Ethical design for digital wellbeing and mental health

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Affective Technologies

Systematic review - 139 papers over last 10 years of SIGCHI proceedings
- Emphasis on data production
- Limited evaluation in clinical context
- Limited engagement with emotion regulation theories

Affective Technologies

Ethics concerns and best practices
- diagnosis vs lack of support, stigma
- logging personal data vs privacy
- involving users vs careful screening
- secondary data use vs consent

Affective Health Technologies: Acceptance

The Technology Acceptance (TAC) Toolkit

Nadal, C., McCully, S., Doherty, K., Sas, C., Doherty G., 2022. The TAC toolkit: Supporting the design for user acceptance of health technologies from a macro-temporal perspective, CHI'22 [Best Paper Award]

And a website

ehealthacceptancedesign.com

A virtual think-space

Images: ©Camille Nadal

Design Exemplars

Emotional awareness

• AffectiveHealth wearable system
• Smart materials interfaces
• ThermoPixels toolkit for hybrid crafting

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AffectiveHealth System

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Understanding emotional responses
Increased awareness of affective chronometry

Smart Material Interfaces: Implications

- Immediate & embodied feedback - awareness of raise time
- Gradual thermochromic feedback - awareness of decay time
- Design for slowness
- Increased expressiveness for emotional awareness

Design Exemplars

Emotional awareness

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ThermoPixels Toolkit

ThermoPixels: Evaluation

1. Low fidelity prototypes for representations of emotional arousal
   - Introducing arousal
   - Arousal sketches using colors on paper

2. Crafting working prototypes for representations of emotional arousal using ThermoPixels
   - Introducing the toolkit
   - Playful exploration
   - Creating working prototypes

3. Experiencing the working prototypes representing arousal
   - Testing the prototypes using IAPS images
   - Interviewing

Images: ©Muhammad Umair

ThermoPixels: Implications

• Embodied exploration: from assembling to creative expression

ThermoPixels: Implications

- Embodied exploration: from assembling to creative expression
- From arousal representations to emotion regulation

ThermoPixels: Implications

- Embodied exploration: from assembling to creative expression
- From arousal representations to emotion regulation
- Personalization of affective interfaces

Design Exemplars

Emotion regulation

• Haptic interfaces: vibrotactile and thermal
• 3D printed flavors
• Digital wellbeing apps
• Depression apps
• Wall-sized displays for dementia care

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Haptic Interfaces

Haptic Interfaces: Method

- Part 1: Co-design of personalized patterns (haptic group)
- Part 2: Evaluation of patterns’ impact for affect regulation (haptic and control group)


Images: ©Muhammad Umair
Haptic Interfaces

“I went for the lowest [30 bpm] I could get. The reason is that I felt slower. It was nicer to clam down at a slow rate, rather than when it’s really high [that] it’s like more panicky” [P9]

Haptic Interfaces

Warm
“It feels like someone is holding my hand” [P6]

Cool
“It’s like putting the ice cubes on your wrist, which [...] kind of cools you down” [P8]

Haptic Interfaces: Implications

- Design for implicit regulation: entrainment of slow bodily rhythms
- Entrainment of slow bodily rhythms: beyond vibrotactile modality
- Design for thermal biofeedback
- Support personalized and dynamically adaptive patterns

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3D Printed Flavors

• From taste stimulation towards multisensory flavor experiences
• From external sensory stimulation to external and internal ones

Images: ©Tom Gayler

3D Printed Flavors

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Digital Wellbeing Apps

Functionality review digital wellbeing apps
• 39 commercial apps
• 17 from academia

Digital Wellbeing Apps

Behavior regulation:
• limiting use time
• interventions for limiting use


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Digital Wellbeing Apps

Behavior regulation:
• limiting use time
• interventions for limiting use

Design implication:
• from limiting meaningless use towards meaningful use

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Content analysis of 353 apps’ descriptions

- transdiagnostic & multi-theoretical interventions
- evidence-informed interventions
- clinical validity & safety

Depression Apps

Content analysis of 353 apps’ descriptions
• transdiagnostic & multi-theoretical interventions
• evidence-informed interventions
• clinical validity & safety

Reflective questions:
• skills and expertise
• treatment design
• safety and duty of care

Depression Apps

Content analysis of 2,217 user reviews from 40 depression apps

- negative impact: misdiagnosis, harmful advice
- usability issues
- data validity, safety, accuracy

Depression Apps

Content analysis of 2,217 user reviews from 40 depression apps

Ethical issues:

• Autonomy - choice
• Access - barriers
• Commerce – costing
• Privacy, respect – limitedly mentioned

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Virtutes:
• Transparency, trust
• Social impact

Depression Apps

Functionalities review of 29 top rated apps
- depression – lack of wellbeing
- science/evidence base
- children - users

Qu, C., Sas, C., Dauden Roquet, C., Doherty, G. 2020. Reviewing and evaluating the functionalities of top-rated mobile apps for depression. JMIR Mental Health 7(1), 13 pages
Depression Apps

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Design implications
• safeguarding
• tracking emotions & thoughts
• integrate tracked data with intervention progress

Qu, C., Sas, C., Dauden Roquet, C., Doherty, G. 2020. Reviewing and evaluating the functionalities of top-rated mobile apps for depression. *JMIR Mental Health* 7(1), 13 pages
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Dementia Care

Dementia: need for cognitive and sensory stimulation

DementiaWall:
- wall-sized display
- 1 year deployment in residential care home
- strong attachment, engagement & adoption

Sas, C., Davies, N., Clinch, S., Shaw, P., Mikusz, M., Steeds, M., Nohrer, L 2020. Supporting stimulation needs in dementia care through wall-sized displays, CHI’20, 16 pages [Honorable Mention Award]

Image: ©Paul Rowley
Dementia Care

Mediated staged experiences for sensory & social stimulation

Sas, C., Davies, N., Clinch, S., Shaw, P., Mikusz, M., Steeds, M., Nohrer, L. 2020. Supporting stimulation needs in dementia care through wall-sized displays. CHI’20, 16 pages [Honorable Mention Award]

Image: ©Paul Rowley
Dementia Care

Nature-inspired media for mood and behavior regulation

“with severe dementia, there is a lot of walking, so that [one resident] almost exhausts herself, [but with] the right image she would relax [almost instantaneously]: shoulders would drop and she would sit and look at the screen”

Sas, C., Davies, N., Clinch, S., Shaw, P., Mikusz, M., Steeds, M., Nohrer, L 2020. Supporting stimulation needs in dementia care through wall-sized displays. CHI’20, 16 pages [Honorable Mention Award]
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