How the use of new technologies changes the treatment of Alcohol Use Disorders

Antoni Gual

Addictions Unit. Psychiatry Dept.
Neurosciences Institute. Hospital Clinic
Barcelona
tgual@clinic.cat

IDIBAPS

UNIVERSITAT DE BARCELONA

d-HealthyLife

Red de Trastornos Adictivos

CLÍNIC BARCELONA
Hospital Universitari

Conflicts of interest

- Cooperation with Lundbeck and Pulso Ediciones in the development of the APP Sideal

- Coordinator of the project d-HealthyLife

- Co-Chair of the INEBRIA Special Interest Group on e-health

- Member of the advisory board of HumanITcare (start-up exploring digital phenotyping in health)

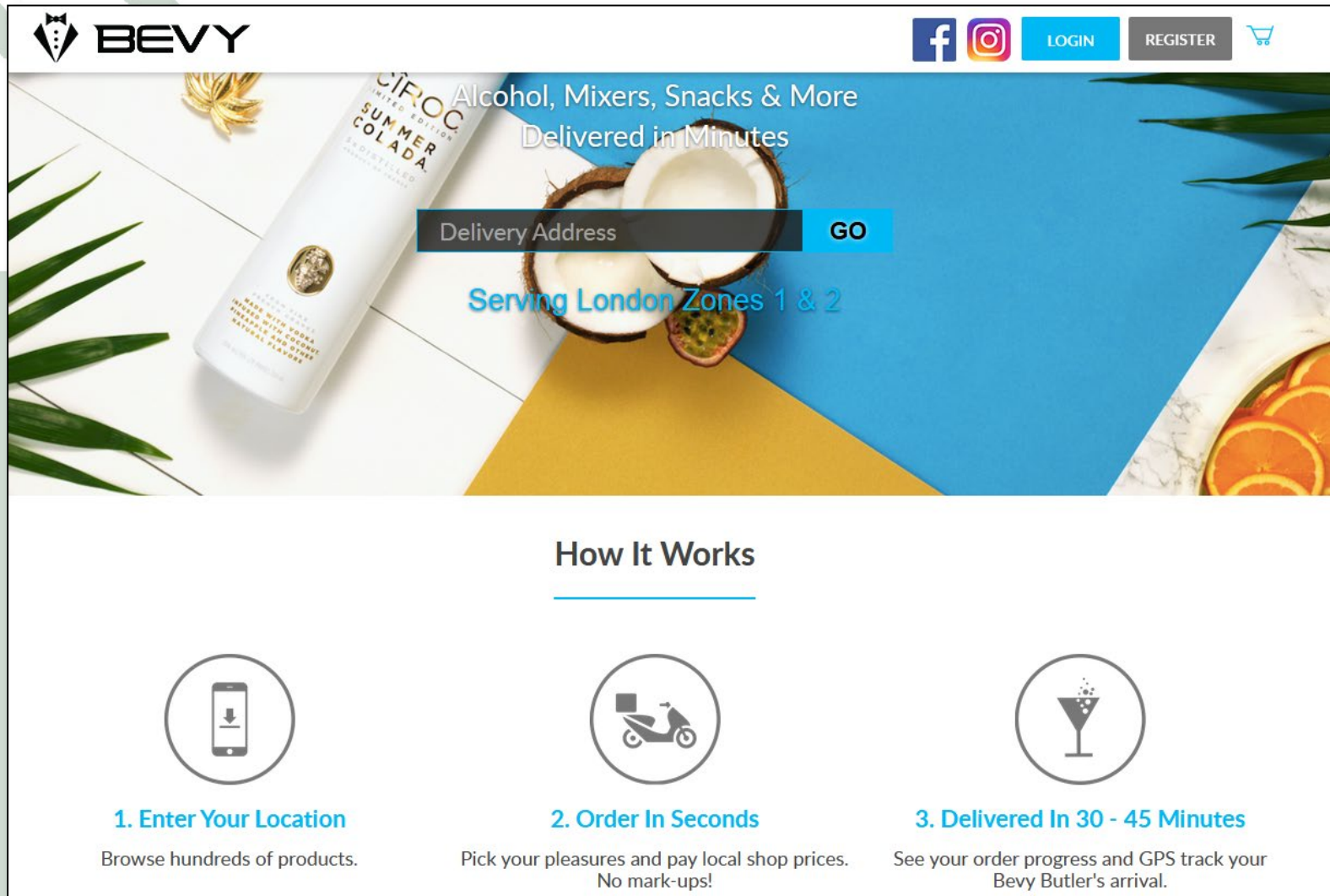- Shareholder in GAI SL (start-up devoted to the treatment of addictions with rTMS)

A picture is worth a thousand words...

Our competitors have already taken steps …

CLÍNIC
BARCELONA
Hospital Universitari

https://www.bevy.co/

Do we really need more options? Do we have unmet needs?

- Reach

- Delay between onset of problem and help-seeking

- Access

- Adherence

- Efficacy and effectiveness

- Overcoming stigmatisation

CLÍNIC
BARCELONA
Hospital Universitari

Do we really need more options?
# Do we have unmet needs?

- Overcoming stigmatisation: **NO**   **100**
- Reach: **we offer treatment to 20%**   **20**
- Delay between onset and help-seeking: **10 y**
- Access: **long waiting lists**
- Adherence: **70% at 3 months**   **14**
- Efficacy and effectiveness: **50%**   **7**

CLÍNIC
BARCELONA
Hospital Universitari

In the future... or right now?

John wakes up on Sunday with a terrible hangover. He can't remember how the night ended. It's not the first time, and he decides to take action.

He surfs the web with his phone and decides to download one of the available APPs. He chooses one of the most sophisticated options.

First step: a few computarized adaptative questionnaires to be filled
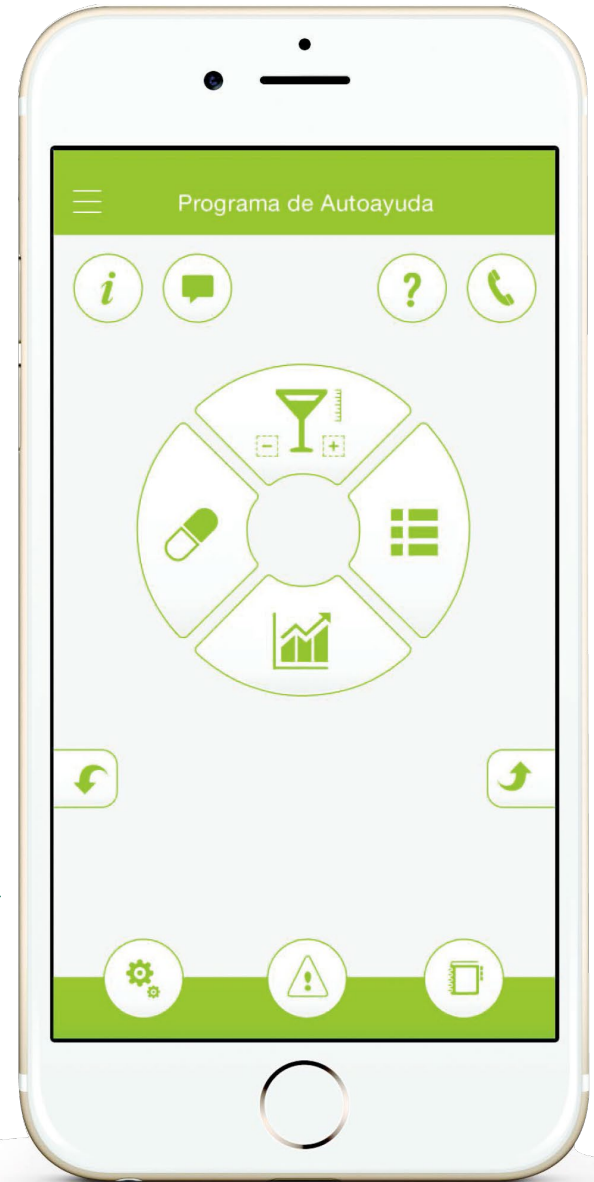
He gets back a treatment plan that includes:

- tailored virtual counseling,
- virtual reality therapy
- monitorization of his digital phenotype
- a sensor to monitor alcohol in sweat

He receives the package in 2h through Amazon Prime.
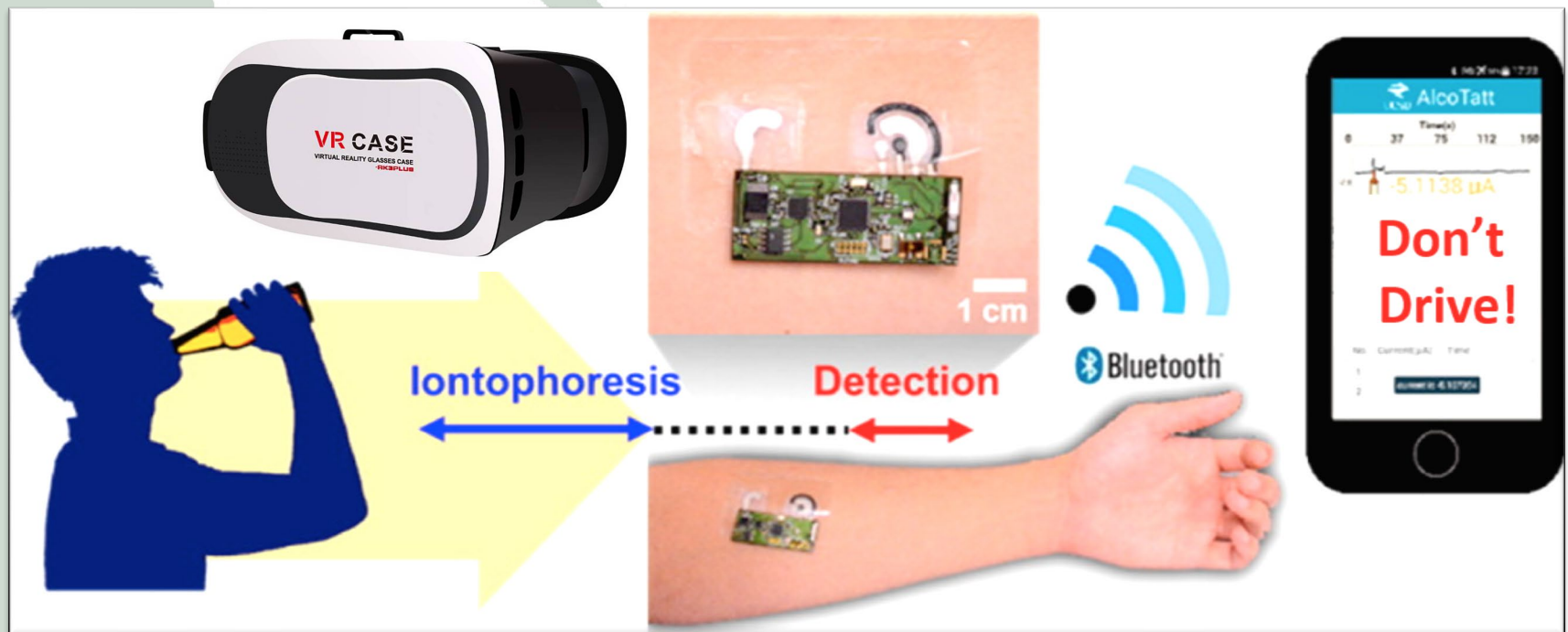
In the future... or right now?

Which new technologies look promising?

- Artificial Intelligence
- Digital phenotyping
- Wearable devices
- Virtual Reality
- Transcranial Magnetic Stimulation
- Digital interventions

Which new technologies look promising?

- **Artificial Intelligence**
- Digital phenotyping
- Wearable devices
- Virtual Reality
- Transcranial Magnetic Stimulation
- Digital interventions

CLÍNIC
BARCELONA
Hospital Universitari

Artificial intelligence Machine learning

- Computerized Adaptive Testing
- Embodied conversational agents (avatars)
- Robots
- Automated linguistic analysis

Validation of the alcohol use item banks from the Patient-Reported Outcomes Measurement Information System (PROMIS®)

Paul A. Pilkonis[a,*], Lan Yu[a,b], Nathan E. Dodds[a], Kelly L. Johnston[a], Suzanne M. Lawrence[a], and Dennis C. Daley[a]

- Fourteen CATs were administered from eight PROMIS domains to generate a comprehensive health status profile.
- The results demonstrated the validity of PROMIS CATs, which require only 4–6 items in each domain.
- Next step: embodied interactive agents (avatars)

CLÍNIC
BARCELONA
Hospital Universitari

Embodied Interactive Agents

www.nature.com/scientificreports

SCIENTIFIC REPORTS

OPEN **Virtual human as a new diagnostic tool, a proof of concept study in the field of major depressive disorders**

Received: 10 May 2016
Accepted: 12 January 2017

Pierre Philip[1,2,3], Jean-Arthur Micoulaud-Franchi[1,2,3], Patricia Sagaspe[1,2,3], Etienne De Sevin[2,3], Jérôme Olive[2,3], Stéphanie Bioulac[2,3,4] & Alain Sauteraud[2,3]

CLÍNIC
BARCELONA
Hospital Universitari

Experiences of a Motivational Interview Delivered by a Robot: Qualitative Study

Joana Galvão Gomes da Silva[1], MSc; David J Kavanagh[2], PhD; Tony Belpaeme[3], PhD; Lloyd Taylor[1]; Konna Beeson[1], MSc; Jackie Andrade[1], PhD

[1]Cognition Institute, School of Psychology, University of Plymouth, Plymouth, United Kingdom
[2]Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia
[3]Centre for Robotics and Neural Systems, University of Plymouth, Plymouth, United Kingdom

MI skills of the NAO robot

Rating	Components of motivational interviewing
0. Absent	• Roll with resistance • Structure adapted to readiness to change or interest or self-efficacy • Express empathy
1. Present but superficial or inadequate	• Promote autonomy, ask permission: *is it okay if we talk about this now?* • Collaboration: *let's focus on...* • Other MI adherent behaviors: *how does that make you feel?* (amplifying emotion)
2. Present but not optimal	• Develop discrepancy or explore ambivalence: *what may happen in the future if you don't change anything?* • Reflections or summary: summary was used— *I suggest you summarize what you are going to do...* —but reflection is not possible in a pre-scripted interview.
3. Fully present	• Evocation: *why is that important to you now?* • Promote self-efficacy: *what could you do, to make sure you follow your plan over the next week?* • Strengthen commitment to change: *try summarizing the things that are likely to get better if you change your behavior* • Open-ended questions: *what would be the first step?*

CLÍNIC
BARCELONA
Hospital Universitari

How does it feel?

[The best aspect of this robotic interview was] being able to talk freely and for as long as I wanted about every aspect of physical activity that concerned me without being judged. [P2, age range: 18-25, female]

...he didn't interrupt and was not judgemental...I felt more motivated because I talked through my goals without interruption or other people's advice. [P10, age range: 34-42, female]

[My experience with the robot was] fine, if not a little awkward. The more time spent with the robot, the more relaxed I felt. [It was] easier to talk to than an actual person. [P2, age range: 18-25, female]

CLÍNIC
BARCELONA
Hospital Universitari

Is group therapy feasible?

Original Paper

Detecting Recovery Problems Just in Time: Application of Automated Linguistic Analysis and Supervised Machine Learning to an Online Substance Abuse Forum

Rachel Kornfield[1*], MA; Prathusha K Sarma[2*], MS; Dhavan V Shah[1], PhD; Fiona McTavish[3], MA; Gina Landucci[3], BS; Klaren Pe-Romashko[3], MS; David H Gustafson[3], PhD

Hospital Universitari

AI in an online alcohol problems forum

- Aggregate data from 2 studies: 154+800

- A boosted decision tree classifier, using features from both 'Bag-of-Words' and 'Linguistic Inquiry and Word Count' performed best in identifying problems disclosed within the discussion forum, achieving 88% sensitivity and 82% specificity in a cohort of patients in recovery.

Figure 5. Receiver operating characteristic (ROC) curves for boosted decision tree classifiers on the Bag-of-Words (BoW; left), Linguistic Inquiry and Word Count (LIWC; middle), and hybrid (right) feature spaces.
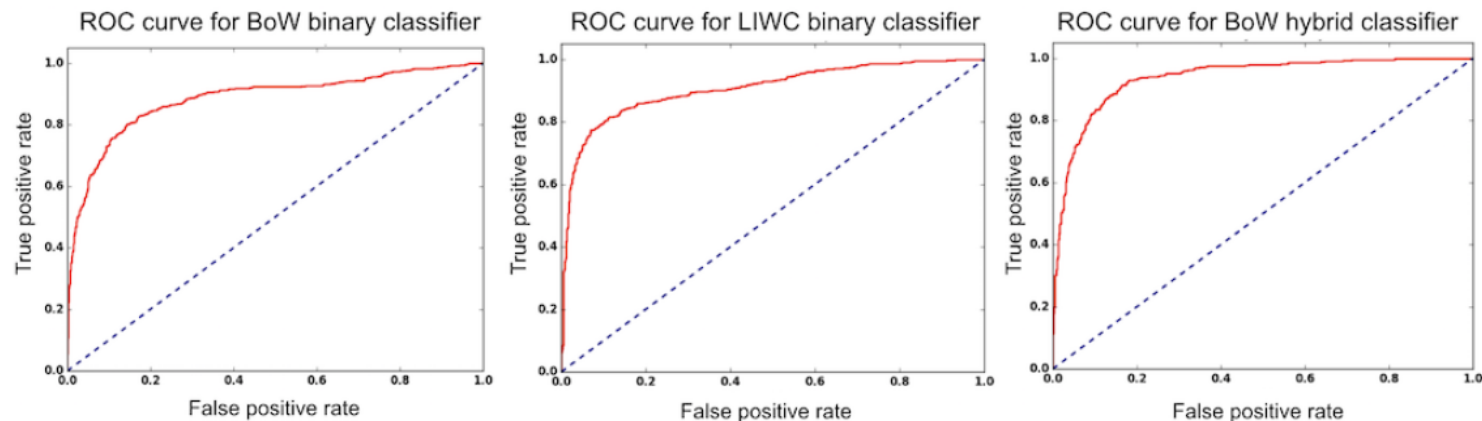
(Kornfield et al, 2018)

CLÍNIC
BARCELONA
Hospital Universitari

Which new technologies look promising?

- Artificial Intelligence
- **Digital phenotyping**
- Wearable devices
- Virtual Reality
- Transcranial Magnetic Stimulation
- Digital interventions

CLÍNIC
BARCELONA
Hospital Universitari

Digital phenotyping

- Digital phenotyping is defined as the "moment-by-moment quantification of the individual-level human phenotype in situ using data from personal digital devices." (Jain et al., 2015)

- The data can be divided into two subgroups:
  - active data (requires active input from the users: Ecological Momentary Assessment)
  - passive data (such as sensor data and phone usage patterns)

Digital phenotype – Active data

SIDEAL
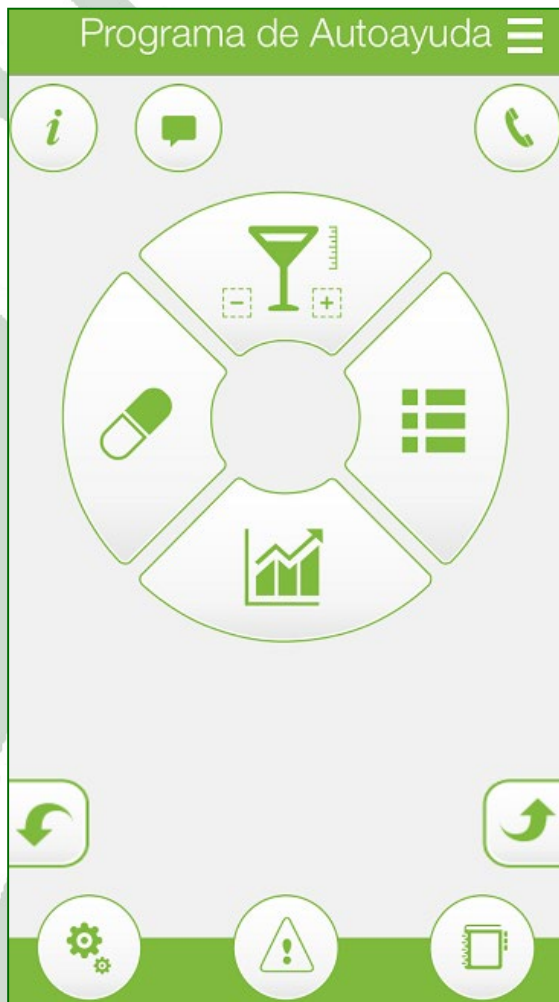
Ecological Momentary Assessment

- Ecological Momentary Assessment (EMA) is the evaluation of:
  - symptoms day to day,
  - in the patient's usual environment,
  - free from recall biases (the patient self-assesses right then, not later; right there, not elsewhere)

(Ferreri et al., 2018)

Ecological Momentary Assessment

- EMA apps are just as reliable as the scales used for psychiatric disorders and its acceptability is excellent (possibly even better) (Torous et al, 2015)

- Several studies have shown that SUDs can be assessed in real time (Morgenstern et al, 2014; Lukasiewicz et al, 2007)

- Has been used in AUD to assess alcohol use, craving, stress, mood, PTSD symptoms, etc. (Ferreri et al, 2018)

- It leads to **Ecological Momentary Interventions**.

Ecological Momentary Interventions

- SMS messages
- Psychoeducation
- Realtime coping strategies
- Motivational messages
- Behavioral change promotion
- **A virtual coach?**

(Ferreri et al, 2018)

CLÍNIC
BARCELONA
Hospital Universitari

Digital phenotype – Passive data

DrinkSense: Characterizing Youth Drinking

Drunk User Interfaces: Determining Blood Alcohol Level through Everyday Smartphone Tasks

Detecting Drinking Episodes in Young Adults Using Phone Sensors and an Artificial Neural Network

sensors MDPI

Article

2015 International Conference on Healthcare Informatics

Smartphone Inference of Alcohol Consumption Levels from Gait

Zachary Arnold, Danielle LaRose and Emmanuel Agu

Computer Science Department, Worcester Polytechnic Institute, Worcester, MA 01609
{zparnold, dmlarose}@wpi.edu, emmanuel@cs.wpi.edu

Correspondence: peg25@pitt.edu; Tel.: +1-412-624-8858

Received: 22 October 2017; Accepted: 8 December 2017; Published: 13 December 2017
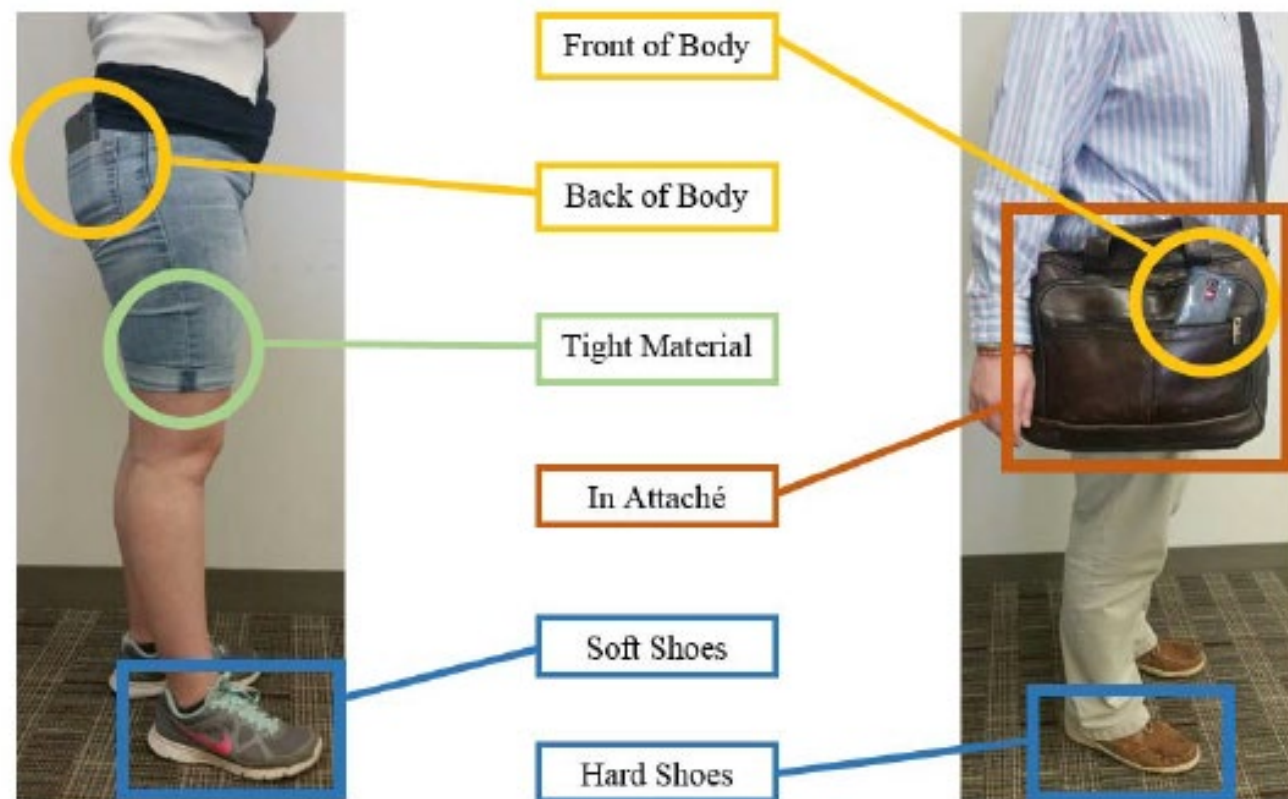
Still some technical issues to be solved ...

Figure 1 - Experimental Factors that could affect Gait inference

But it is doable !!

TABLE 1 – TIME DOMAIN GAIT FEATURES EXPLORED

Time Domain Feature	Definition
Number of Steps [8]	The number of steps taken in a given time interval
Average Step Length [15]	Average in the distance covered by each step
Average Step Time [15]	Average in the time covered by each step
Gait Velocity [8]	Ratio of the total distance covered by the total time
Cadence [8]	Ratio of the total number of steps by the total time
Skewness [8]	Asymmetry of the signal distribution
Kurtosis [8]	"Peakedness" of the distribution and the heaviness of its tail

CLÍNIC
BARCELONA
Hospital Universitari

And allows identification of alcohol intoxication through the user's gait (accuracy 57-70%)
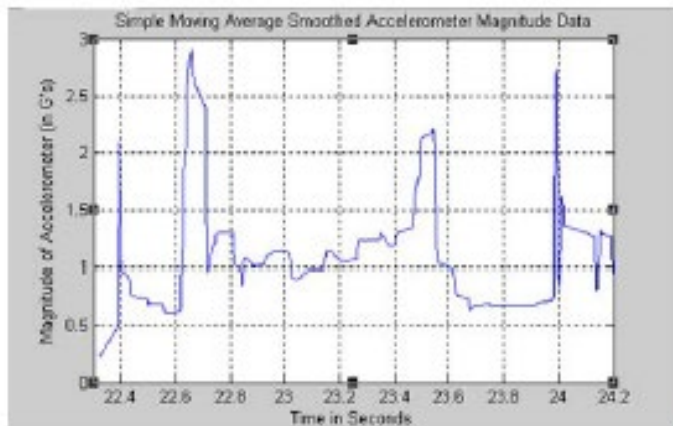

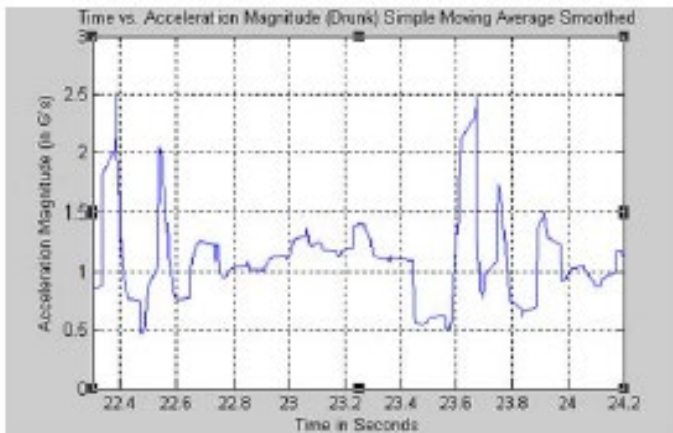Figure 7 - MATLAB Plot of Sober Gait in Time Domain

Figure 8- MATLAB Plot of Intoxicated Gait in Time Domain

TABLE 3 – SOBER VS INTOXICATED FEATURE COMPARISON

	Sober	Intoxicated
numSteps	12	12
cadence	1.1638	1.3327
skewness	1.6739	0.81458
kurtosis	6.1112	3.6834
gaitVelocity	0.096984	0.11106
stepLength	-1.9231	-1.9231
ratio	0.47392	0.79152
stepTime	3.6547	6.9889
avgPower	32307	13379
SNR	-2.9788	-5.1409
THD	-2.0745	-14.41
numDrinks	0	12

Arnold et al, 2015

CLÍNIC
BARCELONA
Hospital Universitari

And they just used the tri-axis accelerometer!!
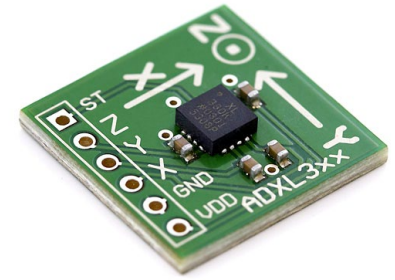
'In future, we would like to gather data from additional sensors including the gyroscope, GPS, bluetooth, the compass and other inertial sensors.'

CLÍNIC
BARCELONA
Hospital Universitari

Which new technologies look promising?

- Artificial Intelligence
- Digital phenotyping
- **Wearable devices**
- Virtual Reality
- Transcranial Magnetic Stimulation
- Digital interventions

CLÍNIC
BARCELONA
Hospital Universitari

Wearables

It is possible to obtain passive data from:

- Accelerometers

- Heart rate sensors

- Sleep trackers

- Skin conductance sensors

- Light sensors

- GPS

CLÍNIC
BARCELONA
Hospital Universitari

Wearables

Original Article

Continuous Objective Monitoring of Alcohol Use: Twenty-First Century Measurement Using Transdermal Sensors

Thad R. Leffingwell ✉, Nathaniel J. Cooney, James G. Murphy,

Susan Luczak, Gary Rosen, Donald M. Dougherty, Nancy P. Barnett

Experiences with SCRAMx alcohol monitoring technology in 100 alcohol treatment outpatients

Sheila M. Alessi[a,*], **Nancy P. Barnett**[b], and **Nancy M. Petry**[a]

[a]University of Connecticut School of Medicine and Calhoun Cardiology Center Behavioral Health, 263 Farmington Avenue, Farmington, CT 06030-3944, USA

[b]Center for Alcohol and Addiction Studies, Brown University, Box G-S121-5, Providence, RI 02912, USA

Acceptance of Transdermal monitoring of alcohol: Scram X

- 100 patients
- 9% declined participation
- 96% of bracelets returned
- 94 equipment tampers affecting 2% of monitoring days (56% detected drinking)
- 81% helped reduce their drinking
- 75% would wear it longer than 3 months

CLÍNIC
BARCELONA
Hospital Universitari

BACtrack Skyn

PROOF - Alcohol Tracking Wearable

PROOF™ is a sleek wearable that uses disposable
cartridges to track BAC levels through your skin.

Ethaxip

Unidad Conductas Adictivas –
Hospital Clínic de Barcelona

DISPOSITIVO MÉDICO PARA EL
DIAGNÓSTICO Y TRATAMIENTO DEL
CONSUMO NOCIVO DE ALCOHOL. ETHAXIP

Edad Muestra: 18-60 años

Reclutamiento
3 semanas

Criterios de inclusión:
Aceptación voluntaria de
participar en el estudio.
Firma del consentimiento
informado

Tasa de abandono
estimada: 5%

Fase A: Voluntarios Sanos N=10

Consumo de 1 ube: Control
Temperatura, F.C., T.A. y adherencia de
ETHAXIP midiendo alcohol en piel.
A las 2 h.
Consumo de 2 ube, repetición
protocolo anterior.

Fase B: Pacientes N=30

AUDIT, dx clínico:
Adherencia ETHAXIP, pedir al paciente
realice un registro de los consumos durante
24 h. Al día siguiente, retirar ETHAXIP,
valorar datos obtenidos y compararlos con
los registrados por el paciente.

FCTecnics
Biotech R & D

METEOR
CENTRE D'INNOVACIÓ TECNOLÒGICA DE MEMBRANES I ENGINYERIA DE PROCESSOS

CLÍNIC
BARCELONA
Hospital Universitari

OXFORD
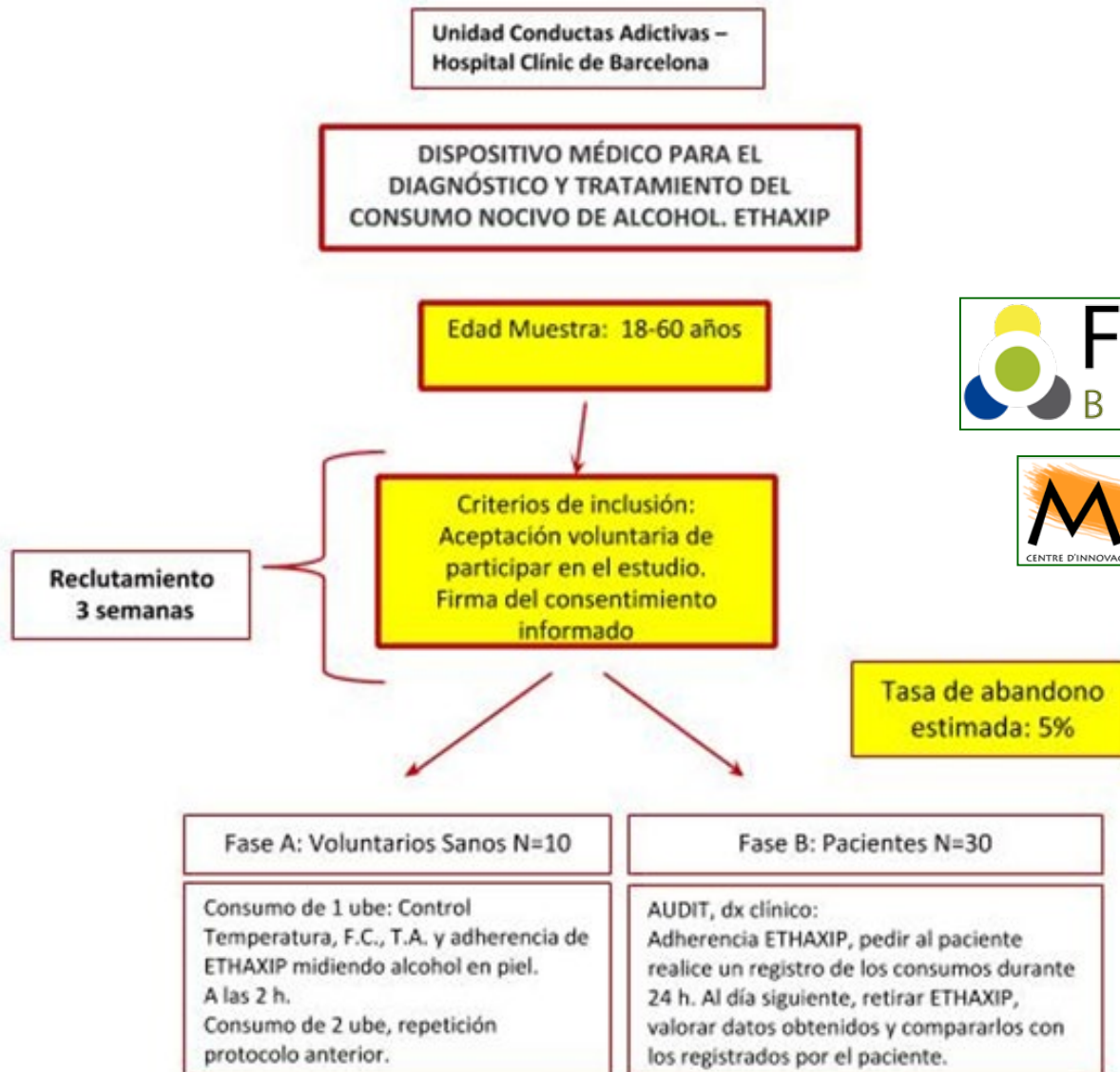
Letter to the Editor

New Alcohol Biomarkers. New challenges

Pablo Barrio[1,*], Friedrich Martin Wurst[2,3], and Antoni Gual[1]

[1]Psychiatry Department, Addictive Behaviors Unit, Clinic Hospital, Barcelona 08036, Spain, [2]Psychiatry Department, Psychiatric University Hospital Basel, Klingelbergstrasse 61, 4056 Basel, Switzerland, and [3]Center for Interdisciplinary Addiction Research, Universität Hamburg, Mittelweg 177 20148, Hamburg, Germany

*Corresponding author: Villarroel, 170 08036 Barcelona, Spain. Tel.: 0034932271719; Fax: 0034932275400; E-mail: pbarrio@clinic.cat

If properly used, with a humanistic and patient-centered approach, these new tools will help patients and clinicians reach better assessments, better informed decisions and better patient outcomes.

CLÍNIC
BARCELONA
Hospital Universitari

Which new technologies look promising?

- Artificial Intelligence
- Digital phenotyping
- Wearable devices
- **Virtual Reality**
- Transcranial Magnetic Stimulation
- Digital interventions

CLÍNIC
BARCELONA
Hospital Universitari

Virtual reality

Virtual Reality Therapy for the Treatment of Alcohol Dependence: A Preliminary Investigation With Positron Emission Tomography/Computerized Tomography

RUTGERS
Center of Alcohol Studies

After VRT, alcohol-dependent subjects showed decreased brain metabolism in the right lentiform nucleus (P(FDR < .05) = .026) and right temporal lobe (BA38, P(FDR < .05) = .032) relative to that at baseline.

CLÍNIC
BARCELONA
Hospital Universitari

<u>Original Paper</u>

Virtual Reality Cue Refusal Video Game for Alcohol and Cigarette Recovery Support: Summative Study

Mary Metcalf, MPH, PhD; Karen Rossie, DDS, PhD; Katie Stokes, MAT; Christina Tallman, MPhys; Bradley Tanner, MD

Clinical Tools, Inc, Chapel Hill, NC, United States

Patients didn't seem enthusiastic...

Game satisfaction scores (5-point Likert-type scale).

The game was fun.	4.43
This game was engaging.	4.58
Based on my experience, I would recommend this game to other patients in treatment for substance use problems.	3.88
Based on my experience, this game will aid in my substance use treatment and recovery.	3.45
Overall, this game will be a useful substance use treatment and recovery tool.	3.78

CLÍNIC
BARCELONA
Hospital Universitari

Project: Virtual Reality (VR) therapy for the treatment of alcohol use disorders

AIMS:

- Identification of *craving signs*
- Developmentand validation of a cravng measurement tool through 'eye tracking' technology
- Validation of VR scenarios to produce craving
- Efficacy of VR therapy in the treatment of resistent patients

Funded by the PNSD
PI: Dr Gutiérrez Maldonado

CLÍNIC
BARCELONA
Hospital Universitari

Identifying Triggers of Alcohol Craving to Develop Effective Virtual Environments for Cue Exposure Therapy

Alexandra Ghiță[1], Lidia Teixidor[2], Miquel Monras[2], Lluisa Ortega[2], Silvia Mondon[2], Antoni Gual[2], Sofia Miranda Paredes[1], Laura Villares Urgell[1], Bruno Porras-García[1], Marta Ferrer-García[1] and José Gutiérrez-Maldonado[1]*

[1] Department of Clinical Psychology and Psychobiology, University of Barcelona, Barcelona, Spain, [2] Addictive Behaviors Unit, Hospital Clinic of Barcelona, Barcelona, Spain

- 75 patients and 95 healthy volunteers
- AUD patients experience more craving in negative mood situations
- Controls experience more cravings at night, in bars and in weekends

CLÍNIC
BARCELONA
Hospital Universitari

Attentional bias assessment in patients with alcohol use disorder: an eye-tracking study

Alexandra GHIŢĂ [a,1], Bruno PORRAS GARCÍA[a], Manuel MORENO[b], Miquel MONRAS[c], Lluisa ORTEGA[c], Silvia MONDON[c], Lidia TEIXIDO[c], Amadeu OBACH i VIDAL[c], Antoni GUAL[c], José Antonio AZNAR CASANOVA[b], Marta FERRER GARCÍA[a], Paola BERTOMEU PANISELLO[a] & José GUTIÉRREZ MALDONADO[a]
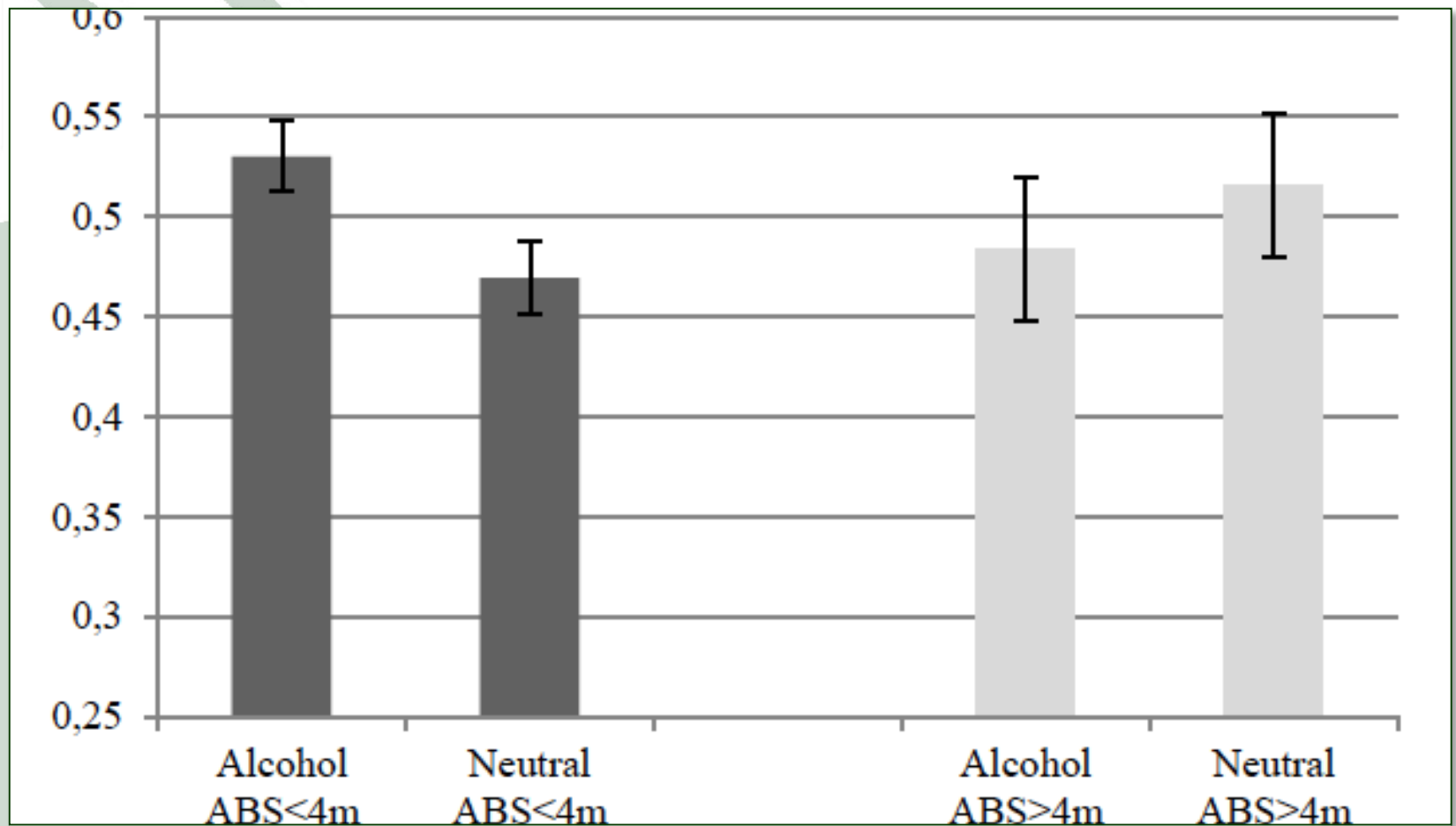
[a]Department of Clinical Psychology and Psychobiology, University of Barcelona
[b]Department of Cognition, Development and Educational Psychology, University of Barcelona
[c]Addictive Behaviors Unit, Hospital Clinic of Barcelona

- 24 AUD patients
- Attentional bias ⬇ with abstinence > 4months

CLÍNIC
BARCELONA
Hospital Universitari

Attentional bias

Ghita et al, in press

Applications of virtual reality in individuals with alcohol misuse: A systematic review

Alexandra Ghiţă*, José Gutiérrez-Maldonado

University of Barcelona, Department of Clinical Psychology and Psychobiology, Spain

- 13 studies

- Clear limitations:
  - No RCT
  - No evidence of generalization of craving responses in the real world
  - No data on long term effect

- Consistent results with regards to eliciting and reducing alcohol craving

Which new technologies look promising?

- Artificial Intelligence
- Digital phenotyping
- Wearable devices
- Virtual Reality
- **Transcranial Magnetic Stimulation**
- Digital interventions

CLÍNIC
BARCELONA
Hospital Universitari

Brain Stimulation Techniques

rTMS
repetitive Transcranial
Magnetic Stimulation

tDCS
transcranial Direct
Current Stimulation

DBS
Deep brain
Stimulation

Coles et al, 2018

CLÍNIC
BARCELONA
Hospital Universitari

Efficacy of repetitive transcranial magnetic stimulation in alcohol dependence: a sham-controlled study

Biswa R. Mishra[1], S. Haque Nizamie[1,2], Basudeb Das[1] & Samir K. Praharaj[1]

Center for Cognitive Neurosciences[2] and Central Institute of Psychiatry, Kanke, Ranchi, Jharkhand, India[1]

- 45 patients with AUD allocated to active and sham rTMS in a 2 : 1 ratio
- Received active and sham rTMS to the right DLPFC (10 sessions).
- At 1 month - significant reduction in the active group in the Alcohol Craving Questionnaire
- The effect size for treatment with time interaction was moderate (h2 = 0.401).

Efficacy of repetitive transcranial magnetic stimulation

Commentary on Mishra et *al.* (2010): Transcranial magnetic stimulation effects on craving: impressive therapy or therapeutic impressions?

- The features of the intervention make it the perfect placebo, and should temper our enthusiasm until follow-up studies are conducted.
- We need additional studies to replicate findings, assess effects on drinking behavior, validate that TMS is the active component of the intervention and determine mechanism.
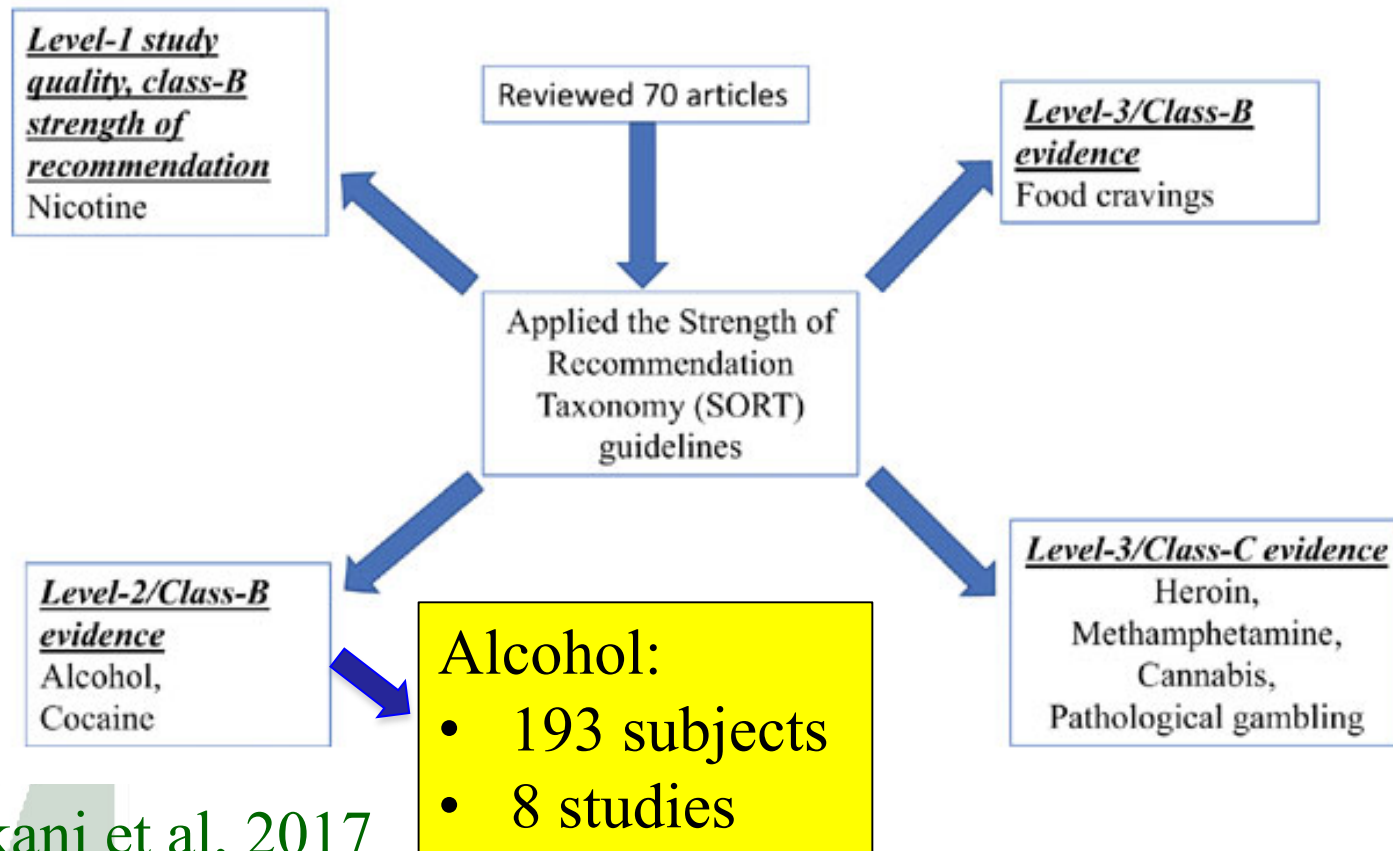
Trafton, J. 2010

CLÍNIC
BARCELONA
Hospital Universitari

Role of Repetitive Transcranial Magnetic Stimulation (rTMS) in Treatment of Addiction and Related Disorders: A Systematic Review

(E-pub Ahead of Print)

Author(s): Ramkrishna Makani, Basant Pradhan*, Umang Shah, Tapan Parikh.

rTMS in Treatment of Addictions

Reviewed 70 articles

Applied the Strength of Recommendation Taxonomy (SORT) guidelines

Level-1 study quality, class-B strength of recommendation
Nicotine

Level-3/Class-B evidence
Food cravings

Level-2/Class-B evidence
Alcohol, Cocaine

Level-3/Class-C evidence
Heroin, Methamphetamine, Cannabis, Pathological gambling

Alcohol:
- 193 subjects
- 8 studies

Makani et al, 2017

A Review of Brain Stimulation Methods to Treat Substance Use Disorders

Alexandria S. Coles, BA[1], **Karolina Kozak, MSc**[1,2], and **Tony P. George, MD, FRCPC**[1,2,3]

[1]Addictions Division, Centre for Addiction and Mental Health, Toronto, Ontario, Canada

[2]Institute of Medical Sciences (IMS), University of Toronto, Toronto, Ontario, Canada

[3]Division of Brain and Therapeutics, Department of Psychiatry, University of Toronto, Toronto, Ontario, Canada

rTMS studies on alcohol

Author	N	# ses	Brain region	Design	Technique	Results
Addolorato	11	1	L&R DLPFC	Sham-controlled	dTMS	↓alcohol
Herremans	29	1	R DLPFC	Sham-controlled	rTMS	Negative
Herremans	36	1	R DLPFC	Sham-controlled	rTMS	Negative
Hoppner	19	1	L DLPFC	Sham-controlled	rTMS	Negative
Ceccanti	18	10	MPFC	Sham-controlled	dTMS	↓alcohol
Girardi	24	10	MPFC	Open label	dTMS	↓craving
Herremans	26	15	R DLPFC	Open label	rTMS	↓craving
Mishra	20	10	L&R DLPFC	Randomized	rTMS	↓craving
Mishra	45	10	DLPFC	Sham-controlled	rTMS	↓craving

Coles et al, 2018

CLÍNIC
BARCELONA
Hospital Universitari

tDCS studies on alcohol

Author	N	# ses	Brain region	Design	Technique	Results
Wietschorke	30	1	DLPFC	Sham-controlled	Ca⁻ L	⬇craving
Den Uyl	41	1	DLPFC	Sham-controlled	Ca⁻ R	⬇craving
Nakamura	49	1	DLPFC	Sham-controlled	Ca⁻ R	Negative
Den Uyl	91	4	DLPFC	Sham-controlled	Ca⁻ R	Negative
Klauss	33	5	DLPFC	Sham-controlled	Ca⁻ L	⬇relapse
Da Silva	13	5	FTP	Sham-controlled	Ca⁻ R	⬆relapse
Boggio	13	2	L&R DLPFC	Sham-controlled	crossover	⬇craving

Coles et al, 2018

CLÍNIC
BARCELONA
Hospital Universitari

Noninvasive brain stimulation treatments for addiction and major depression

Katharine Dunlop,[1,2] Colleen A. Hanlon,[3,4,5] and Jonathan Downar[1,2,6,7]

Brain activity is organized into functional networks. Two are relevant to SUDs:

- The salience network (SN), crucial for cognitive control and response inhibition.
- The ventromedial network (VMN) that corresponds to the reward circuit.

CLÍNIC
BARCELONA
Hospital Universitari

Brain Functional Networks
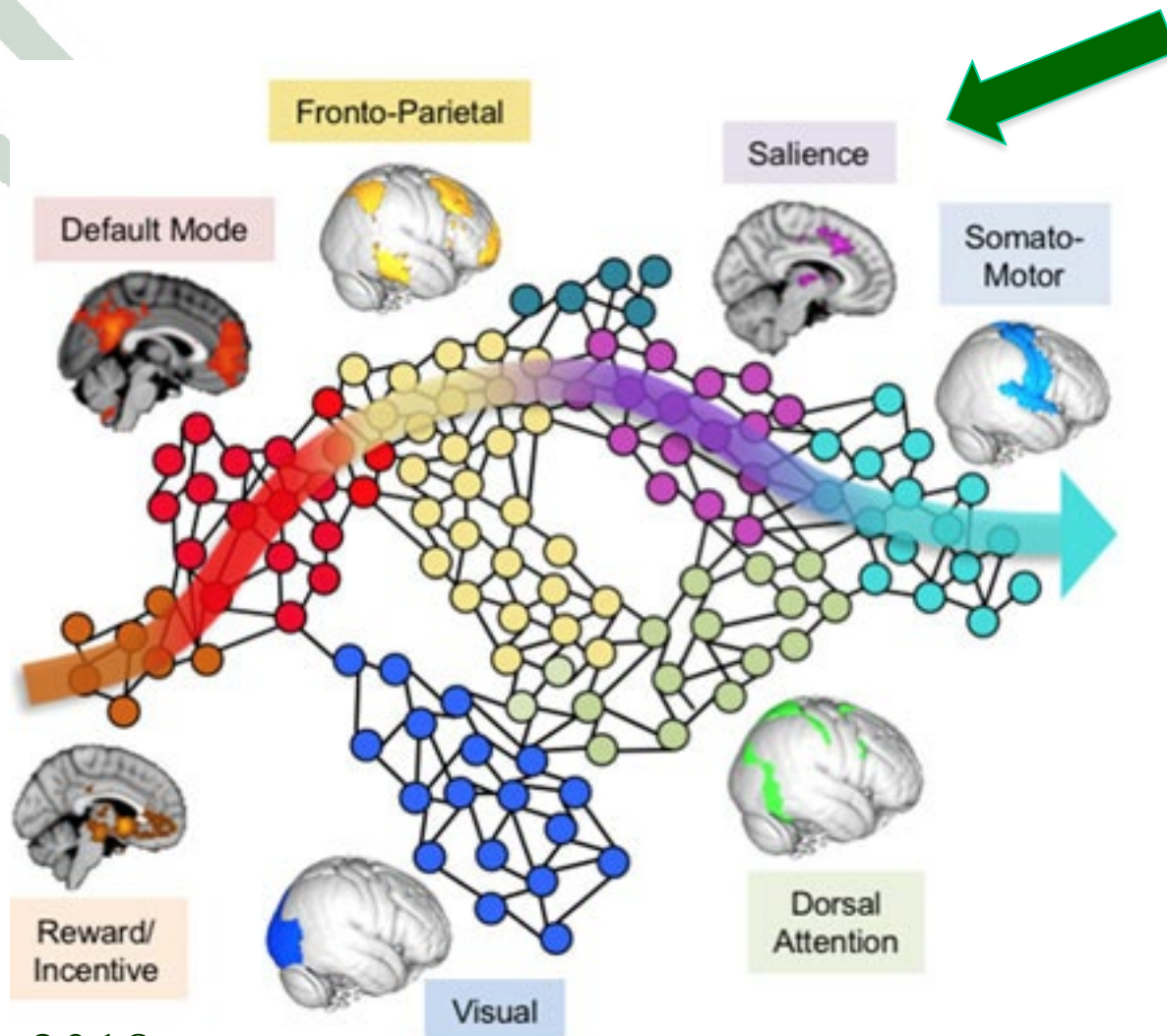
Coles et al, 2018

rTMS and tDCS treatment strategies

- Stimulation of the core SN nodes in the dorsal anterior cingulate cortex, dorsolateral prefrontal cortex, and anterior insula.

- Inhibition of the VMN for quenching the pathological incentive salience underlying SUDs.

Coles et al., 2018

Which new technologies look promising?

- Artificial Intelligence
- Digital phenotyping
- Wearable devices
- Virtual Reality
- Transcranial Magnetic Stimulation
- **Digital interventions**

Personalised digital interventions for reducing hazardous and

REGULAR ARTICLE

Behavior Change Techniques Used in Digital Behavior Change Interventions to Reduce Excessive Alcohol Consumption: A Meta-regression

Claire V. Garnett, PhD[1,2,*] • David Crane, PhD[2,*] • Jamie Brown, PhD[1] • Eileen F. S. Kaner, PhD[3] • Fiona R. Beyer, PGDip[3] • Colin R. Muirhead, PhD[3] • Matthew Hickman, PhD[4] • Emma Beard, PhD[1] • James Redmore, MPH[4] • Frank de Vocht, PhD[4] • Susan Michie, DPhil[2]

Cochrane review. Main results.

- 57 RCTs; 34,390 participants
- 41 RCTs; 19,241 participants in meta-analysis
- ⑩⬇23 g alcohol weekly (95% CI 15 to 30)
- ⑩⬇One binge drinking per month. 15 studies (3587 participants)
- ⑩⬇One unit per drinking occasion per month. 15 studies (9791 participants)
- No difference vs. face-to-face intervention

Kaner et al., 2017

Behavior Change Techniques used

- Feedback on behavior   85.7%
- Social comparison   81.0%
- Feedback on outcomes of behavior   69.0%
- Social support   64.3%
- Instruction on how to perform   52.4%
- Salience of consequences   50.0%
- Biofeedback   50.0%

Garnett et al., 2018

CLÍNIC
BARCELONA
Hospital Universitari

More effective Behavior Change Techniques

- **Behavior substitution**   **95 gpw**
  (95% CI:−162.90, −27.34)

- **Problem solving**   **46 gpw**

  (95% CI: −90.97, −0.87)

- **Credible source**   **32 gpw**
  (95% CI: −60.64,−3.55)

  gpw = grams per week

Garnett et al., 2018

CLÍNIC
BARCELONA
Hospital Universitari

It does not always work....

Implementing referral to an electronic alcohol brief advice website in primary healthcare: results from the ODHIN implementation trial

Preben Bendtsen,[1] Ulrika Müssener,[2] Nadine Karlsson,[2] Hugo López-Pelayo,[3] Jorge Palacio-Vieira,[4] Joan Colom,[4] Antoni Gual,[3] Jillian Reynolds,[3] Paul Wallace,[5] Lidia Segura,[4] Peter Anderson[6,7]

Table 1   Number of referrals to eBI and log-on rates per jurisdiction in 60 PHCUs randomised to the eBI arms of the ODHIN trial

Jurisdiction	Providers, n	Active providers, n (%)*	Referrals to eBI, n†	Mean log-on rate (%)
Catalonia	107	34 (32)	100	0.58
England	52	39 (75)	258	28.81
The Netherlands	72	28 (39)	58	17.32
Poland	34	33 (97)	793	10.58
Sweden	85	44 (52)	198	36.95
Total	350	178 (51)	1407	18.40

*Active providers defined as those who had handed out at least one eBI referral card during the 12-week implementation period.
†Number of patients referred to eBI.
eBI, electronic brief intervention; ODHIN, Optimizing Delivery of Health Care Interventions; PHCUs, primary healthcare units.
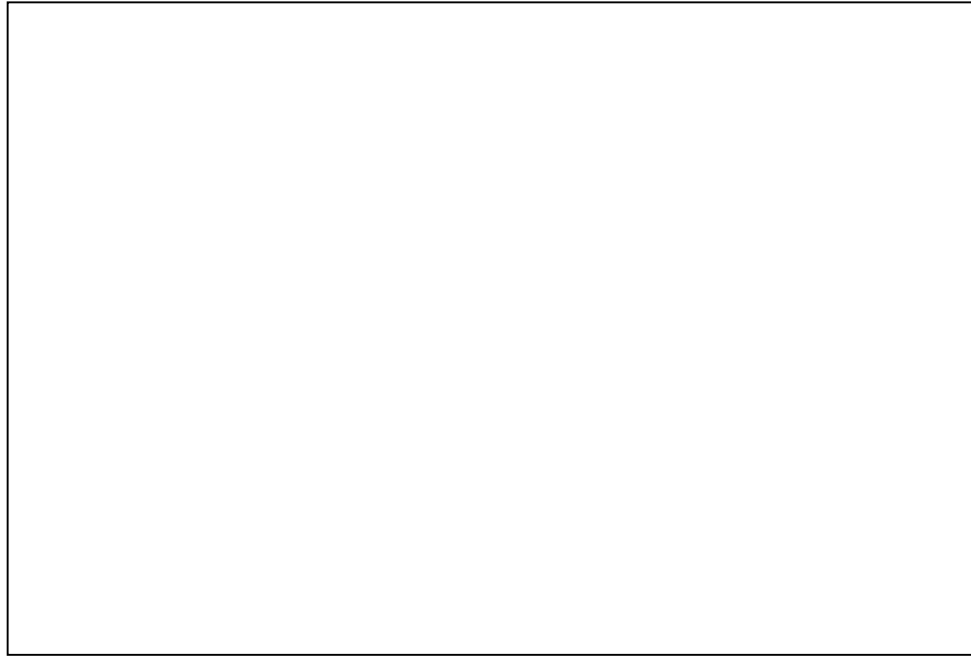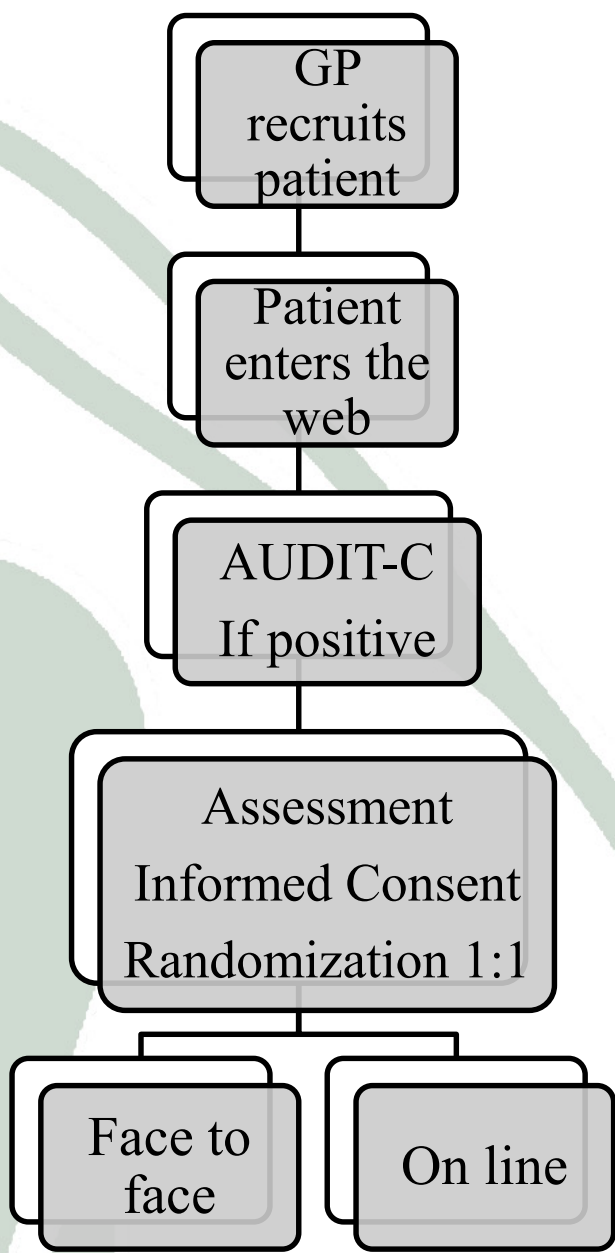
EFAR Project

A randomised controlled non-inferiority trial of primary care-based facilitated access to an alcohol reduction website (EFAR Spain)

ClinicalTrials.gov NCT02082990

Funding source (PI042924)

GP recruits patient

Patient enters the web

AUDIT-C If positive

Assessment
Informed Consent
Randomization 1:1

Face to face

On line

Online follow-up of patients at 3 and 12 months

López-Pelayo et al., 2014

Difficulties found in EFAR

	Planned	Real
PHC professionals	113	83
Leaflets	150	78
Patients per professional	9	4
Total patients	1000	368
Length (months)	12	24

CLÍNIC
BARCELONA
Hospital Universitari

A-Chess

Substance Use & Misuse

Explicating an Evidence-Based, Theoretically Informed, Mobile Technology-Based System to Improve Outcomes for People in Recovery for Alcohol Dependence

David H. Gustafson, Bret R. Shaw, Andrew Isham, Timothy Baker, Michael G. Boyle & Michael Levy

A-Chess
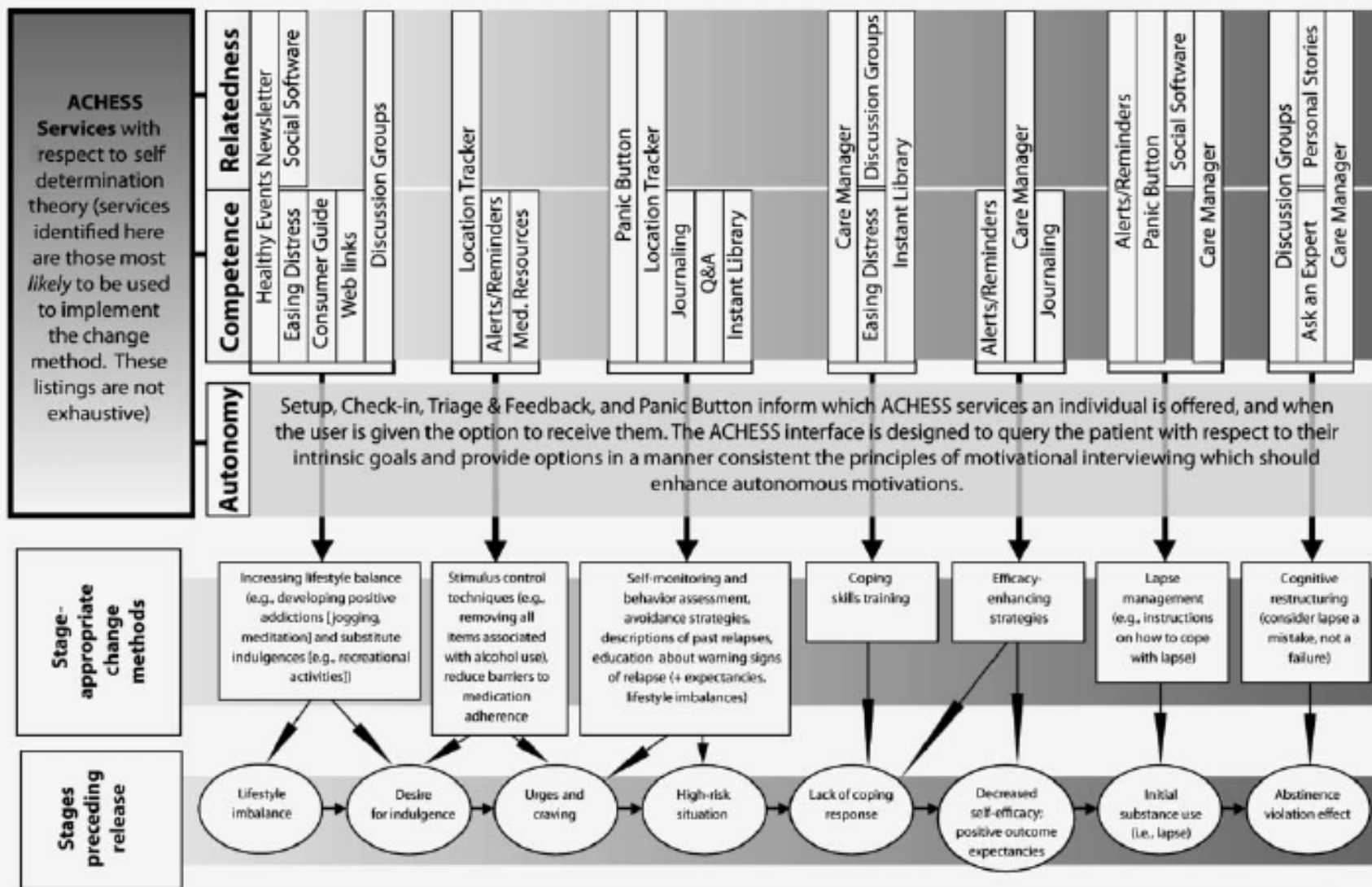
Sideal

Self-management and Shared Decision-Making in Alcohol Dependence via a Mobile App: a Pilot Study

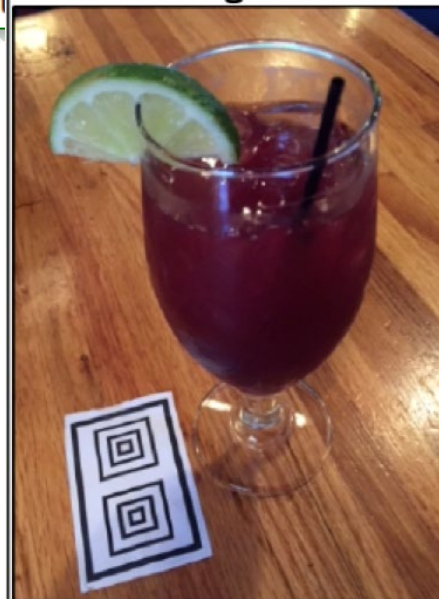Pablo Barrio[1] · Lluisa Ortega[1] · Hugo López[1] · Antoni Gual[2]

Original Paper

The Remote Food Photography Method and SmartIntake App for the Assessment of Alcohol Use in Young Adults: Feasibility Study and Comparison to Standard Assessment Methodology

Tera L Fazzino[1,2], PhD; Corby K Mar

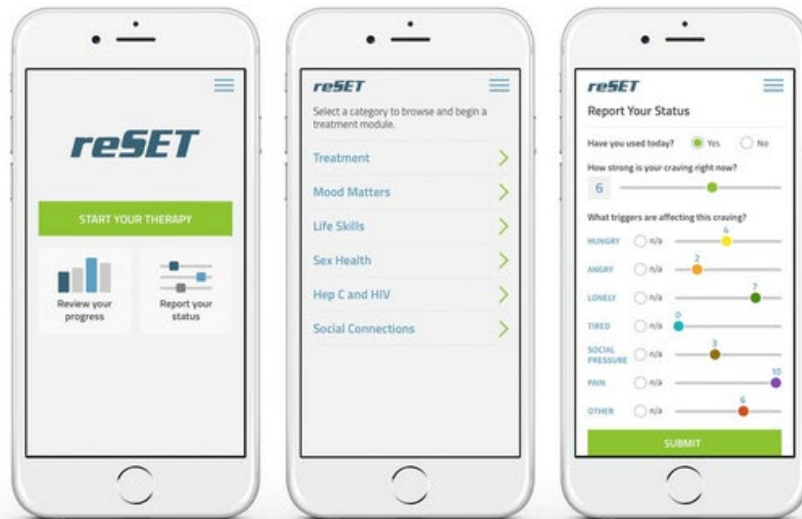Application of RFPM and SmartIntake® to measuring alcohol intake.
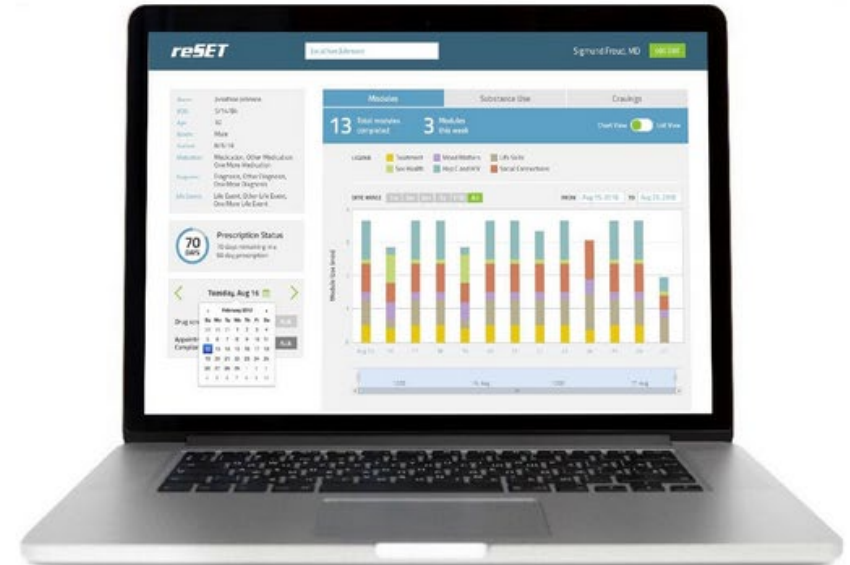
Before image.
Description: "Sangria with lime"

After image.

Fazzino et al, 2018

FDA authorized APPs

Patient-Facing Smartphone Application

Clinician-Facing Web Interface

Release

Today, the U.S. Food and Drug Administration permitted marketing of the first mobile medical application to help treat substance use disorders (SUD). The Reset application is intended to be used with outpatient therapy to treat alcohol, cocaine, marijuana and stimulant SUDs. The application is not intended to be used to treat opioid dependence.

Related Information

• FDA: Recently Approved Devices

Key elements of APPS

- Immediate access

- Assesment & Intervention in real time

- Enhances self-management

- Simplifies monitorization

- Need to design them with a motivational perspective and through co-creation

- Should be usable as a stand alone tool and in clinical settings

Dashboard

:igarettes

depuis
4ans

économisé
2083€

8770cig. non-fumées

Version Pro   Version Pro

Profil   Statistiques   Réussites   Journal   Autre

Summary

- New technologies will change radically the assessment of AUD

- Data on new treatments are exciting but still preliminary

- Change has already begun. Jump on the train before you miss it!

- It is crucial to use the new tools with a humanistic, motivational, patient-centered approach.

CLÍNIC
BARCELONA
Hospital Universitari

I know that I know nothing

Socrates & Plato

How the use of new technologies changes the treatment of Alcohol Use Disorders

Tak!

Antoni Gual

Addictions Unit. Psychiatry Dept.

Neurosciences Institute. Hospital Clinic

Barcelona

tgual@clinic.cat

IDI BAPS

UNIVERSITAT DE BARCELONA

d-HealthyLife

Red de Trastornos Adictivos

CLÍNIC BARCELONA Hospital Universitari