Expectancy and opinion about a CCBT program for the treatment of depression and the use of different sensors

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- Emotional Disorders (ED) are treatable illnesses with **Cognitive Behavioural Treatments (CBT)** (Antony & Stein, 2009; Nathan & Gorman, 2007; Norton & Price, 2007)

- The provision of mental health care is generally less than the adequate in terms of accessibility and quality:
  - Less than 50% of people with emotional disorders receive appropriate treatment either:
    - by the **cost**
    - the **time** required in its application
    - lack of **well trained professionals**

- Therefore, many patients are reluctant or have **difficulty getting help**

Sonreír es divertido

- Psychological treatments have advanced significantly, however, they keep **forgetting the central goal** → to **reduce costs (personal, social and economic**) associated with mental health problems.

  -The individual **psychotherapy**, the dominant model in the provision of services, is not likely to achieve these needs.
  -It is unlikely that mental health professionals can reduce the prevalence and burden associated with mental illnesses without a **radical change.**
  -It is necessary to develop a **new portfolio focused on developing different models of health care application.**
  (Kazdin y Blase, 2011)

  BEYOND ONE-TO-ONE THERAPY

Sonreír es divertido

- The computerized treatments (CCBT) provide a **good alternative** for traditional CBT
  - Reduce the therapist time maintaining the clinical results.
  - The convenience of using it from home.
  - Reach patients who otherwise would not receive treatment.
  - Reduce the stigma attached to receiving therapy.

  So, CCBT have demonstrated efficacy and utility for individuals who cannot access to traditional approaches.

  (Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEvoy & Titov, 2010; Johansson & Andersson, 2012; Titov et al., 2011)

- However, little is known about the **expectations, opinion , acceptability,** or **usability** of CCBT programs

  (Mohr Siddique & Fokuo, 2010, Kaltenthaler et al., 2008; Kay-Lambkin et al,. 2011)

- There are **few studies focusing on their assessment**

  (Kay-Lambkin et al,. 2011 ; Carrard et al., 2011; Ljótsson et al., 2011; Cavanagh et al., 2009; Wootmon et al., 2011; Gun, Titov & Andrews, 2011)

- But, these **are important variables**:
  - They inform us about the **feasibility** of the intervention
  - They help optimizing CCBT **effectiveness**
  - They can be important in **predicting response** to CCBT
  (De Graaf et al., 2009; Kaltenthaler et al., 2008)

- In addition, CCBT could be improved by the use of **physiological and activity sensors.**

- Recently, the use of sensors, biosensors or other technological tools within the called **"personalized health care systems"** is an increasing trend in the application of treatments. (Bonato, 2009; Teng et al., 2008).

- Wearable technology is currently seen as a **helpful tool for treating and preventing several psychological problems.**

- Although there exist a lot of applications, sensors and interactive mobile technologies developed for enhancing psychological wellness, there are few published studies to support their efficacy**,** and even **less data** on their **acceptability and usability.** (Muench, Boudreaux, Hansen, 2012).

- In the last years, several European projects have focused on this kind of tools:

  - MONARCA project (Puiatti et al., 2011)
  - INTERSTRESS project (Cipresso et al., 2012)
  - REACTION project (Spanakis et al., 2012)
  - SensorART project (Tsipouras et al., 2012)
  - **OPTIMI project** (Botella et al., 2011, Botella et al., 2012)

- **MONARCA project**:
  - collects physiological information from a "GSR sock" using GPS signal, periodic EEG measurements, voice analysis from mobile phone conversations, and motion analysis to provide an assessment of emotional state and mood.

- **INTERSTRESS project:**
  - uses heart rate and heart rate variability as a stress measurement, and also permits biofeedback exercises as a part of the psychological treatment.

- **REACTION project:**
  - to monitor several parameters such as glucose levels, nutritional intakes, administered drugs, and patient's insulin sensitivity, offering decision support for insulin dosing to professional caregivers.

- **SensorART project:**
  - uses haemodynamics sensors to detect changes in flow and pressure and biosensors for inflammation or heart failure.

Preventing depression

Main hypothesis: There is a significant relationship between **depression**, **stress**, and the **person's coping ability.**

Sonreír es divertido

Cognitive, behavioral and physiological monitoring tools based on the ICTs for early detection and prevention of depression have been developed :

1. **Sensors to detect changes** associated with **stress**, poor **coping**, and **depression**

2. An CCBT assessment and treatment protocol: *Smiling is Fun.* **Coping with Stress and Emotion Regulation Program**

Sonreír es divertido

1. Sensors

– **EEG sensor**

detect the subjects' physiological and cognitive state.

– **ECG sensor**

 • **24 hour monitoring**

detects their physical activity.

– **Accelerometer**
 • **24 hour monitoring**

The program collects data from the sensors and provides feedback → The user can see detailed results **graphically.**

2. Smiling is Fun

- An **internet-delivered, multimedia, interactive, CCBT self-applied program** for ED.

- It is based on classical CBT techniques, such as psychoeducation and **behavioural activation** (Ekers, Richards, McMillan, Bland & Gilbod, 2011).

- It also includes other psychological strategies to improve **positive mood** (Algoe & Fredrickson, 2011; Catalino & Fredrickson, 2011; McMahan & Renken, 2011; Wood, Froh & Geraghty, 2011).

- It is designed to allow the individual to learn and practice adaptive ways to **cope with stress and daily problems.**

Video demo
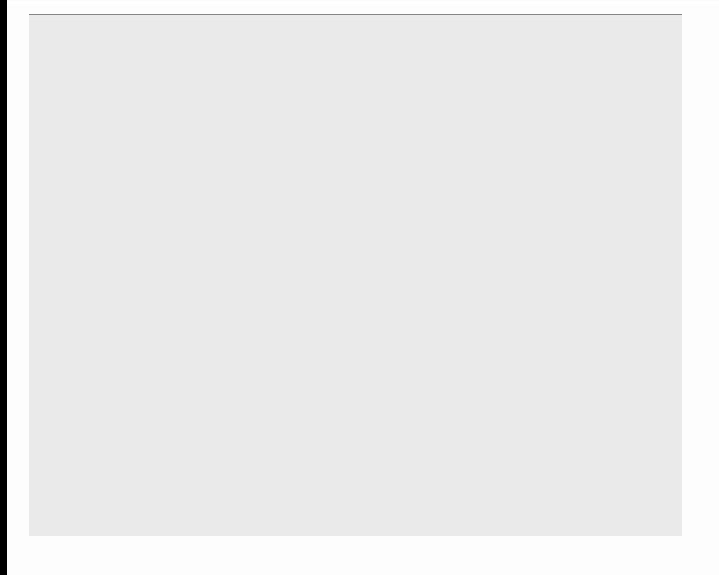
Starting the program

HOME Module

It explains what the program is about, its objective, who can benefit from it, and who we are.

WELCOME Module

Information regarding the content of the modules.

Reccommendations for the user to benefit from it in the best possible way.

The psychological content of the program is designed to stop the vicious circle *of stress, lack of social support, adverse symptoms, poor coping, and poor functioning (self – efficacy).*
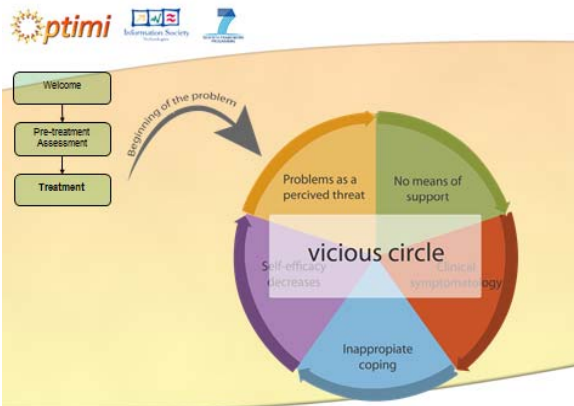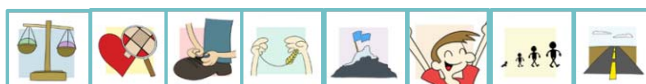
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Treatment modules

- **Eight modules** oriented to **help learning different psychological techniques**.

    - Each module includes **exercises to practice such techniques.**

- These modules are **sequential**.

- *M1. Motivation for change*
- *M2. Understanding emotional problems*
- *M3. Learning to move on*
- *M4. Learning to be flexible*
- *M5. Learning to enjoy*
- *M6. Learning to live*
- *M7. Living and learning*
- *M8. From now on, what else…?*

User Feedback Tools

1. ACTIVITY DIARY

It is designed for the user to **pay attention to the daily activities**, and it **provides feedback**, helping him/her to **see that his/her mood state is closely related to the activities** carried out.

•**Activity report 1**

The user is asked:

- the degree of **satisfaction** each activity has meant.

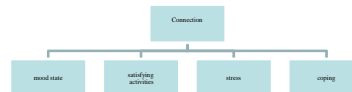- to what extent they are related to his/her own **goals and values in life**.

• **Activity report 2**

- **The percentage of the day he/she has been active** or involved in his/her life for the last 24 hours.

Furthemore, the person is asked for his/her ability to **coping**, **mood state**, and **stress,** in a range from 0 to 10.

The user can see detailed results **graphically.**

2. HOW AM I ?

It provides **information and feedback** to the user, regarding his/her **progress** throughout the program.

It shows the evolution of:
- **information from sensors**
- **activity level**
- **emotional distress** (anxiety and sadness)
- **positive emotionality** (active, enthusiastic, energetic, etc.)
- **negative emotionality** (angry, fearful, stressed, tense, moody, etc.)

3. CALENDAR

Allows the users to know **where they are** throughout the program

It provides them with information regarding homework and **tasks already achieved, remembering** also those **still outstanding.**

Research Design

The present study is a **non-blinded clinical open trial** with a **between-group design** with two randomized experimental conditions:

1) **Intervention program plus sensors** (IP+S, N =20): participants had access to the CCBT Intervention Program ('Smiling is Fun') and used sensors (Accelerometer, ECG and EEG).
2) **Intervention program** (IP, N= 22): participants had access to the CCBT Intervention Program without sensors.

- This study is part of a **larger one to test the effectiveness** of an intervention program for preventing depression in individuals at high risk (unemployed males).

- In the larger study a third experimental condition is also used, a waiting-list control group.
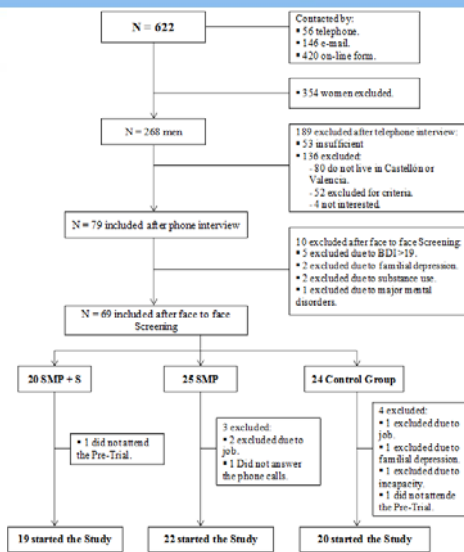
Objetive

To present data for both intervention groups (IP+S group and IP group) regarding their **expectancy, opinion, acceptability and usability about this CCBT program with or without sensors.**

Since participants in the waiting-list control group did not use the program or fulfil measurements regarding this variables.

Measures

- **Expectations of Treatment Scale and Opinion of Treatment Scale** (adapted from Borkovec & Nau, 1972)
  - The 6 items in both questionnaires ask about:
    - how **logical** the treatment seemed.
    - to what extent it could **satisfy** the patient.
    - whether it could be **useful** to treat other psychological problems.
    - its **utility** for the patient's specific problem.
    - to what extent the treatment could be **aversive**.

  Ratings go from 1 (nothing at all) to 10 (a lot).

Measures

- **Acceptability:** Three items have been developed ad-hoc for this study, which represent the more important variables in the Technology Acceptance Model (TAM, Davis, 1989).

1) *Program's utility*: "*I think the program is very useful for me*".
2) *Ease of use:* "*In general, I think the program is easy to use*".
3) *Intention of use:* "*I would like to use this online program often*".

These items were answered using the 5 item Likert scale response from **0-4 ranging from "strongly disagree" to "strongly agree"** regarding the subjective assessment of:

Measures

- **System Usability Scale (SUS)** (Brooke, 1986).

- It is a simple, ten-item attitude Likert scale giving a global view of subjective assessment of usability.

  The total score is obtained through the sum of items multiplied by 2.5 (some of them are direct and some indirect).
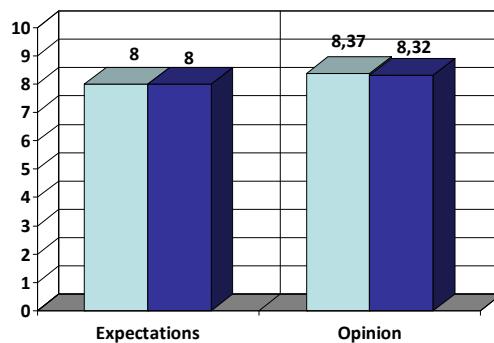
Results

LOGIC

Both intervention groups had **very positive expectations** regarding the treatment logic.

After treatment the opinion even increases slightly (+ than 8) although not significantly.

No differences between groups were found in expectations nor in opinion.
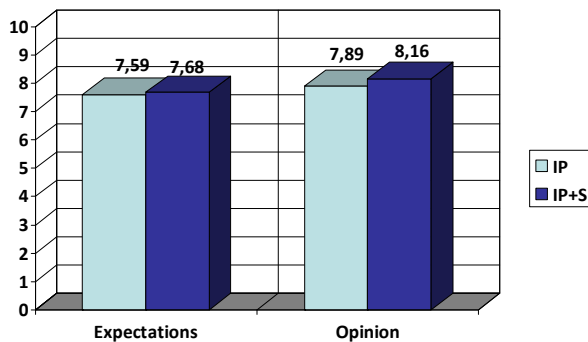
Expectation → Total Mean=8; SD= 1.66

Opinion → Total Mean=8.34; SD= 1.47

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EXPECTANCY AND OPINION

SATISFACTION

Both groups had **very positive expectations** regarding to what extent they think the treament would satisfy them.

After treatment the **opinion increases although not significantly.**

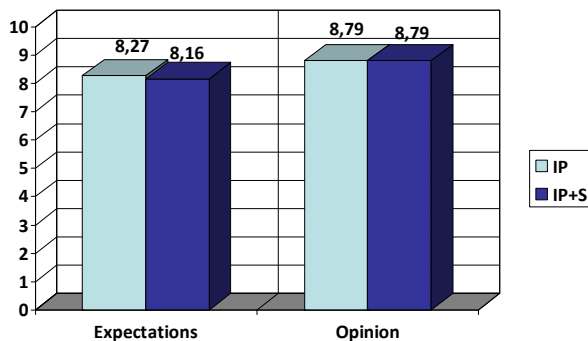**No differences between groups were found** in expectations nor in opinion.

Expectation → Total Mean=7.63; SD= 1.97

Opinion → Total Mean=8.03; SD= 1.55

EXPECTANCY AND OPINION

RECOMMEND

Both groups had **very positive expectations** regarding to what extent they would recommend the treatment to others (higher than 8).

After treatment the opinion about **R*ecommendation* increases significantly from 8.22 to 8.79.** (F(1.36)=5.757 *P*=.022)

No differences between groups were found in expectations nor in opinion
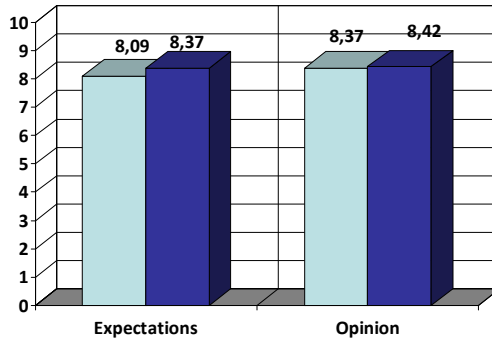
Expectation → Total Mean=8.22; SD= 2.10

Opinion → Total Mean=8.79; SD= 1.52

USEFUL TREATING OTHER PSYCHOLOGICAL PROBLEMS

8,09   8,37   8,37   8,42

IP
IP+S

Expectations   Opinion

Expectation → Total Mean=8.22; SD= 1.62

Opinion → Total Mean=8.39; SD= 1.15

Both groups had **very positive expectations** regarding utility of the treatment treating other psychological problems (higher than 8).
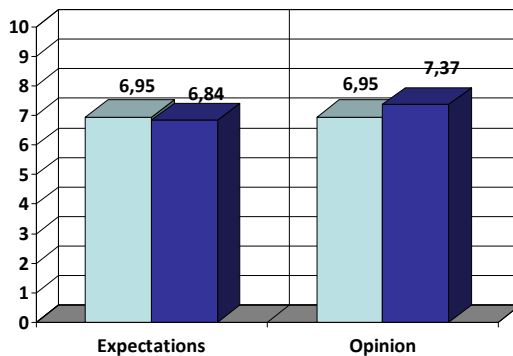
After treatment the opinion about *Utility* **increases slightly in both groups (not significantly)**

No differences between groups were found in expectations nor in opinion

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HELPFULNESS

6,95   6,84   6,95   7,37

IP
IP+S

Expectations   Opinion

Expectation → Total Mean=6.90; SD= 2.36

Opinion → Total Mean=7.16; SD= 2.07

Both groups thought that the treatment will be quite helpful for them.
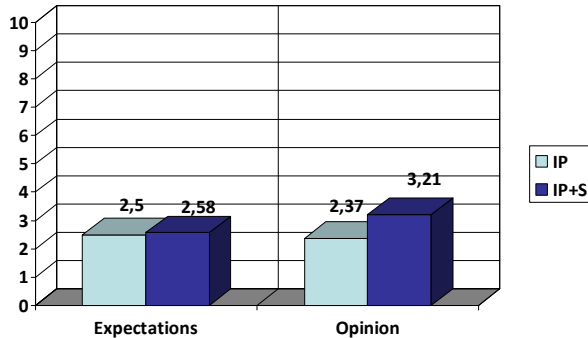
After treatment the opinion about *Utility* **increases only in sensors group (but not significantly).**

No differences between groups were found.

EXPECTANCY AND OPINION

AVERSIVENESS

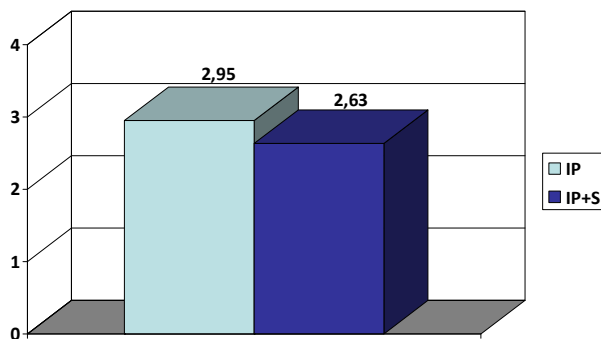Both groups thought that the treatment won't be aversive for them.

After treatment the opinion about *Aversiveness* increases a little in sensors group (but not significantly) and decreases a little in the group without sensors (not signifcantly either).

No differences between groups were found.

Chart legend: IP, IP+S

Values: 2,5 — 2,58 — 2,37 — 3,21

Expectation → Total Mean=2.54; SD= 2.34

Opinion → Total Mean=2.79; SD= 2.26

ACCEPTABILITY

Program's utility: "*I think the program is very useful for me*"

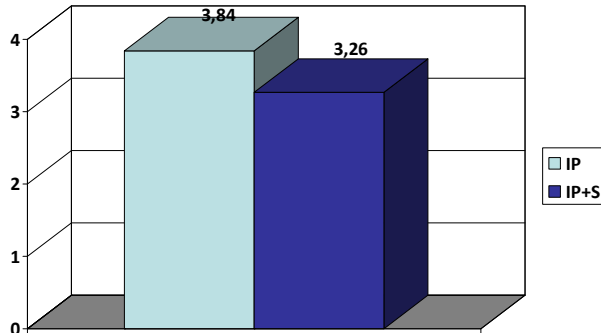Both intervention groups thought that the treatment was quite useful for them.

Although **the group without sensors had a slightly better opinion.**

No significant differences between groups were found. F(1.38)=0.639; *P*=0.429

Chart legend: IP, IP+S

Values: 2,95 — 2,63

Total Mean=2.79; SD= 1.21

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ACCEPTABILITY

Ease of use: "In general, *I think the program is easy to use*"

Both groups thought the program was ease to use (higher than 3.5 over 4).

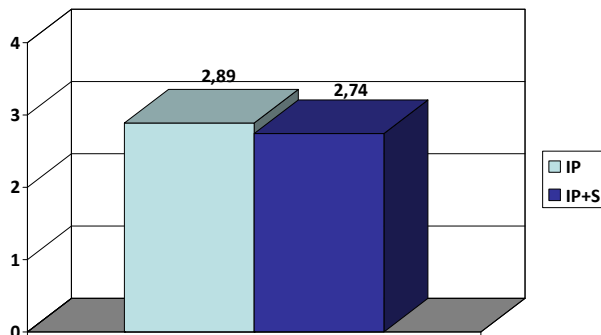The **group without sensors found it a easier than the group using the sensors.**

Although this difference is not statistically significant, it reflects a trend to significance F(1.38)=3.974; *P*=0.059

Total Mean=3.55; SD= 0.95

ACCEPTABILITY

Intention of use: *"I would use this program often"*

Both intervention groups reported a quite high intention of use.

Although **the group without sensors had a slightly higher intention.**

No significant differences between groups were found. F(1.38)=0.130; *P*=0.720
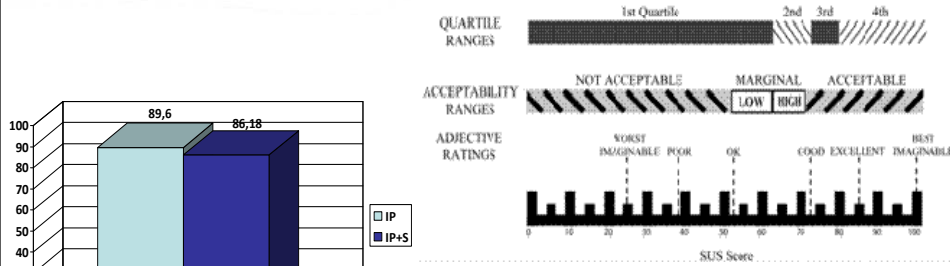
Total Mean=2.82; SD= 1.33

USABILITY

Usability: Total SUS scores

Total Mean=87.89; SD= 12.32

Results between the **3rd and 4th quartile,** among the best products, close to ***truly superior products.***

CONCLUSIONS

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- **Expectations** were high for both groups regardless the use of sensors.
- Participants got widely their expectations and even exceeded them as **satisfaction** scores show.
  - Confidence to recommend the program increases significantly regardless whether or not they had used sensors.

- The results regarding program's *utility, ease of use and intention of use* suggest a good **acceptability** of *Smiling is Fun.*

Sonreír es divertido

Results obtained for **usability** would locate *Smiling is Fun* between the third and fourth quartile, among the best products, close to "***truly superior products".***

Sonreír es divertido

- Participants seem to accept very well these **technological innovations** and **are willing to use different kinds of sensors.**
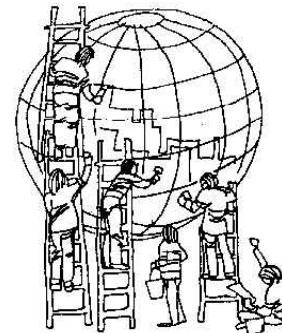- The **sensors:**
  - **demonstrate a great deal of promise, providing useful feedback and objective information to the users.**
  - **are feasible to use**, but maybe we have used too many types of sensors:
    - We do not know the specific acceptance of each sensor or what would happen if the person used only one.


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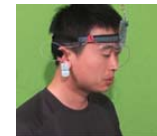
- The **OPTIMI sensor system has a potentially valuable role** to play in the mental health services, and look forward to developing and improving these tools further in future projects.

- However, the sensors are prototypes and significant **technical improvements** are required before proceeding to large-scale trials.

- This is **the first study that used together CCBT + sensors.**

- **These results open the door to the use of CCBT + sensors.**

- Additional research is needed in order to **make their use easier** and also **define who can benefit from what type of application, or what type of sensor**.
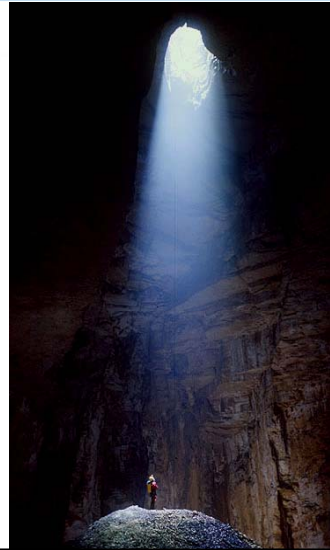
OTHER ICT BASED TOOLS

- Virtual Reality, and AR are absent
- However, at present, it is possible to develop and integrate the VR in the Internet for an online access.
- An available example is a development engine called *UNITY* (http://www.unity3d.com) by Unity Technologies.

Sonreír es divertido

- It is the beginning of a new era in the psychological treatments field.
- The use of CCBT-Internet delivered programs and sensors is quite innovative, but for sure in the coming years we will witness further developments in the field.

Sonreír es divertido

Thank you very much for your attention ☺

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