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Using Gamification to Increase Adherence to Daily Living Routines

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Using Gamification to Increase Adherence to Daily Living Routines

by

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A thesis submitted in partial fulfillment of the requirements for the degree of
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Abstract

Gamification, the use of game elements in non-game contexts, is an increasingly popular way to incentivize self-management procedures. Despite the growing popularity of such programs, little objective research has been done in the area. This study evaluated the use of a web-based gamification program called HabitRPG through a multiple-baseline across participants design. HabitRPG is designed to increase the productivity of its users. Baseline procedures included parental scoring of task completion. Intervention consisted of training on using HabitRPG. Target behaviors were scored with data sheets provided to parents of the participants. The intervention increased the percentage of compliance for all participants.
Introduction

People around the world are increasingly using games to improve their lives. Approximately 59% of Americans play video games (Entertainment Software Association, 2014) and in 2013 they spent 15.39 billion dollars on video game content (NPD, 2014). With the increasing popularity of gaming, there is an emerging trend towards developing games that have a focus on improving real-life human behavior in a process called gamification. Gamification is defined as the use of game design elements to influence behavior in non-game contexts with a focus on improving quality of life (Deterding, Knaled, Nacke, & Dixon, 2011). Gamification is becoming a widely-studied topic across disciplines (Hamari, Koivisto, & Sarsa, 2014; Morford, Witts, Killingsworth, & Alavosius, 2014). Other terms such as “game-based learning” and “serious games” are often classified under the umbrella term “gamification” as will be done for the purposes of this paper (although not all researchers agree on this, see Perrotta, Featherstone, Aston, & Houghton, 2013).

There are many different ways that game elements can be incorporated into daily life. A common implementation of gamification is to take the scoring elements of video games, such as points, levels, and achievements, and apply them to a work or educational context (Deterding et al., 2011). Yee (2006) suggests that incorporating game elements (like points or badges) into daily living tasks is thought to increase motivation and effectiveness of users due to factors such as achievement (in-game advancement and competition), socialization (teamwork and interaction with other players), and immersion (role-playing and character customization). In other words,
aspects of games that are found to be motivating are extrapolated and are used to incentivize real-life situations to increase the likelihood of completing the task.

There are numerous examples of gamification. Some clinicians are using a gamified version of EEG biofeedback which involves a modified display of EEG signals as a helicopter that clients move up or down by altering their brainwave activity (Coben & Myers, 2010). A quite different example of gamification in education involves altering microbiology classroom objectives to resemble a CDC lab encountering a “micro-apocalypse” (Drace, 2013). In this scenario, students role play as CDC scientists who are given instructions from “Dr. X” (the instructor) to develop an antidote by completing standard lab assignments. Gamification is also being explored in the contexts of health, crowd-sourcing, public safety, environmental conservation, and business. All of these areas have experienced substantial growth in research over the last few years. For example, in the health field, Baranowski, Buday, Thompson, and Baranowski (2008) reviewed 27 articles on the use of video games to promote health behaviors. Most of the video games they reviewed led to improved health, with the most important factors for success being the use of narrative structure and goal-setting. Gamification has also been applied to the area of environmental sustainability. Energy conservation improved in homes with teenagers (Gustafsson, Katzeff, & Bang, 2009) and in college dorms (Brewer et al., 2011) through an online competition. Research across disciplines confirms that gamification is a socially valid intervention that is reported as well-liked and helpful by participants (e.g., Drace, 2013; Hamari et al., 2014; Jacobs, Timmermans, Michielsen, Vander-Plaetse, & Markopoulos, 2013; Merry et al., 2012; Perrotta et al., 2013).

Despite recent growing interest in gamification, research on the topic has been riddled with problems. Online games in particular are extremely difficult to study objectively because
access to the programs is usually anonymous and unlimited. A recent review of gamification found several methodological limitations in published studies including small sample sizes, short experimental time frames (which might produce a novelty effect), and improper statistical analyses (Hamari et al., 2014). The literature was also associated with a lack of discussion of participant characteristics, unsound research designs, and a lack of objective measurement of behavior change (Hamari et al., 2014). Gamification research also contains many ill-defined terms (e.g., confusion of the terms “simulation” and “game” which are distinct; see Hays, 2005) that make measurement, replication, and comparison difficult.

The flexibility of gamification has been beneficial for expanding applications to a variety of areas. However, to improve the quality of research on gamification, programs need to be evaluated in the specific contexts in which they are being used. As described in Hays (2005), the effectiveness of a game in one context does not generalize to all contexts. Furthermore, many increasingly popular gamified systems have no supporting evidence in their contexts at all.

One such area of gamification lacking an evidence base is the fundamentally online games. Many online games (e.g., Zombies, Run! and HabitRPG) that involve having participants identify themselves with an avatar or in-game character and adopt specific roles are called Role-Playing Games (RPGs). Most of these kinds of online games are multiplayer and may be classified as Massively Multiplayer Online Games (MMOs), or MMORPGs (Massively Multiplayer Online Role Playing Games). Interestingly, these are two of the most popular types of games in the country with 30% of gamers playing social games and 24% of gamers playing role-playing games according to Entertainment Software Association (2014). Typically, these games have a social component in that multiple players can interact via a chat program or by assisting or challenging other avatars. Many studies support the necessity of an interpersonal
component for games to be effective (Childress & Braswell, 2006; Cole & Griffiths, 2007; Yee, 2006).

Online gamification programs offer society a potential way to increase independence of users through self-management. With children, for example, making in-game reinforcers contingent on daily routine tasks (e.g., doing chores, studying, hygiene) results in less response effort required by parents (e.g., prompting, delivering consequences. Many gamification programs aim to initiate behaviors by promoting self-monitoring. Self-monitoring has also been shown to be an effective intervention for increasing adherence to scheduled activities (Richman et al., 1988).

The goal of the current study was to expand the literature on gamification which is widely used and under-supported by research. Currently, no known research has investigated the efficacy of online self-management gamification software. Many of these kinds of games are offered free online and attract a large number of users. For example, 50,000 people use HabitRPG every day (S. Leslie, personal communication, May 12, 2014). These games are designed to increase the general productivity of their users (defined as increasing studying or exercising, for example) while utilizing behavioral principles (e.g., differential reinforcement, token economies, response cost, and behavioral contracting). The user first creates an avatar that represents the user in the game. The user then assigns real-life tasks to the avatar as adventures or quests that, when completed, provide the avatar with in-game reinforcers (such as “gold,” dropped items, or leveling up by unlocking more “skills” for avatars) based on the difficulty of the task. Online communities of gamers can view and interact with avatars, providing either a competitive or team-based element to the game. These online communities may or may not be comprised of people that the user knows.
HabitRPG is one such program which incorporates behavioral principles and is freely available online. HabitRPG is a multi-player RPG designed to motivate users to complete self-assigned tasks. In this online game, users create an avatar that represents them and real-life task completion corresponds to in-game achievements, which result in in-game reinforcement. The user may list daily routine behaviors to increase (e.g., personal hygiene behaviors, chores) in a checklist format. As these behaviors are checked off on the website, “gold” is awarded (reinforcement) based on the difficulty of the task. With the gold, users can buy in-game items or purchase previously designated real-life reinforcers (e.g., a bathing suit). These features are representative of a self-managed token economy with explicitly stated contingencies (rules) for behaviors and consequences. Additionally, users can connect with friends, interact with their avatars, and view their achievements, developing a complex social team-based or competitive aspect to increase motivation in the game.

Currently, there are no studies evaluating the efficacy of this program or any similar online self-management programs. Consequently, the purpose of this study is to evaluate the effectiveness of HabitRPG for increasing daily routine adherence in children.
Method

Participants and Setting

Four children (three boys, one girl), ages 10 to 13 years, and their parents (7 parents total) participated in this study. Sam was 10 years old and lived with his parents and three younger siblings. He was reportedly diagnosed with ADHD. Jon was also 10 years old and lived with his mother and younger sister. He was also reportedly diagnosed with ADHD. Arya was 12 years old and lived with her parents and a younger sister. James was 13 years old and lived with his parents and older brother. Sam and James both lived out of town and never met the first author in person. Participants with difficulty completing daily routine behaviors (as reported by parents) were selected based on self-reported enjoyment of video-games, as this is the target population of HabitRPG in real life. Inclusion criteria also included the participant’s fluent use of the internet and daily access to a computer. Inclusion criteria for the parents included that they live in the household with their child and that they know how to use and can access e-mail daily. Participants were recruited from a local tutoring facility. Recruitment consisted of an initial meeting with the tutoring facility manager to determine if this intervention would be beneficial for the facility’s students. Information about their potential involvement in this study was disbursed to students and their parents via flyer posted by the facility manager. Interested parents were then given the lead investigator’s contact information. Two of the participants were referred by family members who attended the local tutoring facility. Both of these participants lived out of town and all correspondence was done by email or phone.
An informational phone interview (see appendix A) was conducted by the first author. This phone interview verified basic inclusion criteria (e.g., the age of the child, the child’s ability to use the computer) and included questions regarding the child’s enjoyment of video games. If interested, the parent then set an in-person meeting with the lead investigator. At which time, the participating parents and children were given informed consent and were told about potential risks and benefits that may occur as a result of their participation in the study. The two out of town participants (Sam and James) set up another phone call instead of an in-person meeting after completing and emailing back the informed consent documents. There was a minimal risk to subjects in this study. Because parents were asked to refrain from prompting desired behaviors (e.g., brushing teeth) during the study in order to show whether the gamification program can increase such behaviors, there was a possible risk that the participants would not have appropriate hygiene for a period of time during the study. By using HabitRPG, participants could potentially become less reliant on reminders from parents to complete daily routine tasks (such as brushing their teeth or making their bed). This may benefit the participants directly by giving them a more self-managed, independent method of completing tasks. Parents may also be indirectly benefited by participating in fewer aversive interactions with their children. After the potential risks and benefits were discussed, the parents and children were asked if they would like to participate.

All baseline and post-training procedures were conducted in the participant’s home. Training how to use HabitRPG was also conducted by the first author in the home or by phone call for Sam and James.
Target Behaviors and Data Collection

The behaviors that were targeted in this study varied across participants but included tasks that the participating children did not reliably comply with in the past. The first author and the participants’ parents agreed on approximately ten target behaviors, reflecting daily tasks they were not completing reliably, and developed operational definitions of these targets with the first author. These targets were behaviors that the parents agreed to refrain from prompting during the study. The target behaviors and operational definitions were then compiled into a checklist that was filled out by the parent. Each item on the checklist was scored as a “yes” (completed) or “no” (not completed), as “NA” (not applicable), or as “unable to observe.” The target behaviors for each participant are as follows.

The target behaviors for Sam included:

1. Making bed.
2. Brushing teeth in the morning before school (or 10:00 am on non-school days).
3. Brushing teeth at night before bedtime.
4. Flossing teeth once per day.
5. Letting dog outside in yard and back inside.
6. Taking a shower.
7. Hanging up towel after shower.
8. Combing hair.
9. Putting toys in toy box (e.g., Legos).
10. Keeping bedroom floor clear of toys, clothes, and trash.

The target behaviors for Jon included:

1. Putting shoes in the closet.
2. Placing backpack in designated place after school.
3. Placing dirty clothes in the hamper.
4. Putting clean clothes away.
5. Putting dirty dishes in the sink.
6. Rinsing dirty dishes after use.
7. Brushing teeth.
8. Taking a shower.
9. Hanging up towel after shower.
10. Throwing snack wrappers/containers away after use.

The target behaviors for Arya included:
1. Working on homework.
2. Putting dishes away.
3. Hanging up clothes.
4. Getting in the shower before 7:30 pm.
5. Putting shoes away.
6. Feeding the dog.
7. Washing clothes.
8. Rinsing dirty dishes.
9. Putting away lunchbox after school.

The target behaviors for James included:
1. Waking up on time in the morning (7:00 on school days; 9:00 on weekends).
2. Brushing teeth in the morning before school (or 10:00 am on non-school days).
3. Brushing teeth at night before bedtime.
4. Taking medicine (AM) [allergy medicine]
5. Taking medicine (PM) [melatonin]
6. Taking a shower.
7. Cleaning up after eating (i.e., throwing away wrappers, bringing dishes to kitchen).
8. Washing dishes and loading in dishwasher after dinner.
9. Cleaning room.
10. Keeping floor clear of clothes in common areas.
11. Charging cell phone at night.

Data on target behaviors were collected daily by the parent. The parent reported on tasks completed with the data sheet supplied by the first author (see appendix B). A percentage of tasks completed was obtained from these checklists.

The data sheet was sent nightly to the first author via e-mail or text message. The specific method was chosen based on parental preference and likelihood of compliance. With few exceptions, the parent completed the data sheet and returned it the same evening. In some instances, a parent sent a few days of data in one text or email.

**Inter-observer Agreement**

Inter-observer agreement (IOA) percentages were obtained for at least 31% of data collected. Sam had 31% of days with IOA. Jon had 33% of days with IOA. Arya had 34% of days with IOA. James had 35% of days with IOA. Approximately twice per week, an independent observer (a second parent) completed an additional data sheet and sent it to the first author. Agreements or disagreements were scored for each of the target behaviors and IOA was calculated by dividing agreements by agreements plus disagreements and multiplying by 100%. The acceptable percentage of IOA for each participant was 80% or above. For one participant,
this IOA method was not consistently possible because there was not a second adult in the household that could observe the target behaviors. Instead, this participant sent pictures of the products of the target behaviors being completed or not completed twice per week. For example, one of the behaviors was keeping the bedroom floor clear of clothes. Pictures were taken of the bedroom floor and sent to the first author twice per week.

Mean IOA percentages across baseline and intervention phases were as follows: 100% and 94% for Sam, 100% and 100% for Jon, 80% and 98% for Arya, and 95% and 100% for James.

**Design and Procedure**

The study evaluated HabitRPG in a multiple baseline across participants design with the percentage of the target behaviors completed by each participant scored in his or her data sheet.

**Baseline.** Baseline data on each participant’s compliance with the identified target behaviors were collected by the parents each day on the data sheets described above. The parent was instructed to not provide any feedback, prompting, or consequences about the child’s performance of the behaviors on the data sheet.

**HabitRPG.** The first author provided training to each participant to use HabitRPG in his or her home either in-person or by phone call with the parents and children. HabitRPG is a web-based program designed to increase the productivity of its users. In this game, users create an avatar and earn experience points, dropped items (e.g., food, animal companions), and “gold” for completing specified tasks. Experience points (XP) are tracked automatically and avatars level up after earning a certain number of XP which strengthens the character. Leveling up refers to gaining new character features including new items and skills.
Prior to the meeting or phone call, the first author set up a HabitRPG account for each participant. During the meeting or phone call, the first author customized an avatar with each participant. This was done with the computer or tablet that the participant typically used. The first author was then authorized to access the participants’ account to view their progress throughout the study. The participant was instructed not to change his or her password and to not delete the account. Then, the participant was trained to navigate the website.

The HabitRPG website displays the customized avatar at the top of the screen with its health and XP (see appendix E). Four tabs are also displayed on the home screen: 1) Habits, 2) Dailies, 3) To-Do’s, and 4) Rewards.

The Dailies tab lists behaviors that should occur each day. Once these behaviors are checked off on the website, “gold” and XP are awarded and the behavior can no longer be checked off until the following day. If a Daily task is not checked off before midnight (or a time agreed on by the parents and first author), a response cost of a deduction in “health” and XP will occur.

The Rewards tab lists reinforcers that can be purchased with “gold.” Reinforcers may be customized to include items or activities outside of the game. The price of these reinforcers may be set by the user. For example, Arya and her parents agreed on a custom Reward where, for a set amount of “gold,” her parents would buy her a bathing suit. Additionally, in-game reinforcers are listed in this tab, which have a fixed price. In-game reinforcers include weapons and armor that can be added to the avatar’s costume. Other in-game reinforcers include animal companions that are shown accompanying the participant’s avatar (see appendix F). Sam, Jon, and James purchased only these in-game reinforcers and did not use the custom Reward option.
Participants were taught to navigate these tabs by the first author. Then, under the Dailies tab, all of the target behaviors selected by the participants’ parents were entered and described. These target behaviors were reset daily, but remained under this tab for the duration of the study.

Then, the first author told the participants what they were expected to do on a daily basis for the remainder of the study. First, they would complete the daily target behaviors in real life. Then, they would log into HabitRPG, and check off all the target behaviors under the Dailies tab that they completed that day. The participants were encouraged to log into HabitRPG immediately after they complete a target behavior, but had to do so before midnight.

**Social Validity Measures**

Social validity was measured using three 5-point Likert-type scales similar to the social validity measure used in Boyer et al. (2009). The first two scales were administered to the parents and children at the beginning of the baseline phase. The first scale assessed how much parents thought the intervention would help, how necessary it was, and how easy they thought it would be to use (see appendix C). The second scale was administered to the children and assessed how much they enjoyed video games, what their favorite games were, and how often they used the computer (see appendix D). The final scale was administered to the parents and participants at the end of the study and assessed how much participants and parents liked the intervention, how easy it was to use, the likelihood that they would continue to use it, whether they would recommend it to others, and how effective they thought it was (see appendix E).
Results

The results (see Figure 1) show that the intervention increased the percentage of completed tasks for all four participants. The baseline and intervention means for each participant are as follows: 23.4% and 78.9% for Sam; 18.2% and 59% for Jon; 29.7% and 65% for Arya; and 45.7% and 66% for James (see Figures 1-4 below).

Figure 1. Percentage of task compliance in Baseline (blue) and HabitRPG (red) for each of Sam’s target behaviors.
Figure 2. Percentage of task compliance in Baseline (blue) and HabitRPG (red) for each of Jon’s target behaviors.

Figure 3. Percentage of task compliance in Baseline (blue) and HabitRPG (red) for each of Arya’s target behaviors.
The social validity questionnaires showed that both children and parents thought that; a) the game program was not too time-consuming and did not require too much effort to complete (children’s $M=4.75$, parents’ $M=4.75$), b) they would continue to use the program (children’s $M=4.5$, parents’ $M=4$), c) they enjoyed using the program (children’s $M=4.5$, parents’ $M=4$), d) they thought the program was helpful with increasing the number of daily tasks completed (children’s $M=4.75$, parents’ $M=4.5$), and e) they would recommend it to others (children’s $M=4.75$, parents’ $M=4.5$). The parts of the program that children liked the most included the in-game reinforcers (in-game pets specifically). Children also reported that they enjoyed the game as much at the end of the study as they did in the beginning. One parent reported that they did not like the completing the daily datasheets, although they did not report that they were time consuming. The fact that half of the participants (Sam and James) did not require in-person training also provides social validity for the gamification program. Training for this program
does not require more than 30 min of participants’ time and, because it can be done remotely, no travel time is required.

Correspondence between the children’s and parents’ data for three of the four participants was also evaluated. These data consisted of the children’s self-reported completion or lack of completion of each of the target behaviors on the game website. Jon’s data corresponded with his parent’s data 73% of the time (correspondence data were collected for 50% of Jon’s intervention days). Arya’s data corresponded 87% of the time (correspondence data were collected for 87% of Arya’s intervention days). James’ data corresponded 79% of the time (correspondence data were collected for 87% of James’ intervention days). In most cases, when there was a lack of correspondence, it was a result of the children reporting compliance with a greater number of tasks than the parents reported.
Figure 5. Percentage of daily task compliance for the four participants. Party mode indicates when a participant began playing HabitRPG online with a friend. The blue diamond represents days that Jon did not have his iPad. The red diamond represents the days that Arya was unable to log in to the website due to technical issues.
Discussion

The results of this study indicate that HabitRPG improved children’s adherence to daily routine tasks without parental prompting. These results support the use of HabitRPG for children that enjoy video games and have difficulties completing daily routine tasks. The social validity measures indicate that children and parents enjoyed using this program and agreed that it was helpful for improving children’s task completion. The implication of this finding is that games such as HabitRPG may in fact be valuable approaches for getting children to engage in previously neglected routine daily activities. The value of HabitRPG (and potentially similar games) is that increases in valued behaviors can be promoted efficiently with minimal parent involvement. In this way, the use of the game may decrease coercive interactions between parents and children that often occur as parents attempt to get children to comply with their daily routines (Adams & Laursen, 2001; Laursen 1995). More research is needed to replicate this study and establish the effectiveness of HabitRPG and similar games. Future research should also evaluate parent-child interactions while using the game to see if the game decreases coercive interactions while promoting child self-management.

Sam’s level of task compliance increased dramatically from baseline levels and remained high (near 80%) for 22 days of intervention. He began using party mode two days into intervention, which may have boosted his compliance levels. Party mode consists of having family or friends join HabitRPG and connect to the user. Party members can view each other’s progress which may lead to social reinforcement outside of the game. Sam’s younger brother
joined his party and the two reportedly competed to level-up their characters. Sam’s data are representative of 2 months of participation. Future research should evaluate the additive effects of party mode on task compliance and social validity.

Jon’s level of task completion also increased well above baseline levels. Although he did not achieve the same high percentage in the intervention phase as did Sam, his percentage increase from baseline was substantial as his baseline had dropped to near zero prior to intervention. Jon also began to use party mode with a friend; however, the friend did not continue to use HabitRPG consistently. Jon’s data are representative of 3 months of participation and depict a slight downward trend in the first two weeks of intervention followed by an increasing trend in the second half of the intervention phase. For 5 consecutive days, Jon’s iPad (primary mode of accessing the HabitRPG website) was broken. Although he did not log into the website during those days, his level of task completion was still higher than his baseline levels. Jon’s mother was asked if she would like to have the first author implement a secondary intervention to try to boost Jon’s task compliance more than HabitRPG alone, but she declined.

Arya’s level of task completion increased gradually and with high variability after baseline. Arya experienced some technical issues with the HabitRPG website and could not check off her daily tasks on two occasions. On both of these occasions, her percentage of task compliance was still higher than any of her baseline data. Arya’s data represent 1.5-months of participation.

James had the highest baseline level of task completion (mean = 45.7%). Therefore, he had less room for improvement in the intervention phase. Although, there is substantial overlap between his baseline and intervention data, he did, on average, complete more daily tasks.
following intervention (mean = 66%), resulting in a 44.4% increase over the baseline mean. James’ data represent 3 months of participation with 3 weeks off during baseline.

There were a few limitations for this study. We did not collect long term follow-up data for any participants. Although the intervention phase ranged from 22 days to 46 days across participants, it is uncertain whether the participants would have maintained the high level of task compliance over time. Future research should examine the effects of the intervention over a longer time for more participants. Also, correspondence data between parental scoring of task compliance and children’s self-reported task completion on the website was not started from the beginning of the study. Future research should record correspondence data for all participants for the entire intervention phase. In addition, the age range of participants in this study was small (all participants were 10 to 13 years old). It would be valuable to include children of more varied ages in future studies evaluating this or other gamification programs.

Gamification programs which utilize behavior analytic principles (e.g., self-monitoring, in-game rewards for target behavior completion) may be useful for increasing desired target behaviors. This study offers support for one such gamification program, HabitRPG. It is our hope that this study will spur future behavior analytic research in this diverse and innovative subject area. The specific characteristics of games that are likely to make them effective are based on behavior analytic principles. HabitRPG is fundamentally a self-monitoring program, which is an effective intervention alone for increasing adherence to scheduled activities (Richman et al., 1988). Additionally, differential reinforcement (e.g., “gold” delivered immediately following a task being checked off) and response cost (e.g. losing health when daily tasks were not checked off) are behavioral principles that are utilized in HabitRPG as well as other gamification programs. Future research should compare HabitRPG with a simple To-Do
List intervention to determine whether HabitRPG is more effective than a daily visual reminder of target behaviors.

Future research should also examine the effects of a withdrawal phase of HabitRPG on task completion. When Arya and Jon did not log into HabitRPG their task compliance remained above baseline levels. This suggests that HabitRPG may improve task compliance even when the game is not used. If this is the case, future research should further examine how long participants need to play HabitRPG before a carryover effect can be seen.

A limitation of this study, as well as this research area in general, is that gamification programs are usually designed to rely on children’s self-recording within the game. Therefore, honesty (i.e., accurate self-recording) on the part of the participant is necessary for the behavioral principles to be implemented correctly in the game. For example, in HabitRPG, a participant may come into contact with in-game reinforcers for checking off Dailies without having completed the tasks in real life. As a result, participant’s checking off Dailies in the game may be reinforced but the actual behavior may not be affected by the game. However, in this study, children’s in-game behavior corresponded with their real life task completion most of the time ($M=79.7\%$). Considering the critical role of self-recording accuracy in the success of gamification programs for changing behavior, future research should examine whether participants tend to self-record accurately in games, whether accurate self-recording is related to reactivity due to the parents collecting data on children’s task completion, or whether other factors play a role in promoting accurate self-recording.
References


Appendix A:

Informational Interview and Script

Hello, this is ________ calling regarding your message about your interest in the research study. Is this _________? As a reminder, this study will involve teaching your child to use a computer game program to increase your child’s independence with daily tasks. Do you have 10- to 15-mins to answer some questions to determine if you are eligible to participate in this study?

[If no] That’s alright, is there a better time for me to call back?

[If yes] Great! Let’s get started. First I’m going to ask you some general questions…

1. What is your child’s name?
2. Is [your child] between the ages of 10 to 18 years old?
   a. [Must answer yes.]
3. Does [your child] have any mental health diagnoses, medical concerns, or vision problems?
   a. [Must answer no.]
4. Does [your child] display difficulty (or refusal) performing daily routine tasks (such as brushing teeth before bed, making their bed, putting clothes in their hamper)?
   a. [Must answer yes.]
5. Can you please list the first names and ages of family members living in the household with you and [your child]?
   a. [Must include two adults in the household, including the parent participating in the interview. (for IOA reasons)]

Thanks! Now I’m going to ask you some questions about your child’s computer usage…

1. Does [your child] know how to use a computer?
   a. [Must answer yes.]
2. Does [your child] use the computer regularly?
   a. [Must answer yes.]
3. Can [your child] access the internet daily?
   a. [Must answer yes.]

For the last few questions I’m going to ask about your child’s video-game preferences…

1. Does [your child] enjoy playing video games?
   a. [Must answer yes.]
2. Does [your child] enjoy computer games, console games (XBOX, Wii), or both?
   a. [Not necessary for inclusion, but preferred.]
3. Does [your child] play any RPGs (role playing games) such as Pokémon, Final Fantasy, or World of Warcraft?
   a. [Not necessary for inclusion, but preferred]

Thank you for completing this interview. Based on your responses, you are…
[If eligible] eligible to participate in this research study. If you are interested in participating, I would like to set a date and time to meet with you and [your child]. At this meeting I will ask you to fill out some forms and discuss what specific behaviors you would like your child to be more independent with. At this meeting I will explain the course of the study in detail. I can also explain more about the study now or answer any questions you have. Do you have any questions for me? You may decline to participate at any time including after the meeting, but for now are you interested in participating? When would be a good time for you and [your child] to meet? Thank you again for your participation in this interview and have a nice day.

[If NOT eligible] not eligible to participate in this research study. However, I would like to direct you to the HabitRPG website which hosts the game program I will be using in the study. You are welcome to try out the game for free online. I appreciate your participation in this interview, have a nice day.
Appendix B:

Sample Data Sheet

<table>
<thead>
<tr>
<th>Task/Criteria</th>
<th>Completed? (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Putting shoes in the closet.</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Placing backpack in designated place after school.</td>
<td>No</td>
</tr>
<tr>
<td>3. Placing dirty clothes in the hamper.</td>
<td>No</td>
</tr>
<tr>
<td>4. Putting clean clothes away.</td>
<td>No</td>
</tr>
<tr>
<td>5. Putting dirty dishes in the sink.</td>
<td>No</td>
</tr>
<tr>
<td>6. Rinsing dirty dishes after use.</td>
<td>No</td>
</tr>
<tr>
<td>7. Brushing teeth.</td>
<td>No</td>
</tr>
<tr>
<td>8. Taking a shower.</td>
<td>No</td>
</tr>
<tr>
<td>9. Hanging up towel after shower.</td>
<td>No</td>
</tr>
<tr>
<td>10. Throwing snack wrappers/containers away after use.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Appendix C:

Social Validity Questionnaire (for parents, pre-intervention)

**Directions:** Please read the statements below. Statements 1-5 will require you to circle/highlight a number on the rating scale regarding how much you agree or disagree with the statement. Question 6 asks you to write a brief response.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
</table>
| 1. I believe it is necessary to make a change to get my child to do more daily responsibilities. | 1 - Strongly Disagree  
  2 - Disagree  
  3 - Neutral  
  4 - Agree  
  5 - Strongly Agree |
| 2. I think this computer program will be helpful with getting my child to do more chores. | 1 - Strongly Disagree  
  2 - Disagree  
  3 - Neutral  
  4 - Agree  
  5 - Strongly Agree |
| 3. I think the program will be easy for my child to use. | 1 - Strongly Disagree  
  2 - Disagree  
  3 - Neutral  
  4 - Agree  
  5 - Strongly Agree |
| 4. I think my child will enjoy using this program. | 1 - Strongly Disagree  
  2 - Disagree  
  3 - Neutral  
  4 - Agree  
  5 - Strongly Agree |
| 5. Data collection will not be too time consuming on my part. | 1 - Strongly Disagree  
  2 - Disagree  
  3 - Neutral  
  4 - Agree  
  5 - Strongly Agree |
| 6. Do you have any concerns about having your child using this computer program? | **Provide Response:** |
Appendix D:

Social Validity Questionnaire (for children, pre-intervention)

Directions: Please read the statements below. Statements 1-6 will require you to circle/highlight a number on a scale of 1 to 5 regarding how much you agree or disagree with the statement. Questions 7 and 8 will require you to provide a short answer response.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I enjoy playing video games.</td>
<td>1 Strongly Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>2. I use the computer every day.</td>
<td>1 Strongly Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>3. I go on the internet every day.</td>
<td>1 Strongly Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>4. What are your favorite video games?</td>
<td><strong>Provide Response:</strong></td>
</tr>
<tr>
<td>5. Do you like RPGs (role playing games) such as Pokémon, Final Fantasy, or World of Warcraft?</td>
<td><strong>Provide Response:</strong></td>
</tr>
</tbody>
</table>
Appendix E:

Social Validity Questionnaire (for parents and children, post-intervention)

**Directions:** Please read the statements below. Statements 1-6 will require you to circle/highlight a number on a scale of 1 to 5 regarding how much you agree or disagree with the statement. Questions 7 and 8 will require you to provide a short answer response.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The program was not too time-consuming and did not require too much</td>
<td>1 Strongly</td>
</tr>
<tr>
<td>effort to complete.</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>2. I would continue to use the program on my own now that the study is</td>
<td>1 Strongly</td>
</tr>
<tr>
<td>complete.</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>3. I enjoyed using this program.</td>
<td>1 Strongly</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>4. I think this program was helpful with increasing the amount of daily</td>
<td>1 Strongly</td>
</tr>
<tr>
<td>responsibilities completed.</td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
<tr>
<td>5. I would recommend this program to others.</td>
<td>1 Strongly</td>
</tr>
<tr>
<td></td>
<td>Disagree</td>
</tr>
<tr>
<td></td>
<td>2 Disagree</td>
</tr>
<tr>
<td></td>
<td>3 Neutral</td>
</tr>
<tr>
<td></td>
<td>4 Agree</td>
</tr>
<tr>
<td></td>
<td>5 Strongly Agree</td>
</tr>
</tbody>
</table>
6. What parts of the program did you find most helpful or enjoyable?

Provide Response:

7. What aspects of the program did you not like?

Provide Response:

8. (For child only) Do you enjoy HabitRPG now as much as you did when you started?

Provide Response:
Appendix F:

Screen Shots
The HabitRPG home screen displaying the avatar, its health and XP, and Habits, Dailies, To-Dos, and Rewards.

Example in-game reinforcers including weapons, armor, and animal companions.
Appendix G:

IRB Approval
11/6/2014

Lisa Kadison, B.S.
ABA-Applied Behavior Analysis
13301 Bruce B. Downs Blvd
Tampa, FL 33612

RE: Expedited Approval for Initial Review
IRB#: Pro00019221
Title: Using Gamification to Increase Adherence to Daily Living Routines

Study Approval Period: 11/6/2014 to 11/6/2015

Dear Ms. Kadison:

On 11/6/2014, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents outlined below.

Approved Item(s):
Protocol Document(s):
Thesis Proposal/Protocol

Consent/Assent Document(s)*:
Adult IC minimal risk.docx.pdf
Parental Permission Minimal Risk.docx.pdf

Consent/Assent Script(s)**
Child Assent 9-30.docx
Phone Screen

* Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review
research through the expedited review procedure authorized by 45 CFR 46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

**Your study qualifies for a waiver of the requirements for the documentation of informed consent as outlined in the federal regulations at 45 CFR 46.117(c) which states that an IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects if it finds either: (1) That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject’s wishes will govern; or (2) That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.

This research involving children was approved under 45 CFR 46.404: Research not involving greater than minimal risk.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John Schinka, Ph.D., Chairperson
USF Institutional Review Board