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**Gender Bias or Profit Maximization? An
Economics Experiment on the Gap in
Availability and Cost of
Female Avatars in Mobile Games**

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ABSTRACT

Gender Bias or Profit Maximization? An Economics Experiment on the Gap in Availability and Cost of Female Avatars in Mobile Games

Keywords: Gender Preference, Video Games, Gender Bias, Field Experiments, Child Behavior

The introduction of smart phones, such as the iPhone, and associated applications (also known as apps) have established a new platform for gaming. Industry reports suggest that upwards of 60 percent of the players of these games are females. However, critics have noted that these apps tend to be biased against female representation. In 2015, a 12-year-old girl published her research in *The Washington Post* highlighting this gender difference. She found 98 percent of top “Endless Running Games” apps offered boy characters (often referred to as avatars), but only 46 percent offered girl avatars. Even more striking was that 90 percent of the boy avatars were offered for free, but only 15 percent offered girls avatars for free. In fact, while the average app cost just \$0.26, the average cost of purchasing a girl avatar was \$7.53. Some have drawn from this evidence that the app development industry is biased against women, while others counter that this by arguing that a smart, profit-maximizing industry could simply be seeking to profit by exploiting differences in preferences between boys and girls – in other words, the app developers are not biased, they just provide their customers with what they want. Our study uses experimental economics methodology involving actual monetary choices for real avatars in game situations to test these competing explanations. This framed field experiment involved 214 children, aged 7 to 14. Results suggest that both boys and girls have strong preferences to use avatars that have the same gender while they play. Willingness to play as another gender was present, but essentially none of the participants wanted to pay to play as another gender. These results find little difference in preferences between boys and girls and thus there is little evidence of strategic profit maximizing to explain a phenomenon that continues to look like basic gender bias in the gaming industry.

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I. Introduction

This study is a formal experimental economics test of the results found in a study designed and executed by a 12-year-old who was concerned about what she perceived to be a bias in providing male characters for free and requiring in-app purchases to access any female characters. Her research (Messer 2015) found 98 percent of top “Endless Running Games” apps offered boy characters (often referred to as avatars), but only 46 percent offered girl avatars. Even more striking was that 90 percent of the boy avatars were offered for free, but only 15 percent offered girls avatars for free. In fact, while the average app cost just \$0.26, the average cost of purchasing a girl avatar was \$7.53.

The results of that original study prompted a new curiosity. She knew that she and her sister would hoard their in-game currency in order to purchase female characters, but did other girls do the same thing? Were the other girls willing to purchase female characters? What about the preferences of boys? Would they also hoard their in-game currency to purchase male characters if they weren't offered for free by the app developers? These questions prompted her to start working with researchers at University of Delaware's Center for Experimental and Applied Economics (CEAE) to continue her investigation. This study was co-designed with researchers at the CEAE and the now 15-year-old investigator. The study was designed to empirically test whether children have a revealed preference for same gendered characters and whether that preference is dependent upon the cost of the character. Experimental economics techniques were employed, so that children aged 7 to 14, were recruited to participate in a framed field experiment where they earned real money and had the opportunity to spend this money on in-game avatars that they could then use to continue to play the game. Additionally,

survey data was gathered from participants on their stated preferences and experiences playing mobile phone games.

II. Literature Review

This review of the literature begins with a discussion of bias in video game design towards white male players and against females and non-white players. Then, it describes differences in game preferences for male and female players. Next, it reports findings with respect to what motivates players when selecting avatars followed by a brief look at the what motivates players to make in-app purchases.

Biases in video game design

Bias in video game design in favor of white male players is well documented (see Lynch et al., 2016 for a review of the literature). Female and non-white game players are not represented as often or in positions of power (Representation, Image, and Identity, 2008; Dickerman, C., Christensen, J, & Kerl-Mcclain, S.B., 2008). For example, females are often hyper-sexualized or presented in helpless roles. Non-white characters are often not the heroes; they are the villains or supporting characters. This research also provides evidence that across game types, white male characters dominate, even in games that are preferred by female players more than male players, and even though the gaming population is no longer dominated by white men.

Gender differences in games and game play

As females have taken a larger share of the gaming market, studies have shown there are differences in the games that male and female players prefer and why they prefer them. Lucas and Sherry (2004) surveyed 544 men and women ages 18-24 about their preferred video game

genres, why they play games, and the amount of time they play each week. They found that women played games less frequently than men, were less likely to play for social interaction, preferred traditional games (for example arcade, puzzle, or quiz games) more than men, and had a lower preference for physical enactment games (e.g.: fighting, shooting, or racing games). Men are more motivated to play by competition than women; women are more motivated to play for by challenge of the game.

Two gender studies were conducted by Hartmann and Klimmt (2006). The first asked n=317 women aged 18-26 years to rank a series of four fictional video games from most like to play to least like to play. Additionally, they rated enjoyability of playing the game on a scale of 1 to 6. The authors found that women preferred games that had higher levels of social interaction and lower levels of violence and sexualized female characters. In the second study, the authors surveyed n=795 video game players (n=18 females) using online recruitment and surveys about their preferences for playing competitive games in general as well as playing specific genres of games. The authors found that men ranked the importance of competition higher than women as well as reported a stronger preference for competitive games.

While the above two studies focused on young adults, Greenberg, Sherry, Lachlan, Lucas, and Holmstrom (2010) included participants in elementary, middle, and high school along with university students. The authors surveyed n=692 participants (whom were equally male and female) across grade levels with a balance of males and females about their preferences for different video game genres, frequency of game play, and reasons for playing. Across all age groups, males report playing games more frequently than females, and males and females both report competition and challenge as the top two reasons they play video games. Males report that their preferred genre is physical games (e.g.: action, racing, or sports) while females report their

preferred genre as traditional games (e.g.: puzzles and arcade). This finding is consistent across all age groups.

These findings demonstrate there are significant differences not only in *why* men and women play games, but in *which* games they play. First person shooter games are preferred by male players more than by female players, but puzzle, traditional arcade, and social games are preferred more by female players than by male players. Yet, arcade games (like endless running games), still default to white male characters, even though their genre is preferred by females and a majority of the players are female. This provides evidence to the gender bias literature's position that providing more representation of gender would be beneficial, and corollarily suggesting that it would be strategic for developers to include female characters as central characters within game genres preferred more by females.

Selecting avatars

In games where players select avatars (images that represent you in online games, chat rooms, etc. and that you can move around the screen), there are a variety of reasons for selection, but identification with the avatar is seen as important. Research on selecting specifically gender has mixed results. There is some evidence that players prefer characters of the same gender, while other research shows that gender-switching is common, especially for male players. However, this research is based on MMORPGs (Massive Multi-player Online Role Playing Games), not casual games like endless running games. In general, less research exists on casual games.

Deciding to make in-app purchases (freemium model)

Loyalty or “stickiness” in freemium gaming apps is significantly associated with the intention of making in-app purchases. However, most studies rely on survey data about

intentions to purchase, not data gained from actual purchases. Additionally, said research was conducted with adults, not with children or adolescents. This is a gap in the literature regarding willingness to pay content in an otherwise free app.

III. Experimental Design

This study is a framed field experiment designed to reveal children’s preferences for character gender when playing a video game, combined with a survey to determine their stated preferences about characters’ gender. The experimental design was designed to answer three primary questions: (1) Do children prefer video game characters who have the same gender as themselves? (2) Does the cost of a character affect children’s gender preferences? (3) Do character-gender preferences differ by player-gender? To follow the statistical tests explained below, these questions are expressed as formal research hypotheses in Table 1.

Table 1 – Research Hypotheses

	Hypotheses	Formal Test	Result and interpretation
1	Boys are indifferent to the gender of their avatars in video game when the avatars are free.	$H_0: C_M^M = C_M^F$	Reject, boys prefer male characters.
2	Girls are indifferent to the gender of their avatars in video game, when the avatars are free.	$H_0: C_F^M = C_F^F$	Reject, girls prefer female characters.
3	Children are indifferent to the cost associated with switching the gender of their avatars.	$H_0: C^{\$0} = C^{\$0.25}$	Reject. Having to pay a cost greatly decreased the likelihood of switching
4	Children’s gender does not influence their likelihood of switching their avatars.	$H_0: S_F = S_M$	Fail to Reject. Boys and girls demonstrate similar preferences to have avatars of the same gender

Participants were recruited in-person from two after-school programs, a family festival, and an outdoor pool. Research participants included 214 children aged 7 years old to 14 years

old (mean age 10 years) with a 50/50 gender split (Table 2). The vast majority had access to a tablet computer and had significant experience playing with apps in general. Less had experience with the specific app used in this research, Temple Run 2. Sixty-four percent preferred playing games with an avatar that had the same gender, but only sixteen percent indicated being averse to playing as an avatar with an different gender. Ninety percent of the children participants preferred to have the avatars be free.

Table 2. Descriptive Statistics

	Obs.	Min.	Max.	Mean	Std. Deviation
Gender	214	0	1	0.5	0.501
Male Siblings	214	0	6	1.03	1.041
Female Siblings	214	0	7	1.04	1.229
Age in Months	214	72	201	122.76	24.59
Grade	210	1	11	4.57	2.095
Access to an iPad	214	0	1	0.94	0.231
Experience with Temple Run	213	1	3	1.82	0.510
Experience with Apps	213	1	3	2.49	0.656
Self-Evaluation of gaming skill	213	1	3	2.31	0.579
Preference for Same Gender Avatar	211	0	1	0.64	0.483
Averse Response to Having a Different Gender Avatar	206	0	1	0.16	0.368
Prefer All Genders of Avatars are Free	206	0	1	0.9	0.297
Age in Years	214	6	16.75	10.2298	2.049

The average payout was about \$10 per subject for approximately 30 minutes of their time. All participants were given an initial balance of \$2.00 for participating in the study. They were then randomly assigned to a desk where there were earphones, an iPad, written instructions (with visual representations of the necessary protocols), and a card depicting their initial character assignment (see Appendix for instructions). All recruitment materials, experiment

protocols, instructions, consent forms and assent forms were approved by the Institutional Review Board for Human Subjects.

Temple Run 2 was the video game used, an endless running game in which the player swipes up, down, left, or right on the screen to avoid crashing into obstacles. Available are special ‘maps’ that will alter the scenery of the original game, and special characters whose attire and race are typical of those settings. After being selected, characters appear at the bottom of the screen and move according to the player’s swipes. When landing a jump or stumbling, male and female characters emit different grunts. Because this characteristic is gender-specific, all participants were required to wear headphones in order to perceive it.

There were two available characters: Sigur Frostbeard (male) and Freya Coldheart (female) which were shown on opposite sides of the character card that was in front of the participants at all times (See Figure 1). Initial character assignments were determined randomly depending upon the treatment. The two characters were identical in terms of abilities (i.e. running, jumping, sliding). The only variation between characters was their appearance.

Figure 1. Characters in Temple Run 2.

Sigur Frostbeard



Freya Coldheart



Also on each participant's desk was a sheet labeled MY EARNINGS with eight quarters on it (equal to an initial balance of \$2.00) for the purpose of ensuring that the participants understood how much money they had received and how much they would give away if they decided pay for a different character. The desks were also equipped with privacy shields to ensure the confidentiality of participants' choices. The instructions were then presented orally by an administrator with the aid of a PowerPoint slideshow (see Appendix). To improve participant comprehension of the research interface, questions were encouraged and were answered individually by a research administrator.

After the instruction and questions were completed subjects played the game Temple Run 2 for five minutes using their assigned character and taking a screenshot of their scores at the end of every round to incentivize playing to their full ability (see example screenshot in Figure 2).

Research administrators monitored participants throughout this time to ensure that they were complying with regulations. In particular, it was ensured that participants did not artificially extend the length of their game by watching advertisement videos or by making any in-app purchases which would have altered the abilities of the characters.)

After the five minutes of playing the game were completed, each subject was paid according to their highest score rounded up to the nearest 25,000 points. Each 25,000 points was worth \$0.25. In



other words, if a participant earned 150,000 points, then they earned \$1.50. Their earnings were paid out immediately in quarters and placed on their MY EARNINGS sheet.

To test the research questions, before the second gaming session participants were given the choice to continue playing as their assigned character or switch to the other character with the opposite gender. In some treatments, switching cost nothing. In others, it cost \$0.25 to switch. If a subject wanted to change their character for \$0.25, they would place two quarters in a labeled container and flip over their character card, so it depicted the other character. If they wanted to change characters but were not required to pay for it, they would just flip over their character card. To ensure confidentiality, foam was placed at the bottom of the container so the quarters would not clatter when they were put in. Research assistants passed by each desk confirming that the participant wanted to play as the character displayed on the card and recording their decision.¹

Participants then spent the next five minutes playing as their chosen character and again were paid based on their high score for the previous five minutes, as described previously.

Finally, they were asked to complete surveys on their preference in characters, feelings about the game, and previous experience playing similar video games. Parents were asked to complete a survey on their child's basic demographic information (See Appendix).

The first five-minute period was designed for beginners to understand how Temple Run 2 is played and the characters' role in the game, and for all participants to experience their designated character. The option to change characters was offered to determine the subjects'

¹ Note that the purchase of this avatar was just during the experiment session. To account for this temporary nature of the decision, we adjusted the cost to change character gender to be much lower than it would be in the actual game (25 cents in the experiment session compared to approximately ten dollars for the special characters available in the app). Future research could explore ways to make in-app purchases during the study permanent for players to test if the permanence of the purchase results in greater willingness to pay to switch character gender.

preference for characters of different genders while the purpose of the cost to doing so was to ascertain the strength of that preference. Five minutes was determined as long enough for participants to understand their character and the gameplay, but not so long as to bore them.

There were 4 treatments. Table 2 provides a description of all treatments. In Treatment 1 the initial assigned character was the opposite gender of the participant and after 5 minutes they had the choice to switch to the other character, but at no charge. In Treatment 2 the initial assigned character was the opposite gender of the participant and after 5 minutes playing as that character the participant then had the choice to change to a character of their own gender for \$0.25. Treatment 3 began with a character the same gender as the player and switching after the required 5 minutes was at no cost to the participant. Treatment 4 had the character begin as the same gender as the participant and changing to the opposite gender cost the participant \$0.25. A diagram of the table layout for each participant is included in Table 3.

Table 3. Treatments in Experimental Design

	Same Gender	Different Gender
Pay to Switch	<p><u>Treatment 1</u> <i>Round 1:</i> Avatar Gender = Player Gender</p> <p><i>Round 2:</i> Avatar Gender = Player’s Choice</p>	<p><u>Treatment 2</u> <i>Round 1:</i> Avatar Gender \neq Player Gender</p> <p><i>Round 2:</i> Avatar Gender = Player’s Choice</p>
Free to Switch	<p><u>Treatment 3</u> <i>Round 1:</i> Avatar Gender = Player Gender</p> <p><i>Round 2:</i> Avatar Gender = Player’s Choice</p>	<p><u>Treatment 4</u> <i>Round 1:</i> Avatar Gender \neq Player Gender</p> <p><i>Round 2:</i> Avatar Gender = Player’s Choice</p>

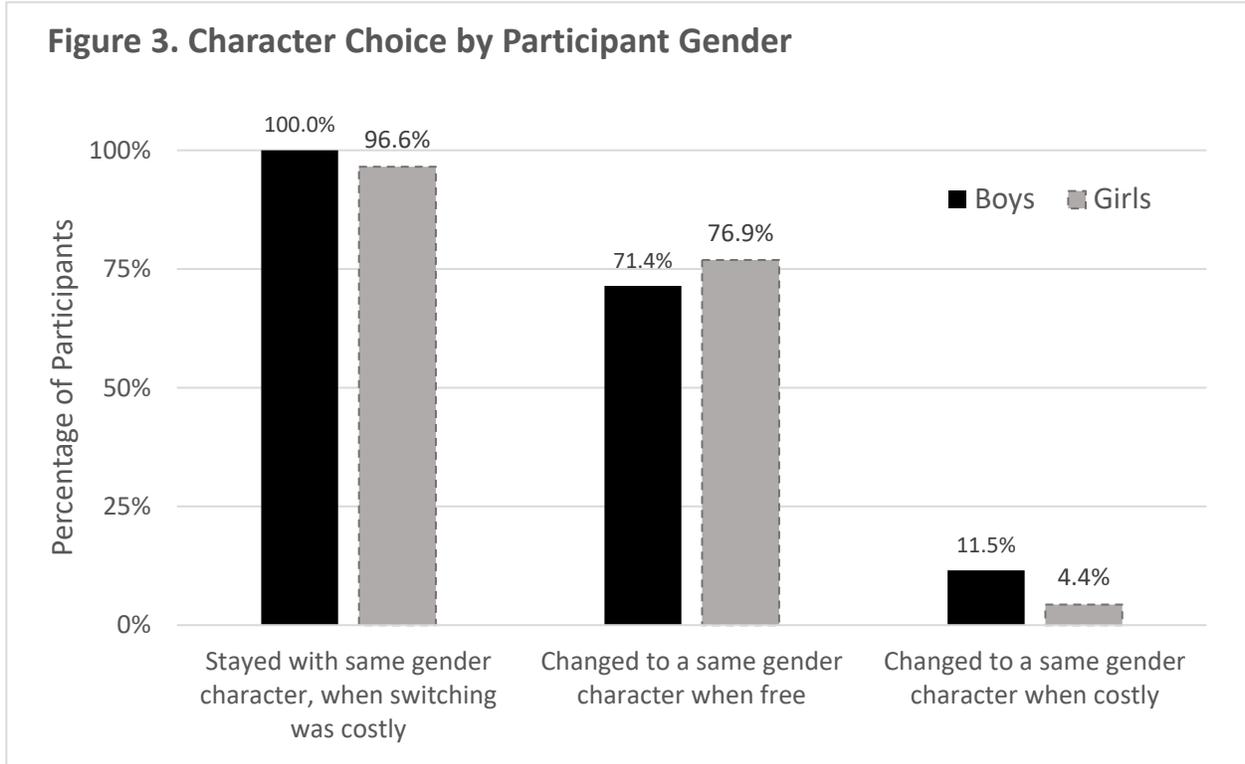
After completing the experiment, children completed a short survey about their stated character preferences and experience playing mobile games. A copy of the survey is included in

the Appendix. Parents completed a short demographic survey while their children participated in the experiment. A copy of the survey is included in the Appendix.

IV. Results

The key research questions addressed by this research relate to the decision by the participants to either retain the avatar that was randomly assigned to them in the first stage of the experiment or to switch to the other avatar that was different in gender and appearance. Recall that if there are inherent differences in the preferences for the gender of their avatars, strategic profit-maximizing app developers could exploit these differences, perhaps by offering boy avatars for free and charging for girl avatars (in the case, where girl players have strong desires to play as girl avatars).

A review of the decisions by the children participants, does not show differences in preferences between girls and boys. For instance, 100% of the boys refused to switch to a girl avatar in the second stage if it was costly; while 96.6% of girls made a similar decision (Figure 3). When the ability to switch to a same-gender avatar was free, the decision to switch was prevalent with both boys (71.4%) and girls (76.9%). Finally, only 11.5% of boys and 4.4% of girls were willing to pay to play the second round as a same-gender avatar (while this difference was not statistically significant, this trend is opposite of what would be needed if the profit-maximizing theory of girls being willing to pay more to get a girl avatars is to hold).



To explore these results in greater depth and to formally test the research hypotheses outlined in Table 1, a binomial logistic regression model was developed where the dependent variable, switching character gender was predicted by player gender, player age, treatment condition (free to switch, cost to switch), and whether the initial character gender matched the player gender. There are three measures of the model's predictive accuracy presented: percent of cases correctly predicted, sensitivity, and specificity. Percent of cases correctly predicted is equal to the number of true positives plus the number of true negatives divided by the total number of cases. This statistic is a general measure of accuracy. Sensitivity and specificity are more explicit measures of accuracy that identify how well the model predicts positive outcomes (sensitivity), and how well it predicts negative outcomes (specificity). All three measures have a range of 0 to 1 with higher numbers indicating a more accurate predictive model.

Regression diagnostics revealed no outliers, influential cases, or multicollinearity; and cross-tabulations showed no small cell size for any variables. Data was complete for all participants. The model correctly predicted 86.45% of cases. Specificity was moderate to high, 65.30%, and, sensitivity was high 92.72%. Two variables significantly predicted a player’s decision to switch characters in round 2, character gender not equal to player gender and cost to switch.

Table 4. Binary Logistic Regression Predicting Switching Avatars in Round 2.

	<u>Model 1</u>
Gender	-0.305 (0.439)
Costly_Switch	-3.625*** (0.530)
Change to Same Gender	1.502*** (0.456)
Age (in months)	-0.015* (0.009)
Constant	1.356 (1.144)

Notes: * indicates statistical significance at the 0.10 level.
 ** indicates statistical significance at the 0.05 level.
 *** indicates statistical significance at the 0.01 level.

As shown, in Table 4, avatar gender not equal to player gender significantly predicts whether a player will switch characters in round 2 ($B = 1.502, p = .001$). Players were 3.49 times more likely to switch if they started with avatar that had a different gender than their own gender, compared to when they started with an avatar that had the same gender as their own gender. The Costly_Switch variable also significantly predicts whether a player will switch avatars in round 2

($B = -3.625, p < .001$). Participants were 97.3% less likely to switch if they have to pay to switch than if they do not have to pay to switch. Importantly, gender was not a significant predictor of a player's choice to switch ($Wald = .0482, p = 0.487$).

In addition to the results of the game, the survey results add to our understanding of kids' preferences about character gender. When asked about their character gender preference, 63.5% of participants say they prefer to play with a character of the same gender, while 16.5% say they are bothered when they play a character that is not their gender. There is no significant difference in responses to these questions by participant gender. We also asked participants which character they liked better and why. We then coded the open-ended responses to "why" and identified six categories: perceived character ability, character appearance, cost, character gender, character played, no preference. Table 5 includes sample responses for each reason as well as percent of responses that mentioned each reason. If participants mentioned more than one reason for selecting their favorite character, we coded the first reason they mentioned. The two most common reasons were character appearance (29.9%) and character gender (28.5%), followed by perceived character ability (16.8%) and liking the character played (13.1%), with relatively few participants reporting the reason was cost (3.3%) or that they had no preference (7.5%).

Table 5. Participants' Stated Reasons for Preferring a Character

Reason Category	Frequency of Reason
Character Appearance	29.9%
Character Gender	28.5%
Perceived Character Ability	16.8%
"Liking" Character played	13.1%
No preference	7.4%
Cost	3.3%

V. Conclusions

This study employed a framed-field experiment involving over 200 children aged 7 to 14 using real money to make actual in-app purchases to evaluate the underlying explanation for the differences in avatar gender availability that were observed by a 12-year-old, who published her research in the Washington Post (Messer 2015). The study was designed to empirically test whether children have a revealed preference for same gendered characters and whether that preference is dependent upon the cost of the character.

The results clearly show that the children in this study prefer to play a character of the same gender; however, they are more likely to remain the default character if choosing a different character costs money. In addition to the revealed preferences about character gender, children also state a preference for playing a character of the same gender (63.5%), but only 16% say it bothers them when the character is a different gender. In this study, a player's gender did not impact their performance in the game, but age, (self-reported) skill, and frequency of playing were positively correlated with higher scores. When asked to say why they picked a character, children report most often that it is based on either the characters' appearance or gender, followed by perceived character abilities, liking the character, and the cost of a character. A vast majority (90%) of children felt both male and female characters should be free.

This research has practical implications for video game designers. As both male and female players prefer to use with characters of the same gender and having a cost to play as a character reduces switching behavior, it is possible that having a cost for female characters reduces the popularity of the game among female players. This is especially relevant for endless running games as these games are preferred more by females than males. By making female characters free by default, developers may increase the popularity of these games.

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Appendix – Experiment Instructions and Protocols

Pre-Experiment Set-up

Each participant desk should be set up with the following:

- A Privacy divider
- A Pen
- 8 quarters on a paper labeled “my earnings”
- An empty container labeled “payment”
- A character card
- Instruction Card 1
- An iPad:
 - Make sure the “show tutorial” slider in the Temple Run 2 Settings is turned to “on” by going to “menu”, “settings”, “show tutorial – on”.
 - Make sure both male and female character “powerups” are set to “shield” by selecting the character and verifying the image to the top left of the character in the “powerups” box is a shield. If it is not, touch the object on the top left of the screen, change it to “shield” then click “back”.
- 1 pair headphones (plugged in to iPad)



The Endless Running Game Visuals PowerPoint presentation should be displayed so that participants can all see it during the experiment. You will also need an online timer (Google Timer is easy to use).

Treatment 1: At desks where male participants sit, the character card should be turned so the female character is facing up and the female character should be selected in the Temple Run 2 app (“menu”, “change”, select female character). At desks where female participants sit, the character card should be turned so the male character is facing up and the male character should be selected in the Temple Run 2 app (“menu”, “change”, select male character).

Treatment 2: At desks where male participants sit, the character card should be turned so the male character is facing up and the male character should be selected in the Temple Run 2 app (“menu”, “change”, select male character). At desks where female participants sit, the character card should be turned so the female character is facing up and the female character should be selected in the Temple Run 2 app (“menu”, “change”, select female character).



Consent and Assent

Consent and Assent should take place in the hallway outside of the study room. Once parents have consented and child participants have assented, parents and children should be given identical Participant IDs. Children should be taken to one of the participant desks. Parents should be taken to the parent waiting area (inside the study room) and given a computer so that they can complete the Qualtrics survey. Parents should use the child's participant ID to complete the survey. Parents with multiple children participating in the study must sign a separate consent form for each child and fill out a separate survey for each child.

Experiment Script

Read: Hello everyone! Thank you for agreeing to play with us today. You should see 8 quarters on the sheet labeled "my earnings" on the desk in front of you. You have earned these 8 quarters for participating today. You should also have an iPad, a card with a picture of a character on it, an instructions card, a pen, and a container labeled "payment". Please raise your hand if you do not have any of the items I just described. *(Pause to make sure all participants have all study materials)*

Read: Today you are going to play a game called Temple Run 2. You will play two rounds of the game and you will earn money based on your highest score in each round. After you play the game, you will answer a couple of questions about how you play apps and computer games.

Before we play, I am going to show you how to take a screen shot. You need to take screen shots so you can show us your highest score in each round. Each time you die in Temple Run 2 you will see a screen like this showing your score.

(Show Screen Shot: Score on projector)

Read: You will record your score by taking a screenshot each time your character dies. To take a screenshot on your iPad, press the Power button and the "Home" button at the same time, hold for one second, and then release.

(Show Screen Shot: Home Screen on projector and then demonstrates how to take a screen shot)

Read: When you have taken a screenshot, the screen will flash white and you hear a clicking sound. For practice, please take a screen shot right now of the screen on your iPad. Now, touch



the “photos” app icon and make sure you can see your screen shot. Please show this screenshot to the research assistant when he/she comes to your desk.



(Show Screen Shot: iPhoto Icon on projector. Pause here while assistants confirm all participants have successfully taken a screen shot.)

Read: Please press the “home” button to go back to the home screen on your iPad. You will press the home button each time you want to switch between your screen shots and the game. *(Pause here while assistants confirm all participants have successfully gotten back to the home screen.)*

Read: Now I will tell you how to play round one. During this game, all characters have the same abilities. In round one you will play the character shown on the card on the desk in front of you.



Your character is running away from a big monster and trying to avoid obstacles. In general, the longer your character survives and the more coins your character collects, the higher your score. You will have a chance to practice by playing the tutorial. The tutorial will automatically start when you open the game. The tutorial is just practice; you will not earn money until you complete the tutorial.

Once you complete the tutorial, each “run” in the game lasts until your character dies. After each run is over, you will be shown this screen.

(Show Screen Shot: Skip)

Read: touch “skip” at the bottom of the screen and you will see a screen that displays your score for that run.
(Show Screen Shot: Score)



Read: Remember, you must take a screenshot of this screen after each time your character dies. You will earn money based on your highest score in Round 1. If you do not take screenshots then you will not be paid. If you are unsure about whether or not the screenshot was successful, then you are welcome to take a second screenshot or ask an assistant for help.

You are allowed to have as many runs as you would like for the next 5 minutes. A timer on the screen will show you how much time is left.

After the timer goes off, an assistant will come to your desk, look at the screenshots you took, and pay you based on your highest score. If after 5 minutes you are in the middle of a run you will need to end your run and take the screenshot.

You will be paid based on your highest score recorded by a screenshot. For each 25,000 points you earn, you will earn one quarter. In other words, if your highest score is 25,000 then you will earn one quarter. If your highest score is 100,000 points you will earn four quarters, or one dollar.



During this study there are four rules you must follow. If you do not follow these rules, then you will not be paid.

1. Rule 1: You may not change any of the settings of the game.
2. Rule 2: You may not purchase any special powers.
3. Rule 3: You may not make any modifications to your character.
4. Rule 4: You may not talk with other kids involved in this research or look at their screens.

If you have any questions, please raise your hand and the assistant will be happy to help you.
(Show Temple Run Icon)

Read: Please click on the Temple Run 2 Icon, put your headphones on, and begin playing Round 1 now.
(Start the 5-minute timer. Monitor participants during Round 1 to make sure they are taking screenshots and following the procedures. Once the five-minute timer rings, continue reading instructions.)



Read: If you have not already done so, please end your run now, take a screen shot of your score, and take your headphones off.

Once you have taken a screen shot, please open the photos app. An assistant is going to come to your desk, and look at your photos. He/she will pay you based on you highest score. Please wait quietly until all players have been paid.

*(Research Assistants should record each participant’s character (male/female) and high score (number of points) in the **Endless Running Payout Tracker** Google spreadsheet and then pay participants the number of quarters indicated by the spreadsheet. After recording the high score, research assistants should delete all screen shots. Finally, assistants should give each participant a copy of Instructions Card 2. The Administrator should monitor spreadsheet entries for fidelity of data entry. Once all participant scores have been recorded and all payouts are complete begin reading instructions for round 2.)*

	A	B	C	E	G	H	J	M
1	Participant ID	Character 1 m=male f=female	High Score 1	PO1 (Quarters)	Character 2 m=male f=female	High Score 2	PO2 (Quarters)	Net Payout
2	SAMPLE 1	m	50,341	3			0	\$2.50
3	SAMPLE 2	f	150,321	7			0	\$3.50

Read: Now we are going to play round 2. In round 2, you will play Temple Run 2 again for 5 minutes. The rules will be the same as before. However, in this round you can choose between playing two characters. You can see the two character choices on the character card on your desk. Please look at both sides of the character card now. If you would like to switch to the other character, you must pay one quarter. If you want to keep the same character that you played in Round 1, you do not have to pay any quarters. Please choose your character now by flipping the character card so that the character you would like to play for the second round is facing up. If you choose to switch your character, you must put one quarter in the payment container on your desk. If you choose to stay the same character, you do not have to put any money in the container on your desk. Again, just like in Round 1, both characters have the same abilities.

(Assistants should go to each participant, identify if the participant has chosen to “switch” and if so, change the character in the Temple Run 2 App and make sure the participant has put a quarter in the payment container.)

Just like before, you will earn money for the highest score you earn during Round 2. Please remember to take a screen shot after each run and do not change the settings of the game. If you have any questions, please raise your hand and the assistant will be happy to help you. Please put your headphones on and begin playing Round 2 now.

(Start the 5-minute timer. Monitor participants during Round 2 to make sure they are taking screenshots and following the procedures. Once the five-minute timer rings, continue reading instructions.)

Read: If you have not already done so, please end your run now, take a screen shot of your score, and take your headphones off. Once you have taken a screen shot, please open the photos app. An assistant is going to come to your desk, and look at your photos. He/she will pay you based on you highest score. Please wait quietly until all players have been paid.

(Research Assistants should record each participant’s character (male/female) and high score (number of points) in the **Endless Running Payout Tracker** Google spreadsheet, pay participants the number of quarters indicated by the spreadsheet, and give each participant an envelope for his/her earnings. After recording the high score, research assistants should delete all screen shots. Assistants should also prepare a receipt with each participant’s payout amount and ask participant to sign the receipts. Payout Amount is located in the Net Payout column of the **Endless Running Payout Tracker** Google spreadsheet. The Administrator should collect all receipts from the Assistants. Once all payouts have been made and receipts collected, the Assistants should hand out the survey sheets.)

	Participant ID	Character 1 m=male f=female	High Score 1	PO1 (Quarters)	Character 2 m=male f=female	High Score 2	PO2 (Quarters)	Net Payout
2	SAMPLE 1	m	50,341	3	m	75,648	4	\$3.75
3	SAMPLE 2	f	150,321	7	m	124,369	5	\$4.75

Read: Before you leave, we are going to ask you to answer a few questions. An assistant will give you a copy of the questions. Please write your participant number on the top of the sheet, and then answer each question. Once you have answered all of the questions, please raise your hand and an assistant will collect your sheet. Once your sheet has been collected you may take your earnings and leave with your parent/guardian. If you have any questions, please raise your hand and an assistant will be happy to help you.

Thank you again for helping us out today!

Appendix B. Powerpoint Slides

Slide 1



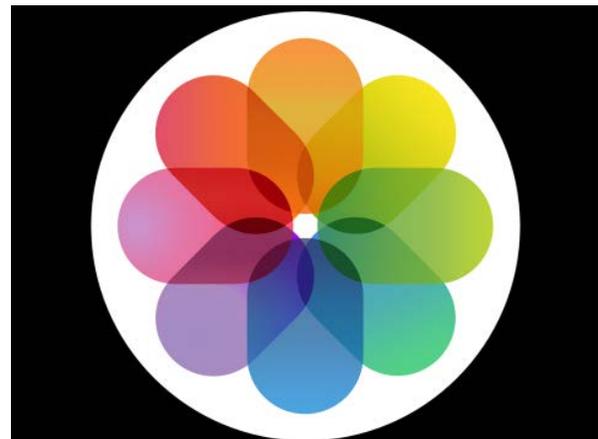
Slide 2



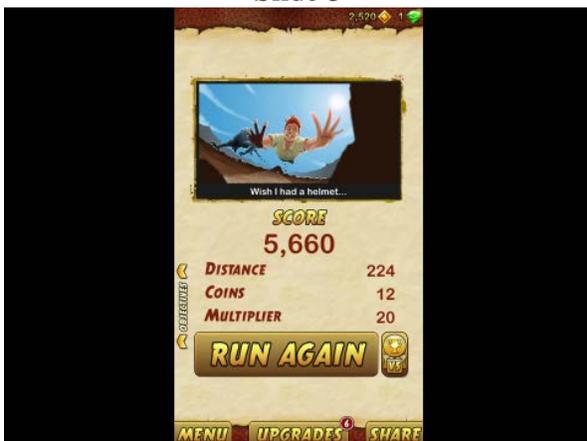
Slide 3



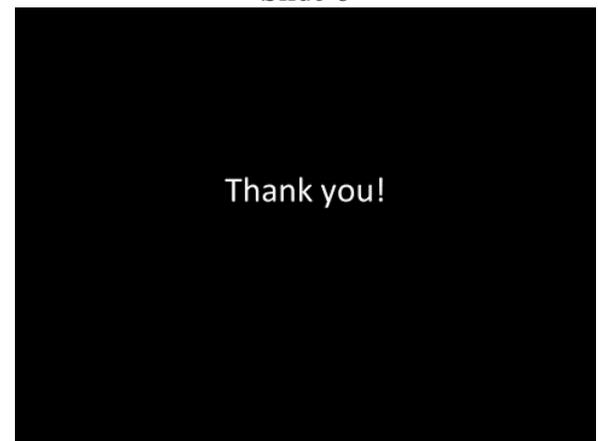
Slide 4



Slide 5



Slide 6



Appendix B. Child Survey

Your responses to these questions will be kept secret. Please do not put your name on this sheet.

Please circle the answer that best describes you for each question.

1. How often do you play the game Temple Run?
 - a. I never played before today
 - b. I play sometimes
 - c. I play almost everyday
2. How often do you play games on a smart phone, iPod Touch, iPad, tablet, or similar device?
 - a. I don't play games on these devices
 - b. I play sometimes
 - c. I play almost everyday
3. How good do you think you are at playing apps?
 - a. I am not good
 - b. I am OK
 - c. I am really good

For each of the following statements circle YES if you agree, and circle NO if you disagree.

4. I like it better when the character I play is a boy like me. Yes No
5. It bothers me when the character I play is a girl. Yes No
6. Boy and girl characters should both be free in all games. Yes No

7. Which character do you like better? **Circle your choice.**



8. Why do you like this character the better?

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College of Agriculture and Natural Resources
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Natural Resource Management	Price and Demand Analysis
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