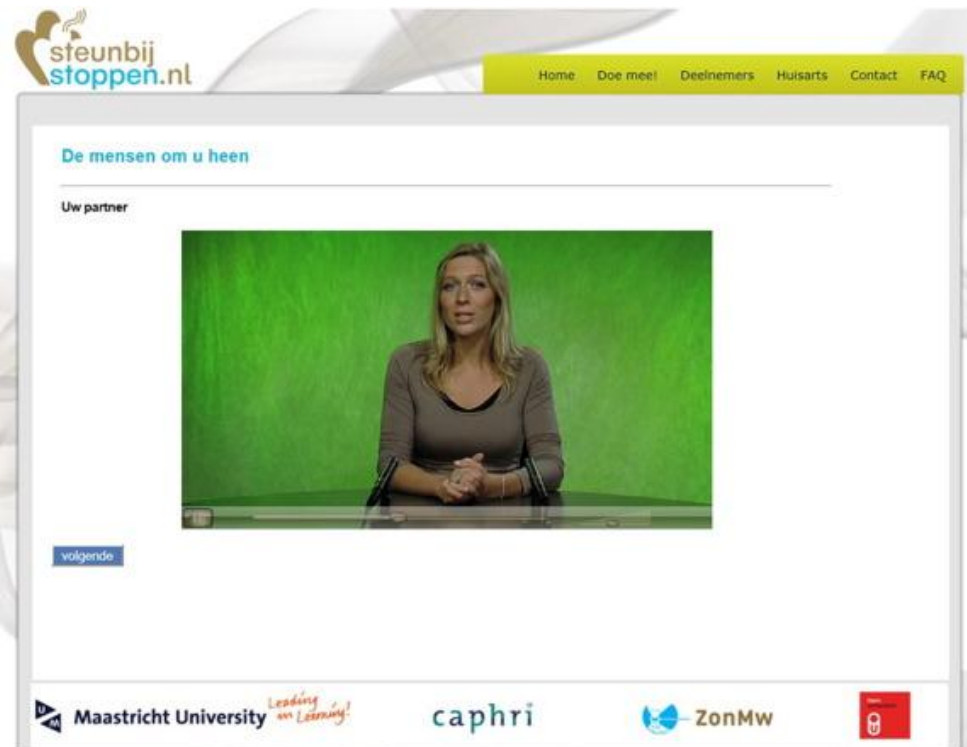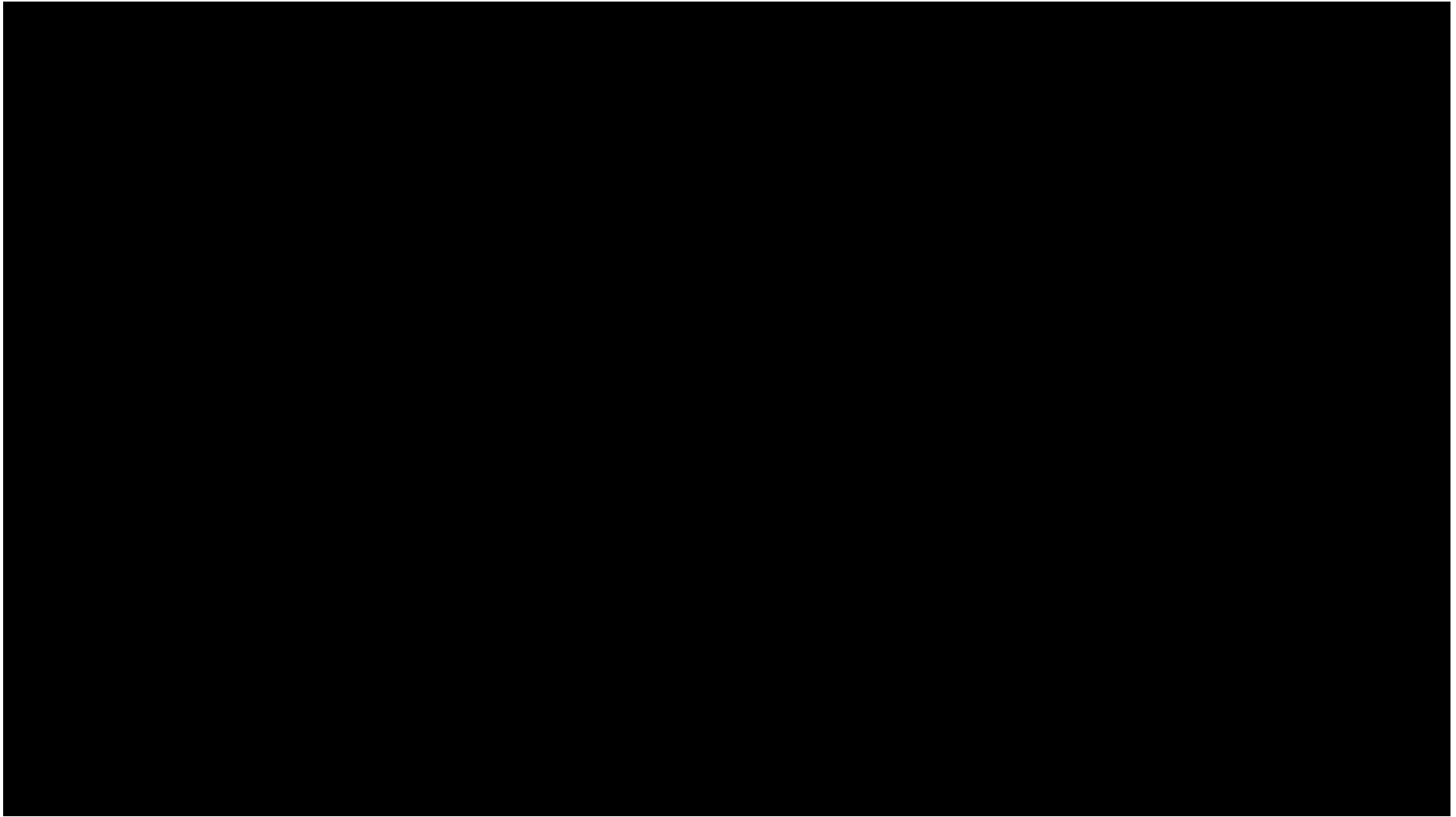
Example of question

Self-efficacy

- I have difficulties not to smoke when:
    - When I am stressed → no
    - When I am angry → no
    - When I feel down → yes
    - When someone offers me a cigarette → no

- Example (coping):
    - Did you make plans how not to smoke when feeling down?

No

Animated version

Usability Evaluation

Why?

- Many applications do not reach their full potential in terms of outcomes

- A critical factor for the uptake and retention of intervention users is a high quality user-centered design

- Usability evaluation is important to make interventions efficient, effective, and satisfying to use

How?

- Usability evaluation methods can in general terms be classified into [3]:

  - User-based methods:
  Based on capturing and analyzing usage data from real end-users

  - Expert-based methods:
  Performed by expert evaluators or designers based on a set of guidelines

[3] Jaspers, M. W. (2009). A comparison of usability methods for testing interactive health technologies: methodological aspects and empirical evidence. *International journal of medical informatics*, *78*(5), 340-353.

Maastricht University

Method 1: user-based

Thinking aloud [3]

- Thinking aloud as participants are performing a set of specified tasks (scenario)

- This enables observers to see first-hand the process of task completion

- Observers at such a test are asked to objectively take notes of everything that users say, without attempting to interpret their actions and words

- Test sessions are often audio- and video-recorded so that developers can go back and refer to what participants did and how they reacted

- Advantages, e.g.:
  - Immediately response from participants
  - observation of problems

- 5 to 8 users required

[3] Jaspers, M. W. (2009). A comparison of usability methods for testing interactive health technologies: methodological aspects and empirical evidence. *International journal of medical informatics*, *78*(5), 340-353.

Maastricht University

Method 1: user-based

Thinking aloud

Method 2: expert-based

Most used:
- Heuristic Evaluation

Benefits:
- Applicable early in the design life cycle –can be used with paper design, prototype or full system
- Based on simple methodologies – not expensive

Notes:
Evaluators should not be a member of design team
3-5 evaluators required

expertise of 2 kinds:
- usability expertise
- application expertise

Heuristic evaluation

- Small group of evaluators inspects the interface and compares its elements with a list of principles/heuristics

- Nielsen: 10 revised usability heuristics (e.g. Visibility of system status, User control and freedom, and recognition not recall) [3]

- Each evaluator inspects the interface independently

- Output is a list of usability problems explained in terms of the guidelines that were violated

Heuristic evaluation

Nielsen: Revised 10 Usability Heuristics

Visibility of system status
Are there any incidents where the program is unresponsive or slow?

Match between system and the real world
Are there any strange words/sentences used in the program?

User control and freedom
Are there any instances where important changes cannot be easily undone?

Consistency
Are there any inconsistencies concerning language use or functionality?

Error prevention
Are there any instances where you made or could make mistakes?

Recognition not recall
Are there any pages where the content or structure is unclear or insufficiently explained?

Flexibility and efficiency
Are there any frequently used functionalities that are not accessible fast enough?

Aesthetic and minimalist design
Are there any instances in which the program offers too much information?

Help users diagnose and recover from errors
Are there any error alerts which were not clear or which did not identify the problem correctly or did not provide a solution?

Help and documentation
Is there enough help or documentation available?

Questionnaires

Aspects asked in questionnaires, e.g.:
- Efficiency (assessing information)
- Effectiveness (value of information)
- Trust
- Relevance
- Layout
- Understanding
- Completeness
- Intention to revisit (reuse)
- Recommended to other
- Enjoyment

Maastricht University

THANKS FOR YOUR ATTENTION
OBRIGADO PELA SUA ATENÇÃO

Training developing tailored messages
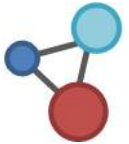
1. Goal of the training (5 minutes)

 To become familiar with principles of developing tailored messages

 (To become familiar with principles of usability testing)

 We will work in small groups of 4-6 persons.

2. Group creation and topic selection (10 minutes)

 Introduce yourself briefly (5 min)

 Please select a topic and an health behavior for which you want to make a tailored dHealth program (5 min)

  (e.g. moderate alcohol consumption, binge drinking, drug use, smoking, etc..).

3. Make two personalized messages (20 minutes) about:

 Intention (yes/no)

  One message for a person with a high intention to engage in the healthy behavior

  One messages for a person with a low intention to engage in the healthy behavior

 Attitude Pro (Yes/no)

  Select which pro of the behavior you want to discuss

  Make the message for a person saying Yes to this pro

  Make a message for a person saying No to this pro

 Attitude Con (Yes/no)

 Self-efficacy (High/Low)

 Action Plan (Yes/No)

 Coping Plan (Yes/No)

 -> So for each factor: 2 messages:

 One for one who filled out Yes

 One for one who filled out No

4. Make two groups:

 Group 1 will make the intention and attitude messages (6 messages)

  Group 2 will make the self-efficacy and action and coping plan messages (6 messages)

 Make the messages on a ppt ready for presentation

5. Usability testing (if you have time)

 Think of a plan on how you want to assess the usability of your mHealth program and the acceptability of these messages

6. Presentation by 2 groups (20 minutes)
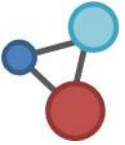
Group presentations

...

Future training

Summer Course Health Communication & Health Promotion
Maastricht University, The Netherlands
July 2-6, 2018
Health Communication and Health Promotion: Theory and Practice
Email: hein.devries@maastrichtuniversity.nl
Web: https://www.maastricht-university.eu/hein.devries/

Thank you!

TWIST **Training With Stakeholders**
Applying EU Addiction Research

www.twist-train.eu