
PlayBetter: A Phone-based Baby Play Support System for Childcare Bystander Parents

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Abstract

The parents' balanced participation in childcare is important for a child's intellectual and emotional growth. In many countries, however, there are many families where one parent is the primary caregiver and the other is just a bystander in terms of caring for their baby because of the latter's ignorance in and indifference to childcare as well as work exhaustion. In this work, we present a prototype called "PlayBetter", an application that can help childcare bystander parents easily play with their baby. Based on the results of the preliminary study, two modes were designed to motivate parents to play with their baby, and to support their efforts to do so: (1) baby play supporter; and (2) motivational message notification. A pilot study was conducted (n=6) with the prototype, and the study participants' feedback that can improve the system are reported.

Author Keywords

Childcare; Bystander parents; Baby play; Behavior change

ACM Classification Keywords

H.5.3 [Group and Organization Interfaces]: Computer-supported cooperative work

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Introduction

Fathers and mothers perform their unique roles in childcare quite differently, but balanced participation in childcare between the father and the mother is essential for children's proper development [3]. According to OECD's 2015 report, however, the mother's childcare time was higher than the father's in most of the countries that the report investigated¹ [9]. In South Korea, the country with the biggest difference between the mother's and father's childcare time, the father's childcare time was only 6 minutes a day (OECD average: 47 minutes). Another report found that mothers also devote more time to childcare even in the dual-career families in South Korea [12].

We conducted an online survey (n=211) to find out why some parents do not participate in childcare. Of the respondents who indicated that they had little participation in childcare, 47.9% answered that they did not have the time to physically participate in childcare. The rest of the respondents, however, indicated that they did not participate in childcare even when they were at home with their baby because of their work exhaustion or their ignorance in and indifference to childcare.

In this paper, we present a prototype mobile application, PlayBetter, which helps childcare bystander parents play with their baby by providing them with a video guide for parents' minimized cognitive efforts, and by sending motivational messages to parents to motivate them to play with their baby. A pilot study was conducted (n=6) with the prototyped design, which showed the helpfulness of PlayBetter in playing with one's baby, and additional design suggestions were provided.

¹Based on this report, we can expect that the primary caregiver is usually a mother, and the childcare bystander parent is usually a father in most countries. We recognize that other configurations might exist, but we argue that our general design insights hold for most childcare configurations.

Related Work

Childcare with a smartphone

There has been much HCI research into integrating childcare with smartphone applications. BabySteps [15] is a mobile application with which parents who use Twitter can easily track their children's developmental milestones via a special hashtag syntax. There are mobile intervention services that help parents who have children with language delays by providing feedback about parent-child conversations [5, 13]. In addition, there are many commercial apps related to childcare in app stores. However, most applications simply give information about childcare or enable communication with other parents or childcare experts. In this work, we focus on helping and motivating childcare bystander parents to easily participate in childcare with their smartphone.

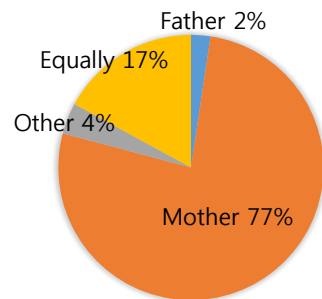
HCI research based on behavior change theory

Smartphones are effective tools to motivate people to do what they want to do continuously (e.g., stop smoking, promote exercise, control weight, etc.). SoberDiary [16] is a phone-based system to assist the recovery from alcohol dependence by visualizing patients' personal progress and by motivating with rewards based on multiple behavioral theories. Roelof et al. suggested that individual factors should be considered to effectively change personal behavior [2]. We targeted childcare bystander parents to motivate them to take part in childcare in this study.

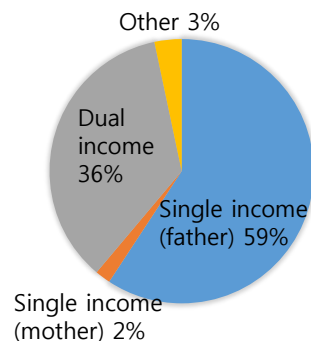
Preliminary Study

An online survey was first conducted to understand the daily childcare pattern among the South Korean parents and to find out why some parents do not participate in childcare. Then the necessity of developing a baby play recommendation system was highlighted based on the survey results, and an expert with a relevant doctoral degree was asked for advice on baby play recommendations. Lastly,

Q. Who is a primary caregiver for your baby?



Q. What is the income form of your family?



PlayBetter was designed based on the results of the aforementioned survey and expert interview.

Online questionnaire for parents

The daily childcare pattern of parents who are parenting preschool children was investigated via an online survey. The online survey consisted of multiple-choice, open, and Likert-scale questions about how the respondent parents participated and shared in childcare and for those who found it difficult to take part in childcare, what made it difficult for them to do so. The questionnaire was posted on dozens of online community sites with most users in their 30s and 40s in South Korea, and 211 participants responded to the survey (gender: 56 males, 155 females; age: 20 in their twenties, 168 in their thirties, and 23 in their forties; income type: 125 single-income [father], 75 dual-income, 4 single-income [mother]).

Online questionnaire results

Most of the participants (76.8%) reported that there was a primary caregiver in their family, and some participants (17.1%) responded that they and their spouse participated equitably in childcare. Many participants (71.1%) reported that the ratio of the mom's childcare was more than 80%. Also, 160 respondents (75.8%) responded that they were primary caregivers, and 81.9% of them indicated that they wanted their spouse to participate more in childcare. The survey asked for the detailed analysis of childcare bystanders: "If you or your spouse have little childcare time (i.e., candidate for bystanders), what are the reasons?". The answers are as follows.

Rank 1. I do not have the time to physically participate in childcare. (47.9%) According to the 2016 OECD economic survey, South Korea has the second-longest work hours among the OECD countries [10]. As this may be a phenomenon that is unique to South Korea, the parents

belonging to this category were excluded from the survey analysis. As these same parents, however, are childcare bystander candidates for the reasons to be cited later.

Rank 2. I want to rest after coming home from work. (29.1%)

According to the psychology research, individuals have finite cognitive resources [4]. Harrison et al. found that when individuals did creative work at a company (i.e., used up their cognitive resources), they spent less time with their spouse at home, whereas when individuals did non-creative work at a company (i.e., retained their cognitive resources), they spent more time with their spouse at home [14]. Based on the previous studies, it can be said that as the respondents had used up their cognitive resources, they wanted to rest when they reached home. It thus seemed necessary to help tired parents participate in childcare while using less cognitive resources.

According to an expert comment, when inducing a spouse to participate in childcare, it is best to recommend that the spouse carries out the easy part of childcare [11]; as such, the most important and useful starting point in childcare is playing with the baby. Playing with the baby will affect the baby's development and will help him/her form a bond with his/her parents [7]. Thus, it will be helpful to provide baby play recommendations with an easy-to-follow video for using minimized cognitive resources.

Rank 3. I do not know how to play with my baby. (21.4%)

Rank 4. I think that childcare is my spouse's task. (14.5%)

It seemed necessary to educate these respondents on how to play with their baby (rank 3) and on the importance of participating in childcare, and to motivate them to play with their baby (rank 4). According to the report [6], 38.5% of the survey participants in South Korea agreed with the following traditional thinking: *The man's job is to earn money; the woman's job is to look after the home.*

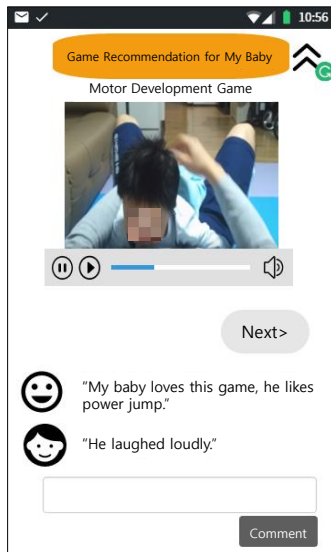


Figure 1: PlayBetter recommends appropriate games for the baby's even development based on play history, and the parent can watch baby play tutorial videos.

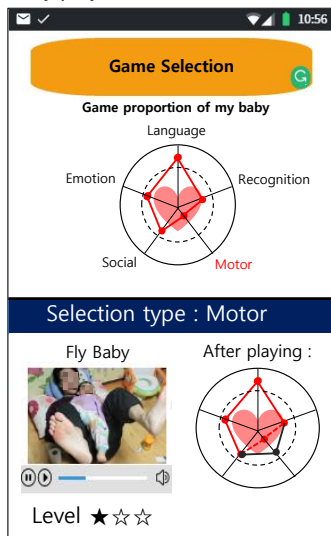


Figure 2: The parents can choose the development domain that they want to play.

Meeting with a childcare expert

An expert with a doctoral degree in early childhood education was consulted via a two-hour face-to-face meeting to understand how and what the mobile application can recommend to parents in terms of playing with their baby.

There are five development domains for babies: language, emotions, social skills, motor skills, and recognition [8]. Playing a game with a baby affects one primary domain and some subdomains. As such, theoretically, it is good to engage in different forms of baby play so that the baby play will affect all the child development domains evenly. In reality, however, it is difficult for parents to balance various forms of baby play, and parents and babies have play preferences. In addition, in the case of parents who act as bystanders in childcare, it is more important to build a bond with the baby as much as possible, rather than trying various forms of baby play. Thus, for such parents, it is good enough just to play with the baby as much as possible, without caring about engaging in different forms of developmental play, whereas in the case of other parents, recommending various forms of baby play that affect multiple child development domains can be helpful.

Design consideration

Based on the results of the online survey and the expert meeting, design implications were drawn to help parents who do not participate in childcare play better with their baby. First, most of the childcare bystander parent respondents were too tired to participate in childcare after coming home from work. Therefore, it seems necessary to design the application in such a way as to help childcare bystander parents participate in childcare with minimized cognitive efforts. Second, the childcare bystander parent respondents also showed indifference to and ignorance of childcare. Therefore, the application should provide information on how to care for a baby, and should inform the parent users of the importance of parents' involvement in childcare.

Prototype Design of PlayBetter

We followed an iterative prototyping process to develop PlayBetter. It consists of two parts: (1) a baby play supporter; and (2) motivational messages. Not all algorithms were implemented in this paper because a pilot test was planned to be conducted to determine the feasibility of implementing the developed application design.

Baby play supporter

A baby play supporter was designed because playing with a baby is relatively easy and is an essential part of childcare. Parents can check PlayBetter's recommended play for the even development of the various domains (e.g., language, emotions, social skills, motor skills, and recognition) of the baby, or can choose a certain form of play for the development of each domain, or their play preference. Also, PlayBetter provides video tutorials on how to play with a baby that are easy for parents to follow. It consists of three modes: (1) game recommendation; (2) game selection; and (3) game history.

1) Game recommendation: PlayBetter recommends appropriate games for the baby's balanced development based on the game history data, which show how many games addressing each domain were played. The users can watch tutorial videos that show how other parents play; they can thus play with their baby by simply following the video. PlayBetter can recommend a game based on the following priority areas: (1) even development of the baby's developmental domains; (2) the baby's age; (3) the baby's preference; and (4) the parent's preference. (Figure 1)

2) Game selection: The users can choose the development domain that they want to address through play. They can choose either an insufficiently addressed development domain or a game that is easy to play, depending on the parents' status or preference. (Figure 2)

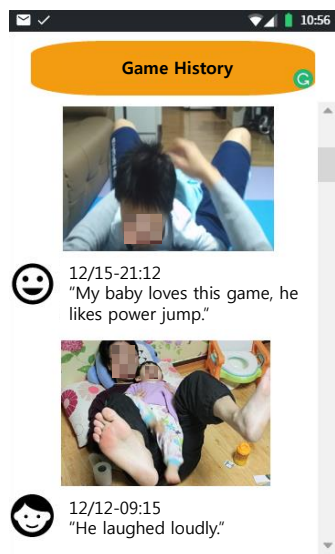


Figure 3: The parent can see what and when they played with their baby.

	Job	Baby	Participation in childcare
F1	ph.d student	16m	active involvement
F2	physical education	6y, 8y	everyday play with a baby
F3	office worker	32m	often play with a baby
M1	ph.d student	31m	primary
M2	housewife	48m	primary
M3	housewife	5y, 3y	primary

Table 1: Participant demographics of the pilot study.

3) Game history: The users can know what and when they played with their babies based on their comments (if they wrote comments) and on the photographs (if they took photos of the play). The history gives information on the game that the baby liked and how the baby responded to the play, and also leaves good memories to the family. (Figure 3)

Motivational message

The baby play supporter focuses on how to make parents play better with their babies at the moment of play, but this function focuses on motivating parents to play with their babies more. PlayBetter sends a motivational message to parents to motivate them to play with their baby.

Based on the previous study, a motivational message can help people change, and using personalized information in the message increases its effectiveness [2]. The notification messages shown in Figure 4 show various examples of sentences motivating parents to participate in childcare (e.g., (a) effective game considering the baby's age; (b) research results highlighting the importance of playing with one's baby; and (c) game addressing the insufficiently addressed developmental domains of the user's baby). The proper notification time and ways can be a major space, but in this work, PlayBetter is expected to send a notification message at the time set by the parent user. This motivational message could motivate childcare bystander parents to participate in childcare, but there would also need to be other ways of changing the mindset of childcare bystander parents.

Pilot Study

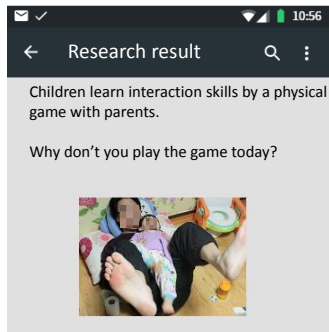
The initial application design described in the previous section was prototyped with the prototyping tool Oven [1], and a pilot study of it was conducted. For such study, six parents (Table 1) of a preschool child in a university (F1, M1) and from community sites (F2, F3, M2, M3) about childcare were recruited.

The interviews were conducted face-to-face or through a screen-sharing phone interview, with each interview lasting 30 minutes. For the said interview, the questions that were used in the previous online survey were adopted to understand the interviewees' daily childcare participation. For the first 15 minutes, the interviewees were asked about their daily difficulties in selecting and doing baby play. For the last 15 minutes, the prototype application design was explained (i.e., how it works and why it was designed), and then the interviewees were asked to give feedback about each of the functions of the developed application.

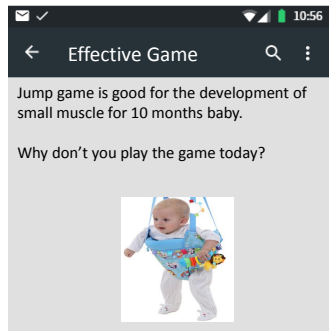
All the survey participants unanimously answered that they had difficulty finding various forms of baby play. They said that they could not play a single game for a long time because either the baby or the parents felt bored after some time. They frequently searched information about forms of baby play that their babies might like from books or from blogs or community sites. Even though they knew that there were forms of baby play that could stimulate various child developmental domains, they could not consider different stimuli because they did not have the time to do so (M1) or were unconsciously trying to engage in a form of play belonging to a field that they were good at (F2).

Game recommendation & game selection

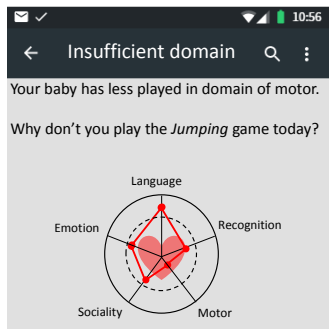
All the study participants said that two modes are independently useful and needed and can be used differently: "I can use the game recommendation function when I'm tired, so I can simply follow the video guide for the recommended game" (M1); "I will go over the recommended games to get information on them, and I can play one of them if I feel good about it; otherwise, I will search for other games through the game selection mode" (F1); and "There may be times when I can't play the recommended game because of my or my baby's condition; in those times, I will use the game selection mode to search for another game" (F3,



(a) Motivational research results



(b) Effective game for the specific age



(c) Insufficient domain of the development game

Figure 4: Examples of the motivational message types

M2). Therefore, forms of baby play should be selectable along with recommendations because it is impossible to force the parent users to engage in a certain form of play with their baby for various reasons, such as the parents' and/or baby's condition and space constraints.

Game history

Most of the study participants stated that the application's game history function would help them remember their baby's play preference. One mother said, *"I sometimes record a video of myself playing with my baby. It helps me remember how much my baby liked the game that we played"* (M2). Another parent said, *"This seems good for my memory. I think I'll go over this game history in the bathroom so I could be reminded of how I played with my baby"* (F1). Also, there was a suggestion that the sharing of this information between married couples or other parents be made possible: *"I would share the play information with my wife, such as what game my baby and I played and how we played it, and if I can see other parents' baby play history, I could refer to them to find ideas of what to play with my baby"* (F2). One study participant said, however, that it is annoying to leave a comment: *"Play history data are useful and funny, but I don't do SNS or blog because it's annoying"* (F3).

Motivational message

The study participants were asked which among the three types of messages shown in Figure 4 is the most motivational. Some of them selected the type of message that divulges which games address the insufficiently developed child development domain (F1, F2, M2), but others liked the message about which games are effective (F3, M1). Thus, there seemed to have been individual differences. All the study participants agreed that the message might motivate the parents to play with their baby, but most of the study participants said that they did not like to receive annoying

notifications when they were busy: *"I don't like this kind of notification. I think I'll just ignore this message now and then check it later"* (F1, F3, M1). Therefore, the notification time and ways should be carefully decided.

Dicussion & Future Work

This work initially targeted for childcare bystander parents to motivate them to participate in childcare. According to our preliminary study, we found that there were four major reasons why bystanders did not take part in childcare (insufficient time, tiredness after work, ignorance, and indifference to childcare). We prototyped PlayBetter to help childcare bystander parents play with their baby because playing with a baby is an important and useful starting point in childcare. During the study on how to recommend appropriate baby play for parents, we found that even though the parents knew about various baby play types that stimulate child development, they had difficulty considering different stimuli because of the complexity in monitoring and planning and searching the play. As a result, most resorted to playing whatever their baby liked. We believe that recommending appropriate plays that support balanced child development might be a promising future direction.

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