CSCW 2015   Social Dynamics and My Phone

NUGU: A Group-based Intervention App for Improving Self-Regulation of Limiting Smartphone Use

"When No Use is Good Use?"

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**Smartphones'
useful functions**

- Information seeking

- Productivity

- Social Networking

- Entertainment

- …

Smartphones have now become
an **integral part of the daily lives**

Smartphone use often **distracts** our everyday life **activities**

When we are

- Studying

- Working

- Socializing

- …

Distractions

To avoid such **distractions,** we should **limit** our smartphone usage

However

…

Due to the **lack of self-regulation,**

we often **fail** to maintain the limiting behavior
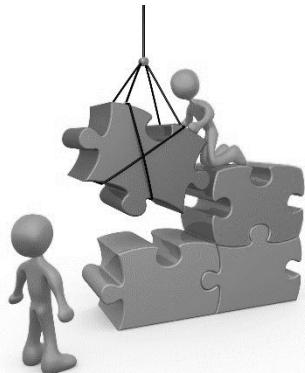
We leverage **social support**

to improve the self-regulation

1. Understanding

limiting practices of smartphone use

2. Designing

A mobile intervention app that helps users limit usage

(by leveraging 'social support')
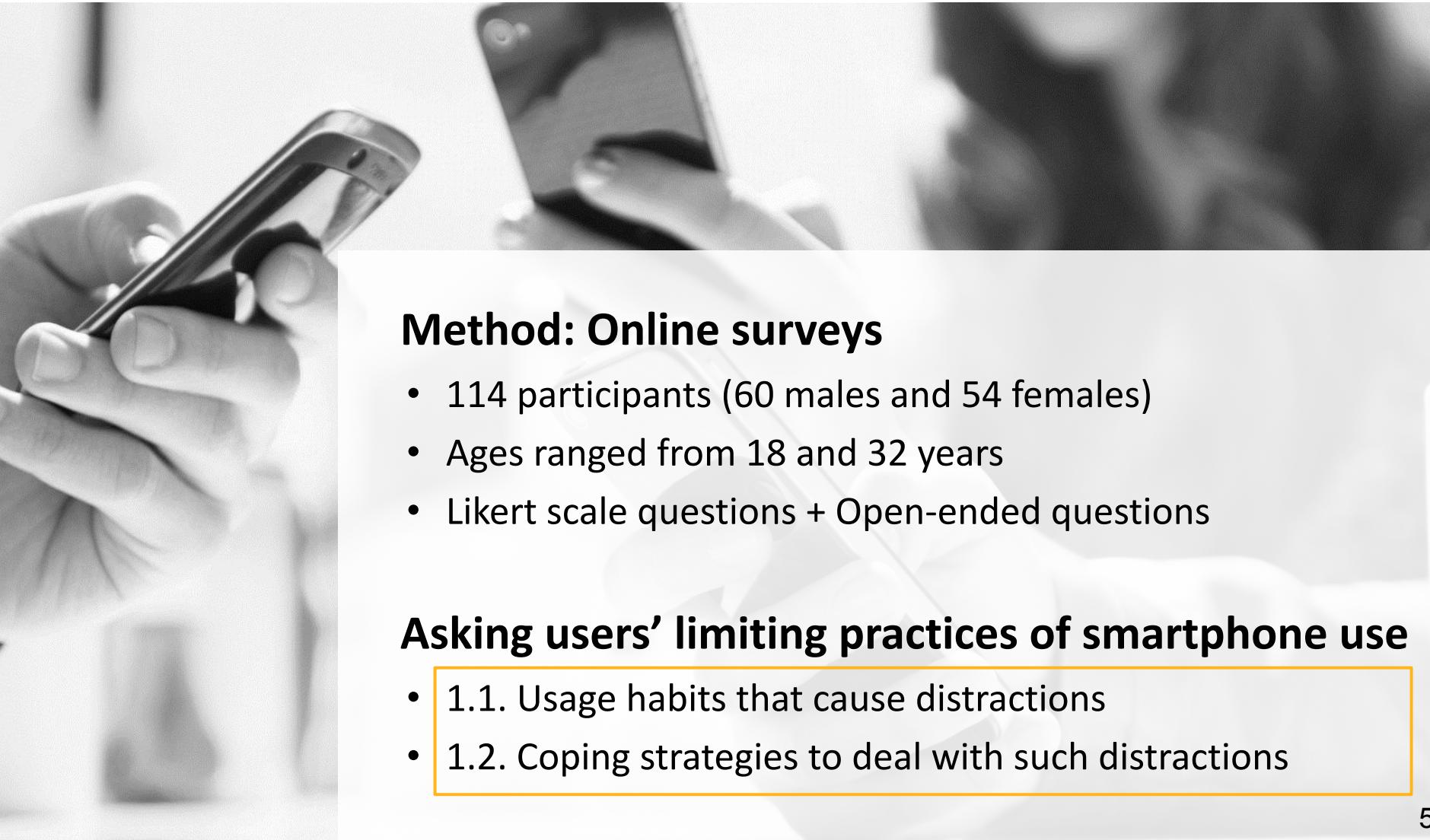
3. Evaluating

The effectiveness of NUGU

1. Understanding

limiting practices of smartphone use

Method: Online surveys

- 114 participants (60 males and 54 females)

- Ages ranged from 18 and 32 years

- Likert scale questions + Open-ended questions

Asking users' limiting practices of smartphone use

- 1.1. Usage habits that cause distractions

- 1.2. Coping strategies to deal with such distractions
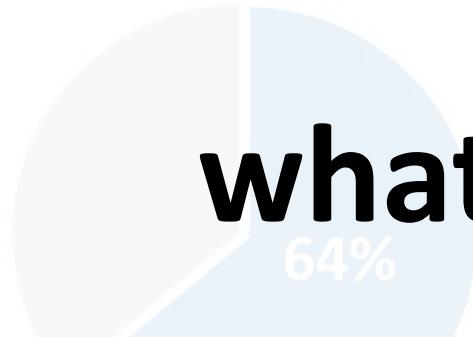
"I'm overusing my smart

Then,

"I want to change my usage habit?"

64%

what usage habits

do they want to change?

60.2%

Score >= 4 (Agree, Strongly Agree)

Score >= 4 (Agree, Strongly Agree)

What usage habits do they want to change?

(According to open coding analysis)

(1) Frequent short usage

(2) Occasional long usage

What usage habits do they want to change?

(According to open coding analysis)

(1) Frequent short usage

(2) Occasional long usage

What usage habits do they want to change?

(According to open coding
analysis)

(1) Frequent short usage

(2) Occasional long usage

What usage habits do they want to change?

(According to open coding
analysis)

**(1) Frequent short usage**   **(2) Occasional long usage**

These usage habits considerably distract users' primary activities
(studying/working/socializing …)
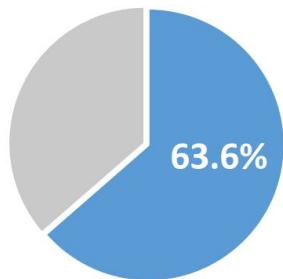
1. Understanding

1.2. Coping strategies to deal with such distractions

"Have you ever attempted to limit your smartphone due to its distractions?"

63.6%

In our survey, 63.6% marked "YES"

What <u>coping strategies</u> did they try?

1. Understanding

1.2. Coping strategies to deal with such distractions

Our survey results showed
people cope with such distractions by

1. Physical separation – 33.8%

2. Removing apps – 15.4%

3. Turning off – 14.0%

4. Using software tools (e.g., usage monitoring, timers, etc.) – 9.8%

5. ETC. (changing data plans, using 2G phones)

These are usually based on **an individual's *will***

Effectiveness of coping strategies

BUT, their effectiveness is **limited**
and they often **failed** to maintain anticipated behavior.

Some participants commented,

"**I deleted every bookmark in my browser**. But the funny thing is that later I just entered the URLs myself and **entered the communities again**. Taking the time to enter the URLs does not bother me at all." (P43)

"I used an **app that blocks smartphone usage** during a certain period, but it was useless. I could **easily override and stop the app** and start using my smartphone by myself." (P37)

1. Understanding

Design implications

Difficulty of Self-Regulation

- Relying on an individual's self-control to limit their smartphone usage is not much effective.

Usage Contexts (Activities)

- Responses are related to activities rather than amounts
- Considering only the usage amounts may not be effective to protect daily activities by overlooking different contexts

Flexible Intervention □ Temporary non-use

- The participants preferred to use less restrictive management strategies
- Limiting should be cancelled whenever users really need to use phones.

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The effectiveness of NUGU

2. Designing
A mobile intervention app that helps users limit usage

How to improve an individual's self-regulation of limiting smartphone usage?

- As shown our previous study, users often have difficulties in maintaining the limiting strategies due to the lack of self-regulation
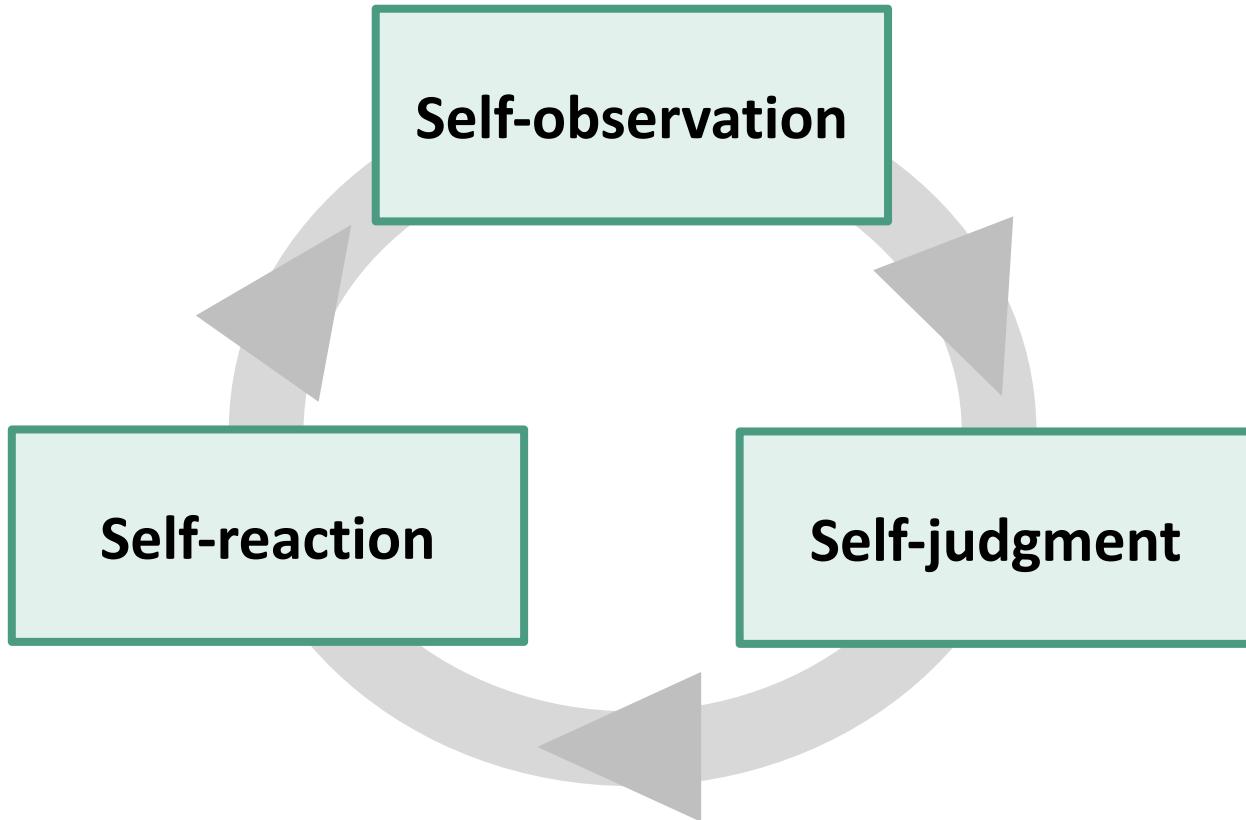
Our approach: Leveraging social support

- Limiting smartphone use with a group of friends
- Sharing their limiting information with one another (for learning and supporting)

5

2. Designing

Our approach: Leveraging **social support**

Three sub-processes of self-regulation

Social cognitive theory of self-regulation (Bandura 1991)

2. Designing

Key components of NUGU

NUGU (our mobile app) supports the key sub-processes of self-regulation

Self-monitoring	Self-monitoring on usage/limiting information
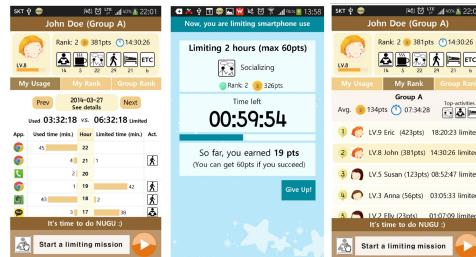
Social Learning & Competition	Sharing limiting information

Goal-setting & Limiting Assistance	Set a limiting goal (called "a limiting mission")

Iterative Design

Main study

Final version

30 participants for three weeks
- Survey, interview, and usage analysis

Pilot study #2

Working prototype #2

10 participants for two weeks
- Interview and usage analysis

Pilot study #1

Working prototype #1

10 participants for two weeks
- Interview

Preliminary study

114 participants
- Online survey

2. Designing

Final design of NUGU


Self-monitoring

Goal-setting & Limiting Assistance

Social Learning & Competition

2. Designing

2.1. Self-monitoring

Overall status of usage/limiting behavior

Comparative view of usage information and limiting information
- This comparative view helps users easily compare their usage and limiting behavior in recent hours.
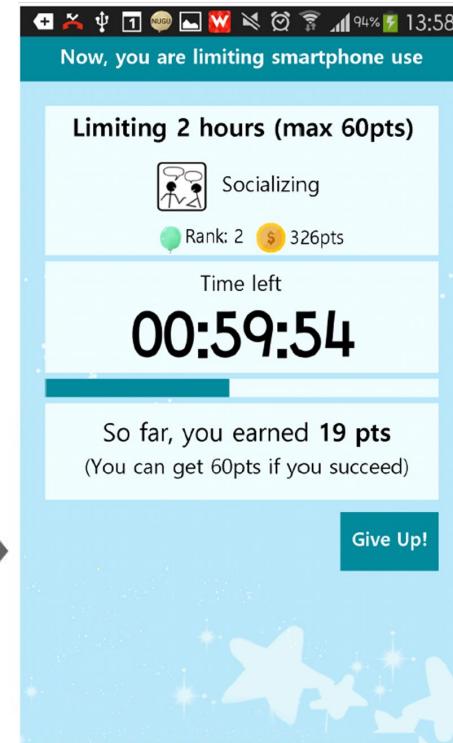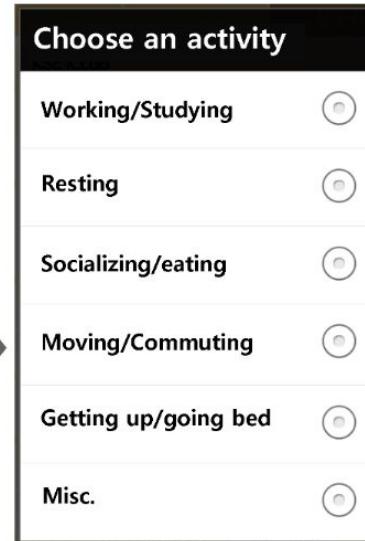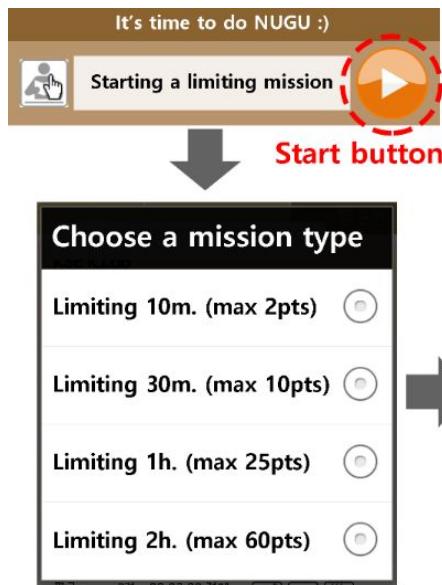
□ Help users aware of their usage problems, and track of their outcomes (limiting).

2. Designing

2.2. Goal-setting & Limiting Assistance
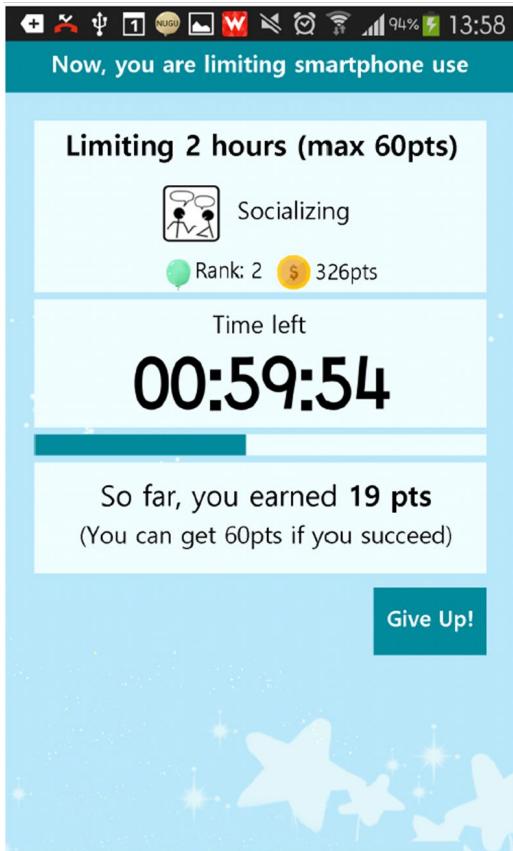

Goal-mode screen

- **Lock the screen** (only allowing to receive incoming calls)
- **Turn into a silence mode**

2. Designing

2.2. Goal-setting & Limiting Assistance

Point system for "motivating users"
- To motivate users, we adopted point system where a user can earn points proportional to the limiting time.

Give-up button for "flexibility"
- The user can give up on a mission if smartphone usage is necessary.
- But, the points are earned proportional to the period of usage limiting.

2. Designing

2.3. Social learning & competition

Within-group ranking

Between-group ranking

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3. Evaluating

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The effectiveness of NUGU

		Within-subjects	
		Pre-session	**Post-session**
Betwe en- groups	**NUGU-Group**	NUGU-Group (pre-session)	NUGU-Group (post-session)
	NUGU-Alone	NUGU-Alone (pre-session)	NUGU-Alone (post-session)

2x2 Quasi-experiment

NUGU-Group using NUGU app

- 35 participants from 8 groups (friends, family, acquaintances …)
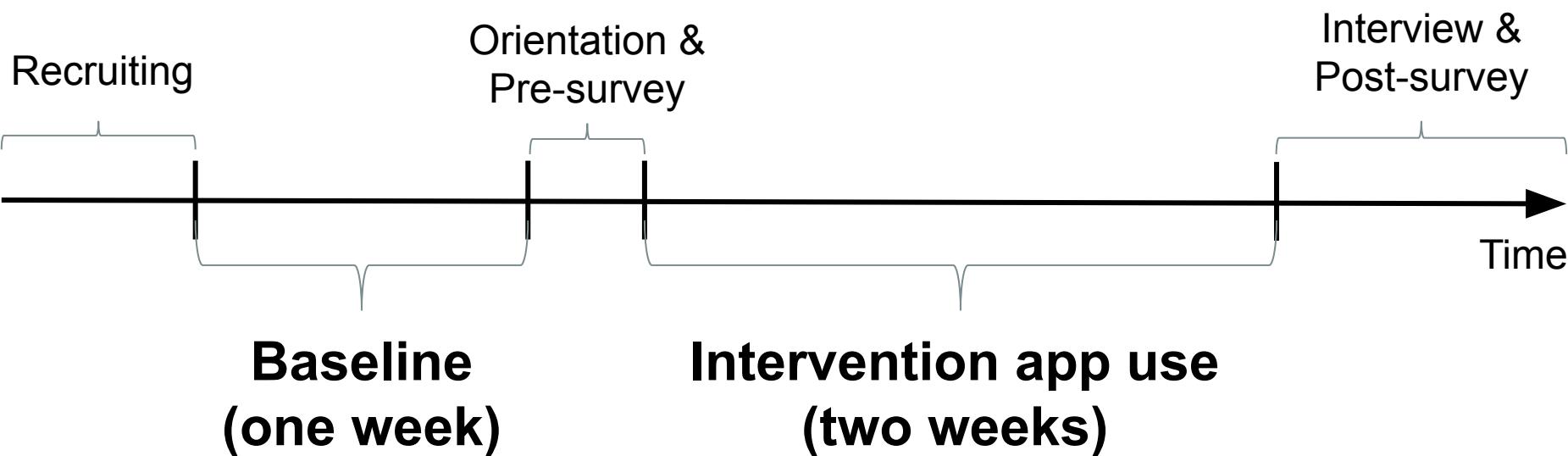
NUGU-Alone using NUGU without *social features*

- 27 participants

3. Evaluating

Experiment procedure

Recruiting

Orientation &
Pre-survey

Interview &
Post-survey

Time

**Baseline
(one week)**

**Intervention app use
(two weeks)**

3. Evaluating

Metrics

Smartphone Usage Amount
- Usage time
- # apps executed

Smartphone Addiction Scale [Kwon 2013]
- Six sub-factors: **daily-life disturbance**, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance.
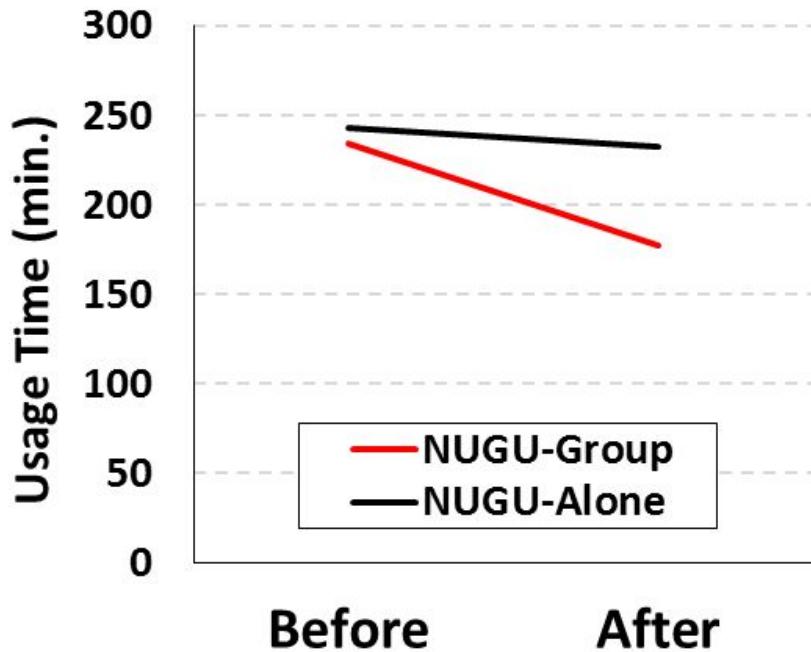
Customized General Self-efficacy about self-regulation on smartphone use [Schwarzer 1997]
- *"I am confident that I can efficiently manage unexpected disruptions due to the smartphone."*
- *"I can limit my smartphone use if I invest the necessary effort."*

3.1. Quantitative Results

Smartphone usage amounts

Within-subjects (before *vs.* after)

- NUGU-Alone: Not sig.

- **NUGU-Group: *Sig.***

Between-groups (Group *vs.* Alone)
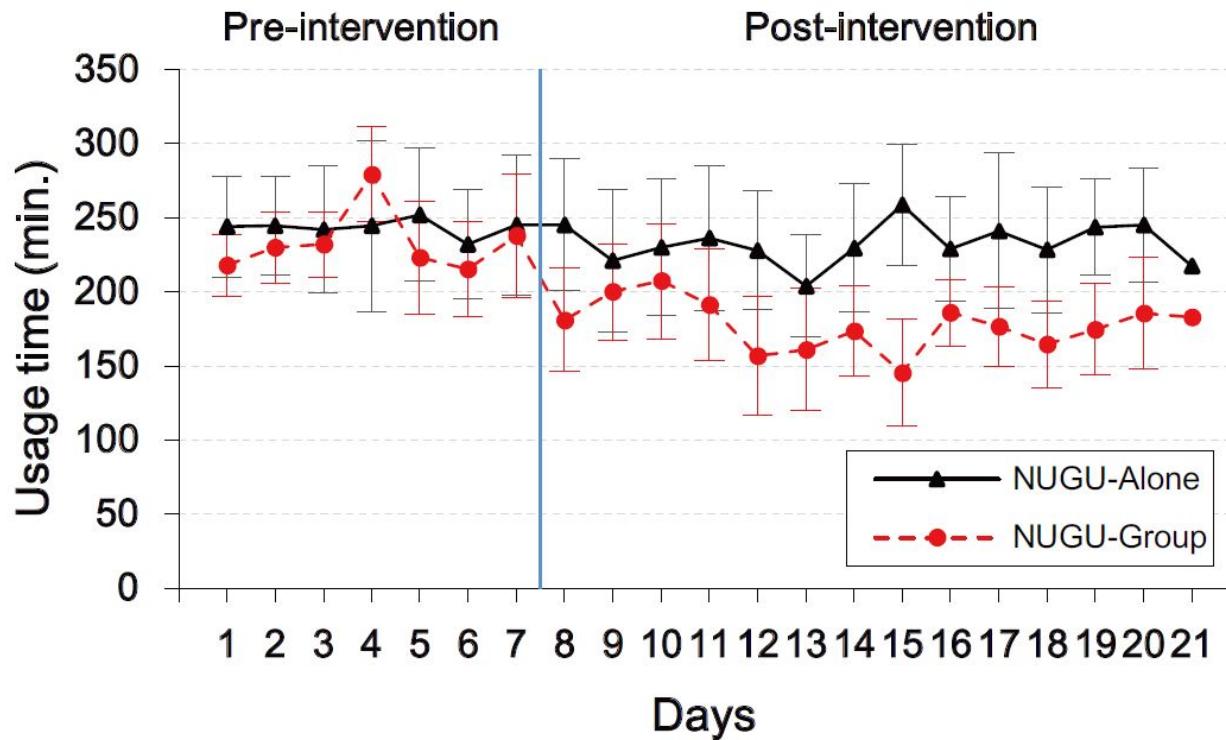
- Before: Not sig.

- **After: Sig.**

NUGU-Group's **usage amount** has become

significantly **less** than NUGU-Alone.

3.1. Quantitative Results
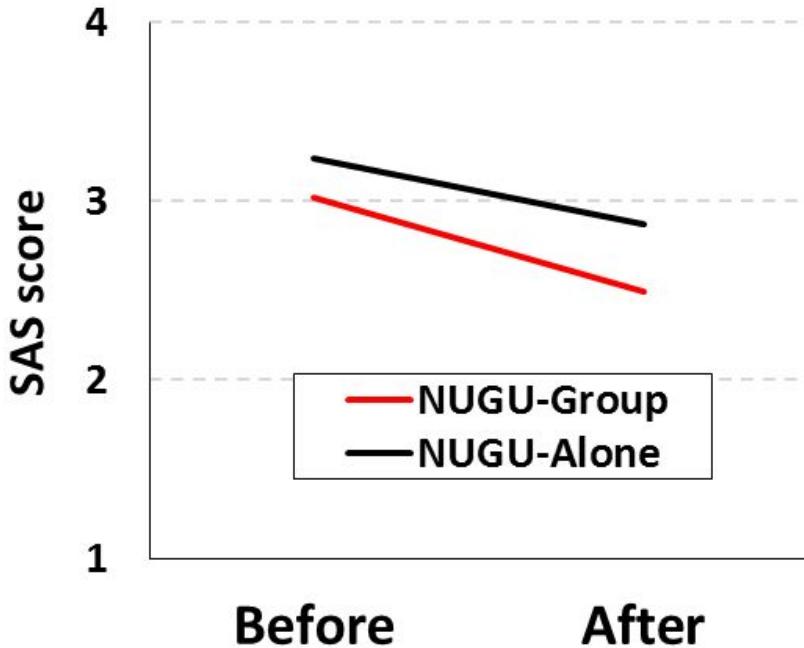
Smartphone usage amounts

3.1. Quantitative Results

Smartphone Addiction Scale (e.g., distraction)

Within-subjects (before *vs.* after)

- **NUGU-Alone: *Sig*.**

- **NUGU-Group: *Sig.***

Between-groups (Group *vs.* Alone)

- Before: Not sig.

- **After: Sig.**

NUGU-Group's **SAS score** has become significantly **less** than NUGU-Alone.

3.1. Quantitative Results

Generalized Self-efficacy Scale

Possibly due to better awareness of their own status
- **Difficulties in limiting smartphone use**
- **Others better outcomes**

"At first, I really thought that I could do very well. But, I found myself often giving up due to a instant message, while others appeared to do well. So, I think I lost my confidence." (NUGU-Group P2)

There was **no significant differences**

in Self-Efficacy Scale between NUGU-Group and NUGU-Alone.

3.2. Qualitative Results

Social learning when no use is good use

Diverse Contexts! and Challenging Goals!

	NUGU-Group	**NUGU-Alone**
Activity Selection	**Diverse** (Studying, working, eating, socializing …)	Skewed (Studying, working)
Duration of Limit	**Longer** (> 30 min.)	Shorter (< 30 min.)

(Differences were statistically significant.)

Such differences are probably related to social learning.

- *"I wondered how the top rankers limited their use. I tried to follow their behavior through referencing the activities they selected"* (P32)

- *"After knowing that setting a longer time helps me concentrate on studying more, I often started to set a goal for two hours"* (P15)

3.2. Qualitative Results

Motivating limiting behaviors with **social support**

The social support was effective in motivating users

- *"I was surprised by others' limiting efforts and I became motivated to catch them"* (P34)
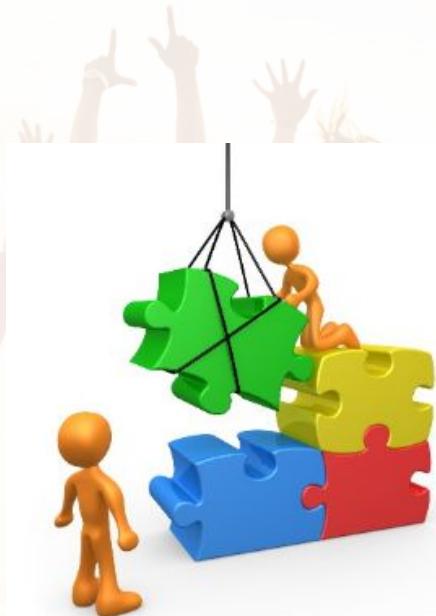
Different motivation depending on the interpersonal relationship

- **Friend/Family:**
    - **Small reward** (buying some snacks for the top) or **funny nicknames** for the top
    - *"In the first stage, my younger brother told me that my limiting efforts were less than the others, so I started to do more."*

- **Acquaintance:**
    - *"The members in other groups appeared to have frequent interactions. I think I could do more if I were in that situation."*

Conclusion

Understanding   **Designing**   **Evaluating**

Conclusion

Socially translucent system design for temporary non-use

- Shared information (summarized statistics) enables to achieve desirable outcomes while preserving user/group privacy.

Scholarship of technology non-use

- We detailed the needs of temporary non-use of smartphones and demonstrated a tool for supporting temporary non-use

Intervention mechanisms for smartphone overuse

- When designing systems for assisting in limiting smartphone use, we showed that social support was more critical than self-monitoring.

Social Dynamics and My Phone

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Thank You!

Appendix

Design Implications

Other social interaction mechanisms

- Ex) Exchanging short messages and emoticons

Fine-grained limiting control (i.e., app-level usage)

- Some apps related to the productivity, as notes and dictionaries, should not be disabled.

contextual alarms for limiting smartphone use.

- Due to high accessibility of smartphones, users must pay attention attention to their smartphone usage throughout the day, which is a challenging task

Conclusion

Understanding

- People want to change **frequent short usage** and **occasional long usage**.
- **Diverse methods** to cope with the distractions
  (e.g., physical separation, turning off, deleting, using software tools ..).
- But, these are not effective due to **the lack of self-regulation**.

Designing

- We iteratively designed **NUGU (No Use is Good Use)**, which is a group-based intervention app to support self-regulation on smartphone use.
- NUGU supports **three components of self-regulation in SCT view** (self-observation, self-judgment, and self-reaction).

Evaluating

- We conducted the **three-week user study** (n = 62) by comparing with its non-social counterpart.
- NUGU-Group users' **usage** decreased significantly, and their **perceived level of managing interruptions** was improved significantly.