Co-Drink: Exploring Social Support Water Bottles to Increase the Hydration Status of Individuals with Intimate Relationship

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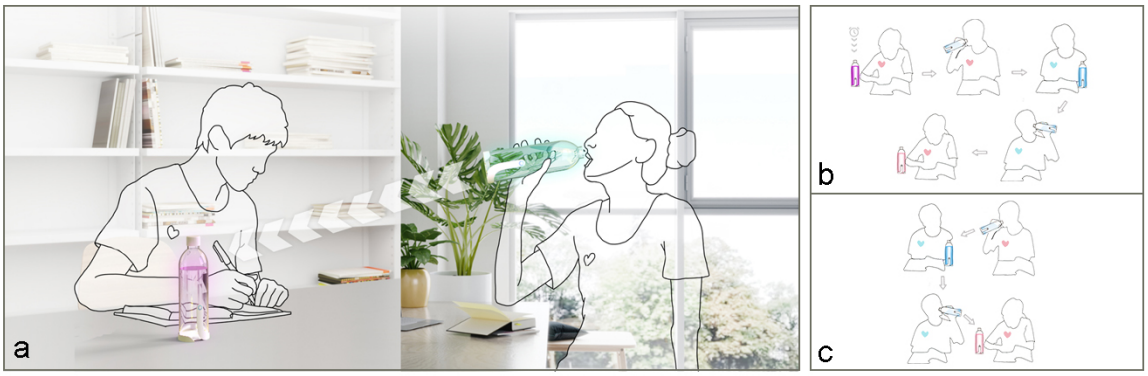

Figure 1: (a) Co-Drink is a couple of smart water bottles to facilitate mutual reminders and remote social interaction between close friends or lovers to help them increase daily water intake; (b) The coaching mode: one user would be the coach to help another habituate regular water drinking behaviors; (c) The co-learning mode: the system light would be set to remind users to mutually encourage each other to improve their drinking habits together.

ABSTRACT

Due to busy work routines in the modern society, it is common that people neglect to drink water. Social influences, such as interactions between friends and lovers, appears to be crucial to foster healthy behaviors. In this study, we investigate leveraging social support mechanisms in the design of persuasive technology to increase the frequency of daily fluid intakes. We firstly carried out an auto-ethnography as well as a probe-based co-design study to explore dedicated social mechanisms for promoting healthy hydration habits. This led to the conceptualization of Co-Drink that focuses on technology-enabled social interactions between individuals with intimate relationships to stimulate their water intake behaviors. Co-Drink was implemented as a pair of smart water bottles with ambient light. It also associated with an app to facilitate a coaching mode and a co-learning mode for persuading health behavior change. The prototypes of Co-Drink were evaluated in a Wizard-of-Oz study with three dyads of college students. Results showed its benefits for hydration health promotion and applicability for daily life use, due to the embedded social mechanisms and the ambient displays integrated with the water bottle. Based on these qualitative findings, we discuss implications for the future development of persuasive technologies for improving water intake behaviors.

CCS CONCEPTS

• **Human-centered computing**; • **Interaction design**; • **Empirical studies in interaction design**;

KEYWORDS

Smart water bottles, water intake, intimate relationship, social support

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1 INTRODUCTION

Water is a critical ingredient of the body and hydration status plays a significant role in our healthy lifestyles, brain cognition, and physical fitness [7]. A recent survey reveals that inadequate water consumption has become an increasingly general health problem for Chinese people [24]. Due to busy work routines in the modern society, it is common that people neglect to drink water, unless they feel being thirsty. Yet, the latest research shows that people who habitually drink less water have lower thirst, which would lead to significantly dehydrated body status in a long run [28]. Therefore, instead of drinking water when it is desired, it is crucial for individuals to develop regular water drinking habits throughout their busy workdays. To promote healthy hydration habits, there have been some behavior interventions, using educational programs [12], behavioral theories [16], self-monitoring and persuasive messaging [1], etc., to remind people drinking water on a regular basis. However, their effectiveness is doubtful, primarily due to their complex interventional settings [39] as well as the dull and repetitive experience flow [34].

It has been suggested that the social support mechanisms could be adopted as an effective approach in persuading people to build healthy behaviors [13]. Due to the rapid advance of social computing and human-computer interaction (HCI), a vast majority of studies have augmented social support strategies using remote communication technologies as health behavior interventions for e.g., physical exercise promotion [7, 29, 32] or nutritional health [25], etc. To our knowledge, there have been very few projects investigating such social influences on aiding water drinking behaviors, except the Lover's Cup by Chung et al. [4]. They focused on exploring the relationships between drinking behaviors and intimate communications remotely. However, how remote social interactions can be designed as a HCI-based motivational strategy to encourage healthy hydration habits is underexplored.

This paper investigates leveraging social support mechanisms in the design of persuasive technology to increase the frequency of daily fluid intakes. We firstly carried out an auto-ethnographical study as well as a co-design study to explore dedicated social mechanisms for promoting healthy hydration habits. This led to the conceptualization of Co-Drink that focuses on technology-enabled social interactions between friends or lovers to stimulate their water drinking behaviors. As shown in Figure1(a), Co-Drink is a couple of smart water bottles equipped with a set of sensors and an ambient light system to facilitate mutual reminders and remote social interactions between two users, in order to help them develop the habit of active and healthy drinking. Co-Drink has two persuasive modes. In the coaching mode, one user would be the coach to help the other habituate regular water drinking behaviors (Figure 1(b)). In the co-learning mode, the embedded reminder system would be set to trigger users to mutually encourage each other to improve their drinking habits together (Figure 1(c)). Based on the Co-Drink prototypes, we conducted a user study following the Wizard-of-Oz approach [6] to qualitatively evaluate the effectiveness of those different persuasive modes, and to obtain some opportunities for future developments.

2 RELATED WORK

In the health promotion domain, there have been a variety of interventions helping people improve their hydration status. For example, Kavouras et al. [12] applied an educational intervention of water intake for athletic youth and found its effects in enhancing their exercise performance. Carfora and colleagues [1] found that daily text messages based on the participants' affective reactions could produce acute effects on increasing daily water intake. Based on a one-year field study, Lahlou et al. [16] suggested that combining information, affordances, and social influences in family settings could increase fluid intakes for children and parents. Nevertheless, aforementioned methods often require a certain amount of manpower and material resources, and it is difficult to verify their effectiveness in day-to-day life [34]. Our work is based on previous research on health-promoting technologies and social support systems as an easy-to-adopt means to increase the personal hydration status.

2.1 Health-Promoting Technology for Encouraging Water Intake

The rapid development of HCI offer several advantages to promote healthy daily water intake. Based on health-promoting technology, Water drinking behaviors can be recorded through automatic data collections or manual information logging. In return, the systems can provide different data visualization and user feedback to remind the user to drink adequate water [33]. There are many mobile applications or desktop software being developed and used to help people make healthy water consumption plans and remind people to drink enough water every day (e.g., Plant Nanny [29], WaterLama [40], iDrated Water [10], etc.). These real-world applications also have their limitations. For instance, their persuasive functions are not integrated well with the dynamic of daily life scenes, which may result to the undesirable disturbance to ongoing daily tasks and lead to low technology adoption rates [9].

Recently, many HCI studies on health-promoting technologies focused on exploring integrated approaches to persuade people in shaping hydration-related health awareness in a natural way. Most of them investigated embedding the self-monitoring and system feedback mechanisms of daily water consumptions with relevant everyday objects, such as kettles, coasters, water dispensers, etc. Playful bottle [3] is a smart cup prototype that associates a mobile phone with a typical cup to enable the detection of the drinking amount and regularity. A persuasive game is also implemented in Playful bottle, where the user needs to drink enough water regularly to water their virtual trees. GROW [11] is a smart bottle, which uses its surface as an ambient display to motivate users to take water every day. When it is detected that the user's water intake increases, a thermo-chromic printed tree image will gradually appear on the bottle surface. Zhou et al. [42] designed MossWater that realizes a metaphorical visualization on people's daily water-drinking behaviors based on the moist or dry moss. The common feature of these prototypes is that they all leverage the novelty of the system feedback as a motivational role. Additionally, we have

observed that social factors could create positive effects on health behavior change and would be valuable to apply for increasing daily water intakes.

2.2 Social Support in Health-Promoting Technology

For health-promoting technologies, there have been several social support strategies that can be applied as persuasive principles, such as cooperation, competition, social learning, social facilitation, etc. [31]. In parallel, many studies have been investigating HCI features to facilitate and augment social interactions. For instance, Thayer et al. [37] found that mutual accountability practices with shared calendars can support the healthy growth of intimate relationships. Chen et al. [2] developed a pair of sensible slippers called ComSlipper, which enables the wearers to establish implicit communications with each other remotely by exchanging postures through the haptic feedback. Similarly, the Lover's Cup by Chung et al. [4] is designed as a pair of connected cups that turned the semantics of different drinking behaviors into different forms of HCI feedback for the distant communications between a couple.

Existing social relationships could also be used as motivational strategies for health promotion. It has been widely proved by various research projects that social factors can provide benefits to health promotion, e.g., family bonding for healthy diet [23], peer support for increased office vitality [32], and the intimacy between friends for encouraging physical exercises [8], etc. As a relatively underexplored aspect, leveraging these existing social dynamics in health-promoting technologies may create extra motivations in improving self-awareness of drinking water. Therefore, this paper aims at investigating how to incorporate the existing social relationships, such as the intimate social bonding, into health-promoting technologies as social support mechanisms to create positive effects on increasing daily water consumptions. Next, we elaborate on our design explorations, which led to the conceptual design of Co-Drink.

3 THE DESIGN OF CO-DRINK

3.1 Design Process

3.1.1 Auto-ethnographical Study. Initially, we investigated how the existing social relationships could be applied as a persuasive strategy for encouraging water drinking behaviors, through an auto-ethnography [5]. Such approach has been increasingly adopted by HCI research for understanding the contexts and acquiring design insights (e.g., [18, 19],). A three-day auto-ethnographical study was conducted, where four researchers took part in as a friend-based support group. Figure 2(a) shows that the study was designed based on [37] that each person needs to drink 250ml water for eight times per day. As shown in Figure 2(b), at each time the social support mechanism was experienced as following: when the specified time approached, member A would receive a notification from the mobile phone and remind member B to drink water. A would then ask B to drink water using a WeChat message, a phone call, or a face-to-face conversation. Upon taking water, member B would inform member A for the task completion and in turn remind the next member. Eventually the task would be looped back to member A to finish a round of water-drinking task relay.

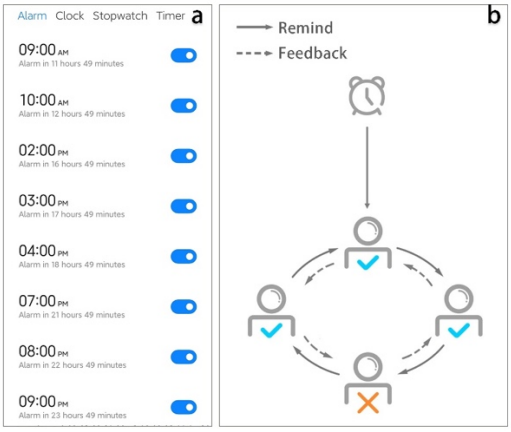

Figure 2: (a) A screenshot of the preset alarms as water-drinking reminders; (b) The social support mechanism designed for the auto-ethnographical study.

In this study, we wrote diaries to record the user experiences and note down special social interactions during tasks. After the study, an internal discussion was conducted to reflect on the experiences and values of such social support mechanisms. Based on this three-day study, we found that creating social reminders based on an existing social relationship could positively influence individual's water-drinking habit. However, we felt that the current way of social interactions involving multiple people and verbal communications led it interfering with the daily life and overburdening to commit. Therefore, we wanted to design a product that can facilitate a lightweight yet interactive way for a dyad of friends or a couple to remind each other drink water easily and pleasantly throughout their workdays.

3.1.2 Probe-based Co-Design Study. To minimize the threshold for technology adoption, we decided to develop a smart bottle that can use light to enable social interactions and provide feedback for mutual support. Figure 3 shows that we attached an Arduino-driven LED light strip to different locations of a transparent water bottle and tested different luminous effects as initial prototyping. After several iterations, we finally decided to place the light strip at the bottom of the bottle so as it can emit different patterns of the light in the bottle naturally and pleasantly. Based on the mockup, we carried out a co-design workshop with two pairs of friends. As shown in Figure 4, each workshop session we demonstrated our mockup and invited the pair of participants to experience it for a few minutes. Afterwards we discussed the aspects of the mockup that could be improved further to consolidate our design concept.

3.2 Co-Drink

We eventually designed and prototyped Co-Drink (see Figure 1(a)), a pair of smart water bottles equipped with a set of sensors and lighting feedback systems merged into a ring-like device attached to the bottom of the bottle. Due to these lightweight technologies, Co-Drink facilitates mutual reminders and remote social interactions for a dyad to help them drink adequate water in their busy workdays. Specifically, as shown in Figure 5, each CO-Drink water

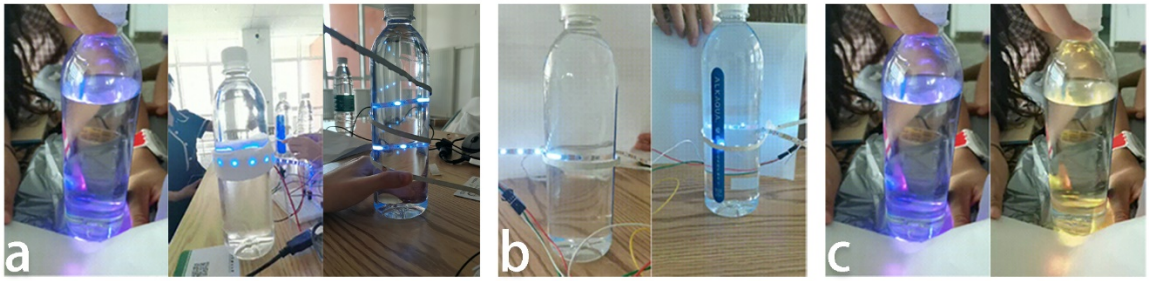

Figure 3: Early prototype explorations on (a) the locations of the light strip, (b) the directions of the light, and (c) the colors of the light.

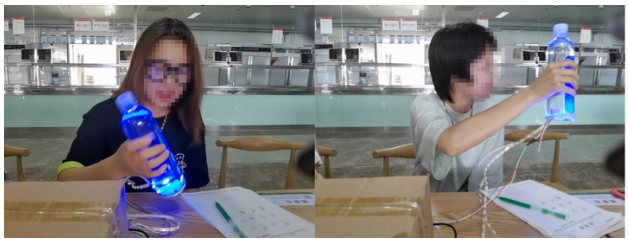

Figure 4: Co-design sessions with the participants.

bottle contains a level sensor and a pressure sensor to detect drinking behaviors and the volume of water, an LED light strip to provide user feedback, and a Bluetooth module to transmit the information collected by the device to a dedicated mobile app. Figure 6 shows that the app can be used as an online platform to provide guidance to users, support self-tracking of the water consumptions, and technically facilitate communications between the two water bottles. Based on such technical infrastructure, two persuasive modes were realized on the Co-Drink system.

The coaching mode (Figure 1(b)): In this mode, one user would be the coach to help another foster a good habit of hydration. Explicitly, when the coach drinks water, the student bottle will be luminated with blue and white color to remind taking water. After the student takes water, the coach bottle will be blinked lightly with the pink color as the feedback from the student. Presumably, this mode is suitable for a pair of friends or lovers, one of whom has a good water-drinking habit and wants to support another to become healthier.

The co-learning mode (Figure 1(c)): In this mode, the embedded system alarm clock is set to remind one of the users periodically. The user then reminds their partner by drinking water in the bottle, which will trigger the light effect of another water bottle. The goal of this mode is to support users to mutually encourage each other to improve their water-drinking habits, where they can also discuss and make a suitable hydration plan.

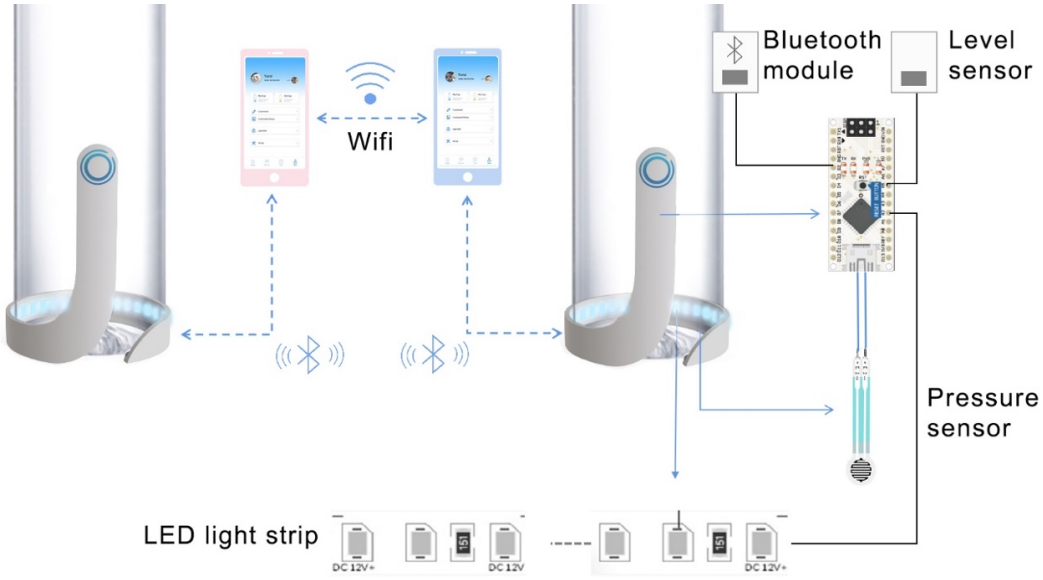

Figure 5: The technical infrastructure of the Co-Drink system.

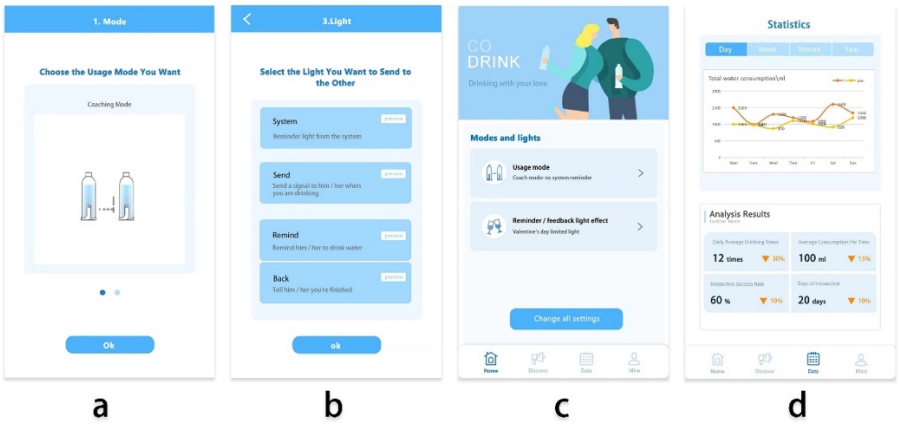

Figure 6: Selected screenshots of the Co-Drink associated app user interfaces: (a) guidance to different persuasive modes; (b) setup of the light effects in different functions; (c) main page of the app; (d) historical data of the hydration status.

Table 1: Characteristics of participants.

Dyad ID	Participant ID	Gender	Age	Major	Evaluation of the water drinking habit
A	A1	Male	21	Industrial design, 3rd year Bachelor student	A2 had a better water drinking habit than A1
	A2	Female	20	Industrial design, 2nd year Bachelor student	
B	B1	Male	22	Computer science, 4th year Bachelor student	B1 had a better water drinking habit and frequency than B2
	B2	Female	21	Industrial design, 3rd year Bachelor student	
C	C1	Male	20	Computer science, 3rd year Bachelor student	C1 and C2 had similar water drinking habit
	C2	Female	21	Industrial design, 3rd year Bachelor student	

4 THE STUDY

To efficiently evaluate the design concept of Co-Drink, we conducted a field study based on the Wizard-of-Oz approach [6]. Th main goals of the study is to 1) qualitatively understand user experiences of the two persuasive modes, and 2) identify design opportunities for the future development of health-promoting technologies for improving personal hydration status.

4.1 Participants

We recruited participants by spreading information via word of mouth. We were interested in recruiting dyads that were close friends or lovers at the time of the study. During recruiting, we also asked them to describe their current water drinking habits. In the end, a total of three pairs of college students volunteered to take part in the experiment to experience the Co-Drink prototypes. Their detail is summarized in Table 1. Prior to the experiment we explained the study procedure to the participants without discussing our research hypotheses. All the experiments were conducted upon receiving the consent from the study participants.

4.2 Apparatus & Setup

As suggested by [20], for the user study we developed the prototypes that could demonstrate the design concept and realize user system interactions based on manual controls of the light by researchers (Figure 7).The study was conducted in an approximately 60 m^2 room. As shown in Figure 7(c), for each Wizard-of-Oz experiment we located the two participants in opposite corners of the room respectively. In addition, for each participant there were two researchers sitting behind to control the light of the prototype and at the same time observe their behaviors.

4.3 Procedure

Before the experiment, we briefly introduced the procedure of the experiment, presented the prototype and the app features of Co-Drink, and demonstrated the two persuasive modes of our design concept. We then started the experiment by inviting the dyad to work separately and use Co-Drink simultaneously. Each experiment lasted two hours (the coaching mode: 1-hour; the co-learning mode: 1-hour). During the co-learning experience session, we preset the

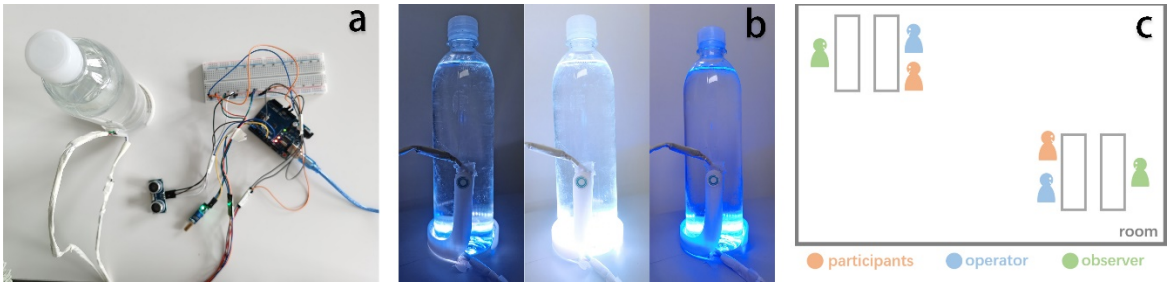

Figure 7: (a) Prototypes used in the study; (b) Light effects applied in the study; (c) the experiment setup.

system to remind one of the two participants every 15 minutes. After each experiment, a focus group interview was conducted with each dyad. Following the semi-structured interviews approach [7], all the interview questions were open-ended, and were divided into three parts to inquire participants' 1) overall feelings and opinions on the design; 2) opinions on the two persuasive modes; 3) opinions on the light-based user system interactions.

4.4 Data Collection and Analysis

During the experiment, we wrote observational notes. All interview sessions were audio recorded and transcribed later for qualitative analysis. All the data were analyzed by thematic analysis following inductive coding [38]. To begin with, we divided observational notes and interview transcripts into labeled statements through repeated reading. Next, we measured the labeled statements using affinity diagrams [35] to identify recurring clusters and emergent themes.

5 FINDINGS

5.1 Values of Co-Drink

In general, we found that the design of Co-Drink stimulated participants to develop healthy drinking habits. For instance, during the post-study interview B1 mentioned that "*Co-Drink can remind me to drink water and make me healthier, so I like it.*" All the participants were also impressed by the dynamic visual effects of Co-Drink created by the combination of the interactive light and the simplicity of the transparent bottle. In the interview, they praised that the design is "very cool" (A1, C2) and "the light is very beautiful" (A2, B1). Specifically, the user study provides some preliminary insights into the positive aspects of our design, in terms of its persuasiveness and unobtrusiveness.

5.1.1 Persuasiveness. We found that the interactive light of Co-Drink can easily produce reminding effects after a short time usage of the product. During the test, we observed that all our participants could quickly notice the reminder lights and link the lighting effects to their drinking behavior. In the follow-up interview, C1 said that *"when I see the light on, I know I need to drink water"*; B1 and B2 indicated that *"the light is very good, it not only reminds me to drink water, but also reminds me to bring a cup."* In addition, they found the remote social interactions facilitated by the bottles could create extra motivations to keep up the healthy habit. A1 described *"When I see the light, I know it's a reminder from my girlfriend, I will pause my work to drink water. But, if it's just a system reminder, I am not sure. . ."* As a coach in the experiment, A2 stated that *"I will also treat drinking water more consciously, because I want to encourage him to develop good habits."*

5.1.2 Unobtrusiveness. Our participants also perceived the light-based interactions from the water bottle to be unobtrusive so that it did not create much interference with their ongoing work tasks. We observed that the six users could drink water immediately after receiving the reminders and quickly returned to work. The process was smooth and took a short time. One observation was that A1 missed the reminder once because he was too focused on the work. This showed an evidence that the light effect was gentle and did not interfere with the user's work that much. In the follow-up interview, C1 further indicated that *"If I needed to be highly focused, I would choose to turn off the light using your associated app."* The study also revealed that Co-Drink, as a lightweight product, has a low learning cost. We found that all the participants could easily and smoothly use Co-Drink, although they were still the first-time user of the prototypes. Many participants also expressed their appreciations to the lightweight and unobtrusive design of Co-Drink, as B1 said *"It is light and easy to carry."*

5.2 User Experiences with Two Persuasive Modes

In the experiment, we asked three pairs of users to experience the coaching mode and the co-learning mode respectively and asked them what they thought of the two conditions after the test. In general, all the participants thought that the existence of the two modes was necessary. Yet, they mentioned that these modes could be customized further. For instance, users with different physical conditions and drinking habits could choose the appropriate mode according to their own conditions.

Specifically, dyad A (A1, A2) indicated a clear preference on the coaching mode, as A1 described *" The coaching mode helps me get a clear sense of what's going on with my girlfriend, I get a reminder every time she drinks, however, I can only receive reminders at fixed times in the co-learning mode. "* Additionally, A2 stated *" The coaching mode gives you a stronger sense of being reminded by my boyfriend rather than the bottle"*. In contrast, the second pair of users (B1, B2) preferred the co-learning mode. We observed that in the experience session with the coaching mode, B1 drank water many times that caused some disturbance to B2. As B2 described her experience, *"Every time the light came on, I knew he was reminding*

me to drink. But I wasn't thirsty, so I was going to leave it there, but it was so frequent that I was getting a bit annoyed." However, when experiencing the co-learning mode, both of them indicated that the frequency of reminders was appropriate. Lastly, the third dyad of the participants (C1, C2) did not indicate any preference between the two persuasive modes and believed that they could be adapted to different scenarios.

5.3 Design Challenges

In addition to verifying the design concept, the study also helped us identify the following design challenges that need to be addressed further in the next iteration of Co-Drink.

First, we found it was not that clear for participants to distinguish different light patterns associated with different functions. C1 said that *"I did not recognize the light as the feedback from my partner, I thought it was the reminder light"*. The reason may be that the reminder light and the feedback light were only different in the flashing frequency, and thus it was challenging for users to distinguish them at a glance. Further explorations may need to be done to modify the other parameters of the light, such as the color, the brightness, the patterns, etc.

Second, the current design of the user guidance was considered ambiguous by a few participants. A1 indicated that the guidance animation in the associated app did not clearly explain the difference between the persuasive two modes; C1 found it difficult to link the light effects to the meaning after watching the guidance once.

Third, we found that the density of the light could be heavily influenced by the level of water in the bottle due to the current design of Co-Drink. B1 and B2 said that *"after drinking half a bottle of water, the light is weaker than before, and the reminding effect drops"*. To solve this problem, instead of applying constant light intensity to the light patterns, we need to explore a dynamic approach to make the light adjustable according to the amount of water.

6 DISCUSSION

Leveraging social support strategies in persuasive technologies has been studied in various health promotion contexts, such as office vitality [32], physical exercises [8], nutrition [23], and mental health management [27]. The social bonding between intimate relationships has great potential to be harnessed to support individuals in developing healthy behaviors [17]. In HCI, it has been proven that technology-empowered social interactions can effectively enhance the perceived value of tasks [27] and enable shared experiences [30]. These benefits may be applied to motivate people to change their health behaviors. This paper reports on an exploratory study that embodied remote social interactions in smart water bottles called Co-Drink as persuasive technologies and studied their user experiences for increase water intake between individuals in intimate relationship. Our study suggested that the two proposed persuasive modes of Co-Drink (the coaching mode and the co-learning mode) were experienced motivational and mutually responsive by all the participants. The interactive light designs of Co-Drink were considered as lightweight and unobtrusive to the daily life, yet it can efficiently support system notifications and remote social interactions between users. These benefits can be based on the following three design implications.

First, as a new interactive property to the ordinary water drinking reminders, the dedicated ambient light utilized the existing object (in our case a pair of water bottles) to create novel user experiences. Our Co-Drink prototypes integrated an 'ambient lighting belt' with a simple transparent water bottle, which brought interactive system feedback to users with novel task experiences. This made the behavior prompt become more playful and enjoyable than the typical system reminders based on sound clips or graphic user interfaces. Moreover, through a user-centered iterative prototyping process, we gradually simplified the light representations in the user system interaction to make it more understandable, less obtrusive, and easy to adopt. Rather than appeared as a separate product, Co-Drink combined HCI features with water bottle. Thus, we found it can support users efficiently relate user experiences with the behavior of drinking. In fact, such strategies have been employed to reduce sedentary behaviors for office workers [33] or support relaxation activities [41] and created similar effects. Future design for improving hydration status can investigate further to integrate ambient displays with existing infrastructure for water drinking.

Second, we embedded social interactions with Co-Drink, which easily inserted the social influence into the health hydration promotion. Based on our early auto-ethnographical study, we developed such mutual support mechanisms that change the experience from being reminded by the system to by the partner. In addition, the design of Co-Drink focused on remote social interactions between two people with intimate relationship and took advantages of their mutual responsibility. From the user study, we learned that most participants perceived the interactive feedback as augmented social interactions from their partners. As such, Co-Drink led users to not take care of their own health but also be conscious about contributing to their partner's health. Thus, such social mechanism enhanced their motivations to habituate healthy drinking behaviors. It has been widely proven that HCI applications based on existing social relationships can create positive influence on health behavior change (e.g., [21, 26]). Similarly, our project also suggested that combining social interactions with smart technologies could support users to engage into the health intervention with a good user experience.

Third, this project also contributed an iterative design research approach for exploring health-promoting technology as well as adapting new features according to real-life settings. In line with early studies on cultural probes [14] and technology probes [22], we took a multidisciplinary perspective that combined social science research with engineering endeavors to develop and evaluate Co-Drink. Due to the auto-ethnography conducted at the early stage, we efficiently gained qualitative insights into the research topic, proposed the corresponding social mechanism, and decided the basic implementation of the design. Through the iterative prototyping process with end-users, we deleted most unessential functions and light effects that would potentially confuse users. The Wizard-of-Oz evaluation method also helped us qualitatively study the integrated interaction design and social mechanism as persuasive strategies,

without spending too much effort on realizing the engineering fidelity of the prototypes. As suggested by [36], it is valuable to carry out design explorations based on multidisciplinary approaches to investigate and verify new research spaces for health behavior change technologies.

In our research, most users held a positive attitude towards using Co-Drink and expressed their willingness to use it in real life. However, the long-term effects of Co-Drink are still unknown. As a qualitative exploratory project, all its studies were conducted with a relatively small number of participants over a short period, which might not be adequate to prove health behavior change in the long-term [15]. In the future, we plan to finalize Co-Drink prototypes based on research insights obtain from this project, test Co-Drink with more participants, and consider individual differences of users. Eventually, we will conduct a long-term experiment to confirm the effect of Co-Drink on cultivating long-term drinking habits.

7 CONCLUSIONS

This paper presents an iterative design study on investigating remote social interactions through ambient technologies to promote healthy water intake for individuals with intimate relationships. Through an auto-ethnography and a probe-based co-design study, we proposed the design concept of Co-Drink. Co-Drink was implemented via a pair of transparent water bottles integrated with a set of electronics and associated with an app platform, to realize two HCI features. First, the Co-Drink could provide user several kinds of ambient feedback through the embedded light belt at the bottom of each water bottle. Second, the users could remotely interact with each other by taking water from the bottle based on the Bluetooth connection between the bottle and the app and the cloud communication between apps. Co-Drink enabled two persuasive modes to increase water intake for a dyad. In the coaching mode, one user would guide another to take adequate water throughout the day; In the co-learning mode, the users would mutually remind each other to drink water based on the preset system reminders. Based on the prototypes of Co-Drink, we conducted a field study with three dyads to qualitatively understand the values of Co-Drink in health promotion, the user experiences with the two persuasive modes, and the design challenges for further improvements. The findings suggest that the use of Co-Drink was experienced persuasive and unobtrusive. The different persuasive modes were considered motivational to encourage users to foster new health behaviors, while their applications might need to be customized according to the user differences. We also learned that several design detail should be improved further. Based on these results, we further suggest that future health-promoting technologies could be designed to incorporate ambient HCI techniques with social support mechanisms to enhance the applicability of health interventions for improving hydration status in people's daily life.

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