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A FORMATIVE EVALUATION OF
A SMARTPHONE APPLICATION FOR COUPLES:
THE AFFECTIONATE GESTURE PLANNER

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Agriculture, Food and Environment
at the University of Kentucky

By

Patrick R. Bortz

Lexington, Kentucky

Director: Dr. Nathan Wood, Associate Professor of Family Sciences

Lexington, Kentucky

2016

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ABSTRACT OF THESIS

A FORMATIVE EVALUATION OF A SMARTPHONE APPLICATION FOR COUPLES: THE AFFECTIONATE GESTURE PLANNER

The Affectionate Gesture Planner (AGP) is a smartphone application (i.e., “app”) that aims to increase relationship satisfaction for couples in long-term relationships by prompting couples to complete loving acts for each other on a daily basis. The AGP app is informed by concepts from social exchange theory and the investment model (Rusbult, 1983), which predict that increasing the mutual exchange of beneficial investments to the relationship improves the quality and stability of the relationship. The present study is a formative evaluation on the prototype of the AGP app. Based on participant feedback, the AGP app will be improved prior to future trials. Future models of the AGP app will be used to compare the efficacy of using standardized suggestions versus personalized prompts.

KEYWORDS: couples app, personalized suggestions, standardized suggestions, affectionate gesture planner

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June 17, 2016

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Chapter One

Introduction

Long-term romantic couples tend to report a decrease in relationship satisfaction over time (Mitnick, Heyman, & Smith Slep, 2009; Strong & Aron, 2006; Wilcox & Dew 2012). Marital distress and divorce predict higher rates of substance abuse and psychiatric disorders (Overbeek et al., 2006), whereas high marital quality and couple satisfaction is associated with lower depressive symptoms, global physical and emotional health (Proulx, Helms & Buehler, 2007), sexual satisfaction (Byers, 2005), relationship stability (Sprecher, 2001), children's functioning (Howes & Markman, 1989), and higher earning potential in married or once-married males (Chiodo & Owyang, 2002). Thus, counteracting the decline in relationship satisfaction should positively affect many aspects of mental and physical health. Couples with high relationship satisfaction tend to engage in about five times as many positive interactions as negative interactions (Gottman, 1999), and encouraging couples to increase their mutual exchange of positive interactions on a daily basis may actively increase couple's relationship satisfaction (Sprecher, 2001).

Smartphone technology has created a new platform for healthcare interventions aiming to impact day to day decisions and behavior (Boulos, Wheeler, Tavares, & Jones, 2011). In 2013, 56% of adults in the US owned smartphones with 91% owning some form of cellular phone (Smith, 2013), which is a steep increase from 45% of adults owning smartphones in 2012 (Rainie, 2012). Smartphone applications are already being tested as a modality for therapeutic enrichment for therapists and individual clients (Clough & Casey, 2015). The use of smartphone applications ("apps") as a modality for

providing interactive interventions is preferred over the modality of short message services (SMS; i.e., “text-messaging”; Ainsworth, et al., 2013). Despite the need for couples to maintain strong relationships and the increased awareness of how apps can impact behavior, no systematic analysis of a couples-focused app has been performed.

The “Affectionate Gesture Planner” (AGP) App

The goal of the Affectionate Gesture Planner (AGP)—a smartphone application or “app”—is to increase relationship satisfaction and excitement for couples in long-term relationships by prompting couples to complete loving acts for each other on a daily basis. The AGP app is informed by concepts from social exchange theory and the investment model (Rusbult, 1983), which predict that increasing the mutual exchange of beneficial investments to the relationship improves the quality and stability of the relationship. As such, the AGP app aims to increase the exchange of loving gestures between romantic partners. If successful, the AGP app will increase participants’ perception of the relational benefits in their current relationship and enhance relational excitement such that imitates the initial stages of the romantic relationship. After completion of a thorough evaluation process, this intervention will become available via the App Store to all persons who own smartphones and are in a romantic relationship.

The purpose of the present study was to conduct a formative implementation evaluation on the prototype of the AGP app during the initial phases of implementation. In this stage, the AGP app was implemented using Apple’s TestFlight Program, a program that allows app developers to test their prototype apps before releasing them on the App Store. First, Apple’s Beta App Review had to approve the app prior to External Testing. Then, the AGP app was distributed for user feedback from participating

couples. Results from the present evaluation were used to improve the experience of using the app, identify and correct potentially confounding variables, and maximize compliance in future research.

Though previous studies have used smartphone applications as interventive tools, there has been no research done on an interactive app targeting interpersonal relationships. The AGP app research may be the first app-based method for collecting dyadic data, and, as such, it is an important area for empirical investigation. This research extends the literature on app-based interventions as well as demonstrates the relevance and process of app development and app usage as an interventive tool.

Literature Review

Social exchange theory: Benefits and equity. Social exchange theory (SET; Kelley & Thibaut, 1978) posits that individuals seek relationships with the highest rewards and lowest costs as calculated from a variety of social exchanges, which can take an almost infinite number of forms (Cropanzano & Mitchell, 2005). In couples, exchanges are generally unquantifiable (e.g., emotional support), and the benefit of an exchange varies depending on the perceived value of the benefits being received (Cropanzano & Mitchell, 2005; Gordon, Arnette, & Smith, 2011). The investment model explains that relationship satisfaction, level of investment in the relationship, and estimation of alternative partners are three aspects that decide a person's commitment to a relationship (Lund, 1985; Rusbult, 1983). Thus, increasing beneficial exchange within a relationship should increase relationship satisfaction, decrease the appeal of alternate relationships, increase relational investment and commitment, and decrease the chances of dissolution of the relationship.

Relationship satisfaction and stability may not be increased if the partners' efforts to exchange benefits are disproportional (Cropanzano & Mitchell, 2005; Sprecher, 2001). Emotional support in married and cohabiting couples was only beneficial to both partners if both partners were giving and receiving support equitably; in addition, one-sided support was beneficial to the giver but not the receiver (i.e., with the exception that one-sided support increased relationship satisfaction for both partners when the receiver was unaware that support was actively being given; Gleason, Iida, Bolger, & Shrout, 2003). Thus, the maximization of relationship satisfaction requires both partners to have a perception of equity within the give and take of their relationship.

However, utilizing a strict behavioral contract may not foster a healthy relationship, given that unhappy couples are more likely to keep track of what they give and receive in a relationship (Gottman, 1999). Furthermore, distressed couples are more likely to interpret positive behavior changes through a negative perspective and more likely to overlook positivity (Bradbury & Fincham, 1990). Therefore, mutually beneficial exchange depends on perceived equity without the confines of a rigid behavioral contract.

Limitations of previous interventions. A variety of studies have produced promising results (e.g., Aron et al., 2000; Coulter & Malouff, 2013), but previous interventions tend either to give specific instructions that limit applicability for many couples or offer generalized suggestions that cannot easily be investigated in research. On one side of the spectrum, interventions prescribing detailed scheduling (e.g., "Magic Five Hours"; Gottman, 1999) or requiring time-based involvement (e.g., prompting couples to devise 10 different 90-minute activities; Coulter & Malouff, 2013) may

inadvertently exclude couples that are confined by time-constraints and discordant availability (Fraenkel & Wilson, 2000). On the other side of the spectrum, generalized suggestions (e.g., “date nights”; Wilcox & Dew, 2012) have indefinite variability for application. In addition, couples with limited financial and temporal resources may lack creativity and intentionality needed for follow through.

The AGP app may be able to offer solutions for these issues in previous interventions by having couples create their own ideas for what makes them feel loved and then using reminders to encourage follow through. In this way, (a) the specific needs of the couples will not be overlooked as in highly directive interventions, (b) the efficacy of the suggestions will not be too ambiguous to study, and (c) intentionality and time-constraints will be mitigated by having reminders take over the role of planning affectionate gestures. Given that both directive and ambiguous interventions have had some success in increasing relationship satisfaction, a research model comparing these methodological approaches may be able to improve understanding as well as therapeutic practice in working with couples and families.

Compliance and accountability via cellular technology. Intuitively, the efficacy of an intervention depends on compliance. Homework efficacy increases when goals are clearly defined and potential barriers are discussed (Detweiler-Bedell & Whisman, 2005). Short message services (SMS)—an inexpensive means of connecting with clients—have successfully allowed clinicians to track and increase participant compliance (Downer, Meara, Da Costa, & Sethuraman, 2006; Shapiro, et al., 2010). For example, Bauer, Percevic, Okon, Meermann, and Kordy (2003) employed SMS to stay connected with patients after care was provided: The participants checked in weekly by

answering three questions via text, which then prompted a response from the web server that also recorded the data. Also, Shapiro et al. (2010) report that participants responded 87% of the time—notably higher than the adherence to paper measures—in their study, which used SMS on a daily basis to track participants’ symptoms of bulimia nervosa during and after treatment. In both of the aforementioned studies (Bauer, et al., 2003 and Shapiro, et al., 2010), participants received feedback messages that were specifically tailored to the severity of the answers. Though over half of the participants did not complete the study (i.e., Shapiro, et al., 2010), participants that completed the study had significantly less bingeing episodes from first to last assessment, thus indicating the value of self-monitoring with the help of their mobile device.

The current study utilized the availability of cellular devices to maintain communication with participants—that is, through push notifications administered through an app. Given that (a) the use of smartphone applications as a modality for providing interactive interventions is preferred over SMS (Ainsworth, et al., 2013) and (b) SMS successfully engages participants while also collecting data and providing feedback, similar interventions through smartphone apps may also produce positive results. The importance of the present study is identified holistically in the following quotation from Donker, et al. (2013):

Mental health apps have the potential to be effective and may significantly improve treatment accessibility. However, the majority of apps that are currently available lack scientific evidence about their efficacy. The public needs to be educated on how to identify the few evidence-based mental health apps available in the public domain to date. Further rigorous research is required to develop and

test evidence-based programs. Given the small number of studies and participants included in this review, the high risk of bias, and unknown efficacy of long-term follow-up, current findings should be interpreted with caution, pending replication. (Abstract–Conclusions)

The present study. The present study involves a formative implementation evaluation on the prototype of the AGP app, a new intervention administered via smartphone application (i.e., “app”). Formative implementation evaluations are used within program development to identify practical lessons to be learned for future trials and to prevent the occurrence of unexpected problems during larger program release (Love, 2004). As such, this study was conducted to identify errors in the AGP app design and function, and the results of this study informed the modifications made to the APG app—thus, maximizing app functionality, ensuring a user-friendly experience, and removing errors prior full release of the AGP app. To ensure rigor in the evaluation and to enact an AGP procedure consistent with future models, both quantitative and qualitative data were collected (Alkin, 2011).

Chapter Two

Method

Participants

A total of 14 couples met the following inclusion criteria: Participants must be currently involved in a romantic relationship, both partners must be at least 18 years old and willing to participate, and both partners must have an iPhone/iOS mobile device. Of the original 14 couples, 11 couples completed the study. Previous research suggests that as few as five participants can reveal 85% of usability issues and that a representative sample is not needed to have valuable results regarding usability (Kirwan, Mitch, Vandelanotte, & Mummery, 2012; Nielsen, 2000). As such, the use of 11 couples was more than enough to produce trustworthy results for how to improve the structure and function of the AGP app.

The sample included three married and eight dating couples with ages ranging from 23–60. Of the 11 participating couples, ten relationships were formed by one male and one female, and one relationship was formed by two males. Nine couples were formed with two individuals both indicating White/Caucasian as their race; two couples were formed by one individual indicating White/Caucasian as their race and one individual indicating Black/African-American as their race (see Table 1).

Table 1

Participant Information Paired by Couple and Using Pseudonyms

Pseudonym	Age	Race	Gender	Relationship Length	Married
1. Emily	25	White/Caucasian	Female	3.7 years	2.5 years
1. Carl	25	White/Caucasian	Male	3.7 years	2.5 years
2. Phyllis	23	White/Caucasian	Female	3.9 years	NA
2. Phil	23	White/Caucasian	Male	3.9 years	NA
3. Anisa	29	White/Caucasian	Female	8 months	NA
3. Allen	29	White/Caucasian	Male	8 months	NA
4. JacQuan	28	White/Caucasian	Male	7.8 years	5.5 years
4. Mandy	29	White/Caucasian	Female	7.8 years	5.5 years
5. Julio	25	White/Caucasian	Male	3.2 years	NA
5. Arnold	25	White/Caucasian	Male	3.2 years	NA
6. Carrie	25	White/Caucasian	Female	2.4 years	NA
6. Jerry	27	Black/African-American	Male	2.4 years	NA
7. Cheryl	26	Black/African-American	Female	1.4 years	NA
7. Earl	27	White/Caucasian	Male	1.4 years	NA
8. Penelope	34	White/Caucasian	Female	1.4 years	NA
8. Bob	35	White/Caucasian	Male	1.4 years	NA
9. Brittany	22	White/Caucasian	Female	11 months	NA
9. Mark	25	White/Caucasian	Male	11 months	NA
10. Mei-ling	25	White/Caucasian	Female	11 months	NA
10. Fred	29	White/Caucasian	Male	11 months	NA
11. Maya	60	White/Caucasian	Female	47.5 years	43.8 years
11. Brian	60	White/Caucasian	Male	47.5 years	43.8 years

Procedure

Recruitment. The present research was sent as proposal to the University of Kentucky's Institutional Review Board and was given approval on September 14th, 2015. Recruitment for this study began on February 4th of 2016; advertisements for the study, which included the IRB approved consent language, were placed on Facebook. Interested persons contacted the researcher via private Facebook messaging, SMS, or email in order to provide the researcher with an email address for each partner in the interested couple. Once the researcher received two email addresses (i.e., one for both partners) from an interested couple, the email addresses of potential subjects were added to the email list for participating couples.

After participants were given access to begin using the AGP app, the researcher sent enrollment follow-ups to potential participants via the same method of communication that each couple used to share their email addresses (e.g., if the participant used private Facebook messaging to share their email addresses with the researcher, then the researcher followed up with the couple using private Facebook messaging). Couples who did not begin use of the AGP app were contacted up to three times by the researcher in order to ensure that they had access to the app and were still willing to participate in the study. All potential participants were emailed updates about the app as needed.

TestFlight Beta Testing. To begin testing an iPhone app, a researcher/developer must purchase membership—renewed yearly—to be an *Apple Developer* as an *Individual*, an *Organization*, or an *Enterprise Program*. The AGP app research was implemented under an Individual membership, because the primary investigator

implemented the AGP app independent of university or outside funding. To implement the AGP app without fully releasing it on the App Store, the researcher used iTunes Connect—a web-based Apple Developer tool for managing apps and other content distributed through iTunes—to access the TestFlight Beta Testing program, which is a program that allows Apple Developers to test their apps prior to releasing them to the public. The TestFlight Beta Testing program offers two modalities for beta app testing: *Internal Testing* and *External Testing*. The present study used both modalities for beta testing.

Internal Testing allows a small team (25 maximum) of administrators and developers to test a given app through the TestFlight app—an app used to upload and test beta apps. In the present study, Internal Testing was used by the researcher and the developer in order to identify obvious malfunctions in the AGP app. Within Internal Testing, the researcher and developer used the AGP app, identified errors, and corrected the identified errors prior to having research participants join the study. Given that confidentiality cannot be ensured among Internal Testers, External Testing was used for the AGP app study participants.

To begin External Testing, the AGP app underwent a Beta App Review (as seen on <https://developer.apple.com/app-store/review/guidelines/>), which is a process used to ensure fidelity to Apple's guidelines for app quality. The AGP app was rejected, modified, and resubmitted for Beta App Review multiple times as a part of the refinement process. When the AGP app was approved for External Testing, the email addresses of participating couples were added to the list of *External Testers*. Then, the External Testers (i.e., potential AGP participants) were sent an invitation email from

iTunes Connect that gave instructions for downloading the TestFlight app as well as a unique invitation code to access the AGP app. Upon receiving this email and invitation code, participants were then able to begin use of the AGP app.

AGP app study. Participants were asked to use the app consistently for at least two weeks and were able to continue use of the app until the data collection ended on April 8th. Participants used the links within the invitation email from iTunes Connect to download the AGP app and begin use. Initializing use of the AGP app included (a) creating a username and password, (b) reviewing and accepting the informed consent, (c) completing the initial survey, and (d) identifying a partner's username to confirm a match. Couples were matched by having users confirm their partner's username via push notification, and then each couple was randomly assigned to the Standardized Condition (SC) or the Personalized Condition (PC; i.e., the experimental group).

Via push notification, participants in the SC randomly received standard prompts taken from a pool of the Gottman Institute's *Opportunity Cards* and *Salsa Cards: Mild*—playing cards that identify romantic gestures and suggestions for increasing intimacy in a relationship (e.g., “Bring flowers home today”; see Appendix F). Participants in the PC created personalized suggestions by completing up to 25 fill-in items (see Appendix D). For example, one fill-in item states, “I long for my partner to ____”. Responses to these prompts (e.g., “I long for my partner to say how much she loves me”) became the pool of personalized suggestions received at random by the participant's partner. (Personalized suggestions created by Partner A are only used as suggestions for Partner B, and vice versa.) All participants received the same instructions (as seen in Figure 1) for how to use the AGP app. After the aforementioned steps, use of the app was as follows:

1. Participants were notified to complete suggestions from their respective suggestion pools (i.e., standard suggestions for couples in the SC and personalized suggestions for the couples in the PC) at a rate of about 5 suggestions per week and one suggestion per notification.
2. Twenty-four hours after receiving a suggestion, participants were sent a follow up notification asking if they completed the suggestion, to which they indicated *yes* or *no*. This item was used as a secondary reminder as well as a measure for compliance.
3. Participants were notified to complete a brief 4-item survey (i.e., the CSI 4), which was sent randomly about 2–3x a week. The *Couple Satisfaction Index* (CSI; Funk & Rogge, 2007) was designed to measure self-reported relationship satisfaction.
4. Once a week, participants were notified to complete a longer survey to measure the compliance and estimation of how equally beneficial the intervention has been to both partners. This survey includes three open-response items that allow participants to both elaborate on their experience of using the app and offer feedback for suggested changes/improvements.

Measures

Demographics. (See Appendix A) Participants were asked to identify their age and gender. To measure the duration of the romantic relationship and marital status of the couple, couples were asked to identify the year and month for both when their romantic relationship began and when they married, if applicable.

AGP survey. (See Appendix B). Participants were notified to complete a longer survey of 20 items through the app at a rate of approx. every two weeks of using the AGP app. Due to unreliable app notifications, the survey was also administered through email at the end of the formative evaluation period. This survey includes three open-response items that allow participants to both elaborate on their experience of using the app and offer feedback for suggested changes/improvements:

(a) “How has the Affectionate Gesture Planner affected your life and love this week? A quick list, brief comment, or short essay will help make The Affectionate Gesture Planner better in the future.”

(b) “Have you done anything extra (beyond what The Affectionate Gesture Planner app has prompted) for your partner in the past week?”

(c) “Do you have any feedback about The Affectionate Gesture Planner app?”

These three open-ended items along with participant’s direct communication with the researcher were used in the qualitative data analysis to identify usability errors.

Also in this survey, participants are asked to identify the number of notifications the participant received in the past week to verify notification delivery. Two items ask about equity of performed gestures within the week and overall. For example the ninth item asks, “Which partner received a greater benefit during the use of The Affectionate Gesture Planner app in the past week?” with the following qualifiers: *my partner got a much better deal* (1), *equally beneficial* (5), *I got a much better deal* (9). This is to measure the compliance and estimation of how equally beneficial the intervention has been to both partners. Another item prompts, “About how hours overall have you devoted to planning and performing romantic gestures for your partner in the past week?”

Included also is the *Four-Factor Romantic Relationships* (FFRR; Malouff et al., 2012) excitement scale, which has respondents rate their level of agreement that each of the nine words (*exciting, passionate, adventurous, interesting, playful, sexual, spontaneous, boring, and romantic*) describes the current state of their romantic relationship. An additional item was added to match the marital boredom item used in Tsapelas, Aron, and Orbuch (2009), which predicted marital satisfaction in a nine year follow up.

Given that participants were required to share their email addresses with the researcher, a line of direct communication with the researcher became salient to participants. As such, participants asked questions and offered suggestions directly to the researcher, and this process became an additional tool for data collection. The transcripts from these emails, texts, and private Facebook messages were included as qualitative data for identifying usability issues. Future research will impose a more controlled form of data collection, but in the present study direct communication was frequently an efficient means of data collection.

Relationship satisfaction. (See Appendix C) The *Couple Satisfaction Index* (CSI; Funk & Rogge, 2007) was designed to measure self-reported relationship satisfaction. The CSI can be modified to include 32, 16, or 4 items, and all three item-lengths have similar reliability and validity. The CSI demonstrated better precision than similar but longer scales such as Marital Adjustment Test (MAT), the Dyadic Adjustment Scale (DAS), and several other measures of satisfaction, resulting in greater power for detecting different levels of relationship satisfaction (Funk & Rogge). Also, the CSI had strong convergent validity with several measures of relationship satisfaction (see Funk & Rogge for the complete list).

In the present study, the CSI 4-item was adapted to measure changes in relationship satisfaction throughout each week. Participants were prompted to consider only the previous two to five days while completing the CSI 4-item; in contrast, the original language indicates that respondents should consider the relationship as a whole. Response options for the four items included a sliding scale with slightly shortened anchors; the original CSI 4-item includes 6-point Likert scales. The questions remained the same as the original CSI 4-items. For example, the item “I have a warm and comfortable relationship with my partner” included response options ranging from *not at all* to *completely*. The CSI 4-item has Cronbach’s alpha of .94, as well as similar levels of validity and correlation to other measures of satisfaction (Funk & Rogge, 2007).

Data Analysis Procedures

Transcripts from emails, SMSs, and private Facebook messages during direct communication with the researcher from participants as well as the responses to open-ended survey items served as the qualitative data for the present formative evaluation. The qualitative data was the primary focus of data analysis, given that the numerical data was confounded by issues in app functionality (e.g., participants being unable to open surveys due to push notification errors). To begin analysis of the qualitative data, all written communication between participants and the researcher and the responses to open-ended survey items as recorded by the AGP app were combined into one document organized chronologically. In this same document, verbal interactions (e.g., via phone call) between the researcher and the participants were also noted—though, none were transcribed or used for direct quotation. After all the qualitative data was organized chronologically, participants were assigned pseudonyms and the aforementioned

qualitative data was then, in a separate document, organized such that individual data was paired by couple and sectioned off (i.e., one section for each couple's data).

After twice reviewing the data in its entirety, data preparation was completed as follows: (a) *open coding* was conducted by having responses examined for novel and recurring themes and creating new codes as novel themes arise; (b) *axial coding* was conducted in alignment with social constructivism—i.e., participant's meanings and understandings of their experiences dictated the theme development; (c) *selective coding* was used such that codes were generated primarily using participants' words when possible (Creswell, 2013). After creating the individual codes, the researcher combined similar codes within subthemes, and then related subthemes were joined under main themes.

A thematic analysis of the responses was used to identify common experiences among the participants as well as to identify unique responses. At the completion of these analyses, the app underwent the participant-suggested modifications for potential future studies. Given that the present study was a formative assessment, themes indicating errors in the AGP app also include a brief discussion of the error and how it was addressed. The results and subsequent discussions are presented in such a way that is intended to be beneficial to other researchers intending to use smartphone apps in research.

Strategies for Validating Findings

Several validation strategies were used to ensure the scientific rigor of the present study and its resulting data analysis. Four validation strategies are used from Creswell (2013):

- *Rich, thick description* was used such that the participants in the AGP study and the process of the TestFlight Beta Testing are discussed in detail. Also, the thematic analysis offers extensive use of direct quotations from the participants.
- *Prolonged engagement* was utilized: Participating couples used the AGP app for a minimum of two weeks during the study, and participants were able to interact with the researcher at any time during the process regarding concerns and questions.
- *Triangulation* of data occurred by collecting data from the AGP iTunes Connect account, the researcher's personal use of the AGP app, the survey responses, and the open communication between the researcher and participants while users were going through study.
- *Peer review and debriefing* also occurred by means of forming a research committee and discussing the research together prior to publishing findings and implications. Multiple committee members reviewed the qualitative data and thematic results during the process and documenting the findings.

In addition to the strategies noted above, the researcher and the developer continued use of the AGP app from before initiating External Testing through the end of the formative evaluation data collection. Personal use of the AGP app allowed a greater understanding of the participants' experiences as well as giving an opportunity for the researcher to investigate issues that participants reported. Further, the present evaluation reviewed data with high sensitivity to all comments from participating couples—that is, even concerns and ideas only mentioned once were considered with equal attention as concerns described more frequently.

Chapter Three

Results

Themes at the Initial Release of the AGP

The AGP app was distributed to External Testers at two release dates: February 23rd and March 2nd, 2016. In the initial app release on February 23rd, only 4 couples had begun use of the AGP app and several errors were readily identified requiring a second release on March 2nd. The issues upon the initial release included (a) invitation code errors, (b) interface not user-friendly, (c) wrong opening page/inability to sign in, and (d) disappearing responses.

Invitation code errors. When External Testing is submitted to begin, iTunes Connect distributes an email containing an invitation code and a link for downloading the TestFlight app to all the External Testers. In most cases, the link within the email would automatically use the invitation code and give access to begin use of the AGP app. (Also, some participants downloaded the TestFlight app and then typed in their invitation code to begin use.) However, several participants experienced having the TestFlight app indicate that an invitation code was expired or that it had already been used and thus were unable to begin use of the AGP app. For example, shortly after the initial release of the AGP app, Maya contacted the researcher and reported that her invitation code was expired. Similarly, emails containing the invitation code were not being distributed to all External Testers.

To correct these issues, the researcher removed the External Tester's email from the External Testers list, saved the change, added the email back into the External Testers list, and saved the change again. This process initiates the sending of a new email and a

new invitation code. Notably, these error occurred through iTunes Connect and cannot be completely fixed by the researcher.

Interface not user-friendly. In many cases, the iPhone keyboard would block the ability to see responses to final items and occlude the submit button. Anisa describes this concern in the following quote:

Hey Patrick, As I was going in to fill out the survey, I realized my keyboard prevented me from progressing beyond the first screen. Not sure if this is a bug, but wanted to let you know I can't hit submit/next.

The error Anisa described could be corrected by tapping on the side of screen, which made the keyboard disappear. However, this error posed a major inconvenience (i.e., by forcing the user to find their own solution), and as such was corrected for the second release. Anisa confirmed that the changes had been beneficial upon the full AGP app (the researcher's responses are italicized):

How's the app running this time around?
Really well! It's much more user friendly this time around and the initial questionnaire was very easy to navigate. I got my first affectionate gesture notification today 😊

Wrong opening page/inability to sign in. At the initial release, the AGP app was opening to the personalized condition (PC1) question items rather than the Sign In page. Given that the Sign In page and resulting process—including the initial survey, the couple match-up process, and the random assignment to conditions—is used to de-identify the data to ensure confidentiality, this round of testing was immediately halted when the researcher learned of the error. JacQuan describes his experience of opening the app and seeing the personalized questions items as the first screen:

I just clicked open once the app downloaded and it took me right to the questionnaire.
Awesome. I am assuming that you gave yourself a username and password?

It did not ask for that. When should I have?
This was the very first thing that came up
When I opened the app.

Shortly after this interaction with JacQuan, the researcher emailed the participants informing them that the first release of the app was being stopped and that a second release would occur a few days after. Prior to this email, approximately 8 individuals had downloaded the app while the majority had not yet begun use in any fashion. This error was fixed prior to the second release.

Disappearing responses. Participants reported that the personalized condition survey items that they created disappeared after submission. The personalized condition survey items were presented in two pages (PC1 and PC2) with the first 15 items on PC1 and the last 10 items on PC2—all of the aforementioned items are fill-in items. Responses entered in PC2 were disappearing after users pressed the submit button. This error is two-fold. First, items entered should be stored in the app so that responses are stored on the phone even before submission, which gives the opportunity to edit responses not fully completed all together. This is a common feature of a user-friendly app design. Second, the AGP app was not able to record the responses under a username because the user had not been given the opportunity to create a username, as noted under the previous heading; and thus, the app would close and delete the item responses, which is described in Phyllis' quote: "Hey, I'm having problems with the app. When I try to complete the second page, it suddenly quits and the info is not saved" (Phyllis). Both aspects of this app-based error were corrected prior to the second release of the app.

Major Themes in the Full Release of the Affectionate Gesture Planner

The second release of the Affectionate Gesture Planner (AGP) app occurred in waves of a few couples per day through March 2nd thru March 4th. Though not all 11 participating couples began use of the app in these days, all couples had access to the AGP app by March 4th. All couples began use of the app by March 15th. In the initial app release on February 23rd, the issues upon release included (a) invitation code errors, (b) lacking of user-friendly interface, (c) inability to sign in/ wrong opening page, (d) responses disappearing on second page of the app. All of these errors were corrected for the second release—the only exception is that invitation code errors continued to be a minor problem.

In the second release of the AGP app, three major themes appeared with each having 2–3 subthemes. The major themes are as follows: (a) Failure to launch and start up issues; (b) The “bugs”: App-based & push notification errors; and, (c) Suggestions and feedback. The following themes include a brief discussion of each of the sub themes.

Failure to launch and start up issues. Several issues arose that hindered couples from beginning use of the AGP app including: (a) Uncertainty of expectations & process, and (b) Expired invitation codes & missing emails. Some of these issues must be addressed directly by the app design while others deserve consideration as confounding variables and biases for future trials of the AGP app.

a.) Uncertainty of expectations & process. This theme was characterized by participants expressing uncertainty about what the expectations were for beginning the process of using the AGP app. In some cases, participants were unsure where and how they would see their affectionate gesture suggestions: “Is it supposed to just show the

gesture up top in the blue and then have that black writing below about prompting?” (Brittany). Another participant expressed uncertainty about how her personalized responses would be presented to her partner through the app: “Is it going to tell him what to do verbatim from the way I write it?” (Emily).

Other users were left with some uncertainty regarding successful completion of a task, which Maya exemplifies in the following quote about her initial survey responses: “Did you get my initial... survey” (Maya). A user-friendly app should indicate when data submissions are successful and should allow easy ability to double-check the success. Future trials of the AGP app will include introductory slides showing pictures of the process and expectations of the app.

The iOS Human Interface Guidelines (2016) indicate that app users seldom review instructions, expectations, or consent documentation for any longer than about one minute on average. Within app development and implementation, the AGP app should use guiding pictures and very brief excerpts of written instruction (“iOS Human Interface Guidelines,” 2016). All functions of the app must occur fluidly and without the necessity of any level of thought, and all tasks and expectations during app use must be doable by the least possible proficiency user (“iOS Human Interface Guidelines,” 2016).

b.) Expired invitation codes & missing emails. This theme was characterized by participants reporting that the invitation codes from the iTunes Connect email were expired or simply not working for one reason or another. Also, nearly half of the potential participants did not receive the first email sent from iTunes Connect due to errors iTunes Connect as well as emails arriving as Spam.

Brittany, as quoted in the following, was among the External Testers who reported having an expired/non-working invitation code: “It told me my invite code expired? ...Do I need a different redeem code?” This error is occurring through iTunes Connect and cannot be fully fixed by the researcher. To correct the issue of expired invitation codes and missing emails, the researcher removed specific users’ emails from the External Testers list, saved the change, added the emails back into the External Testers list, and then saved the change again. In most cases, this process corrected for this general issue. However, some of the users were forced to delete their TestFlight app and then re-download the TestFlight app once a new email was received. This extra process created an unexpected strain on some of the users and was likely the cause of some disengagement.

Two users were initially unable to begin use due to the email for iTunes Connect going to their Spam folder. Brian stated, “I don't even know what a spam folder is,” which may indicate that this error can create its own selection bias if not corrected. In this study, both users found the email and the issue was no longer hindering use of the app.

The “bugs”: **App-based & push notification errors.** During use of the app, several issues arose for users including: (a) app notification errors, (b) app process concerns, and (c) user troubleshooting and re-downloading. As seen in in the following quote, these issues compounded on each other:

You'll see very little data for me because I can't let the app know that I've done the suggested gesture. When I try to click on it from my notification center, nothing happens. It takes me to the app, but it seems to be stuck on a gesture it recommended for me almost 2 weeks ago. (Phyllis)

a.) App notification errors. Participants experienced several issues resulting from problems with the push notifications. Push notification errors ranged from participants not receiving the app notifications to the app notifications being unopenable upon receipt. The app notification errors reported by participants included (a) app notifications not being received, (b) surveys and suggestions not opening from the lock screen, and (c) getting notifications but not being able to open and respond them.

App notifications not being received. In some cases, participants were not receiving any notifications from the AGP app while other notifications were overlooked because they could only be accessed from the user's Notification Center. In at least one case, the AGP user did not receive any notifications from the AGP app: "Phil hasn't gotten any notifications, and we signed up about a week ago" (Phyllis). In contrast, an issue that likely occurred more often than reported was that notifications that could only be opened from the Notification Center were not accessed due to the added inconvenience of seeking out the notification: "I missed a lot of the surveys and notifications because I never check my Notifications Center" (Carrie).

In the case of the app notifications not being sent out, it is more likely that the AGP app itself is not at fault given that few if any other participants experienced this issue and the following consideration: In most if not all smartphone apps, the newly added app asks the downloader if the user will allow notifications from the newly downloaded app. At this step in smartphone app usage, the user can select "Don't Allow"—purposefully or by accident—and in doing so they have disallow push notifications from coming from the newly downloaded app. Individuals can alter this decision to disallow push notifications by accessing their phones' alert settings. In sum,

it is more likely that “Phil” selected “Don’t Allow” than the AGP app failing to send notifications to a specific user.

Regarding the Notification Center, most smartphone apps that use push notifications allow the user to access notifications directly through opening the app. (Note this user’s surprise when this function was absent: “Is it normal that the app notifies me of what gesture to do on the lock screen, but when I go to the app it has no suggestions?” Phyllis.) As such, many app users rarely access the Notification Center and may not even know it exists due to a lack of necessity to access it. In the current study, the researcher emailed instructions for accessing the Notification Center to all participants in order to ensure that all users were aware of their Notification Center. To improve the user-friendliness of the AGP app, app notifications will be accessible by clicking on the AGP app icon and the AGP app will provide icon badges. *Icon badges* indicate the number of unseen notifications from an app on its app icon.

Surveys and suggestions not opening from the lock screen. Another reason that many notifications are not sought for in the Notification Center is that individuals often open push notifications from the lock screen (i.e., the visible screen when a non-active phone illuminates an alert message). Participants in the current study frequently complained about being unable to open surveys and suggestions from the lock screen. In many cases, when participants attempted to open notifications from their lock screen, the AGP app would open, but the notification’s new suggestion or survey did not open: “I get alerts and then when I open the app to see them, it says 'there are no suggestions at this point', so I am not sure where they go!” (Mei-ling). As Penelope describes in the following quote, notifications not opening from the lock screen leads to decreased

compliance: “The notifications I receive don't show up on the app most of the time making it harder to participate... Requires multiple steps to respond.”

Getting notifications but not being able to open and respond them. Even when participants got the Notification Center, some of the notifications were not opening, thus stopping users from responding to surveys: “I received the push notifications just fine, but I was never able to report anything nor respond to the survey via the app” (Mandy). As seen in the following quote, participants were frustrated by being unable to respond to the surveys: “The app is giving me suggestions and telling me to update but then it doesn't show anything for me to submit” (Arnold). However, some participants were still able to gain benefit from the app despite being unable to open the surveys: “I can still see the suggestions in the notification center, so I can still do them, but I am not able to answer whether or not I did them 24 hours later” (JacQuan).

b.) App process concerns. Several app-based errors hindered AGP app usage. Problems identified in this subtheme are those that occur as ineffective app development processes. The app process concerns included (a) partnering before completing initial survey, (b) being stuck on old suggestions, (b) receiving redundant suggestions, (c) seeing the follow up before the suggestion, and (d) users in personalized condition getting standard suggestions

Partnering before completing initial survey. Multiple couples indicated that they were unable to complete the initial survey if they received the match confirmation notification before being able to complete the initial survey. In other words, when the user received the match confirmation notification, they were unable to return to any uncompleted survey items. This error indicates that the AGP app needs to give users an

interface allowing backward and forward navigation options (e.g., a “back-button”).

Adding navigation options (e.g., “back buttons”) to the AGP interface will be a necessity for allowing couples to match up at any given time during the completion of their initial survey.

Stuck on old suggestion. Similar to the app notification errors being unable to open a notification, the AGP app was not updating itself when new suggestions were being received. As presented under the previous subtheme, some notifications would not open and thus an old suggestion or no suggestion would be visible by opening the AGP app, which is a notification error. However, the AGP app was also, at times, unable to update itself with incoming notifications, as described in the following quote:

I would get daily gestures in my notifications on my phone, but when I went to go click on those notifications, it would open up the app and a previous gesture would still be listed there to perform. (It was stuck on the gesture of “Plan a camping/hiking/kayaking trip with your partner”). When I would receive a notification to follow up on whether or not I had completed the gesture, it was still stuck on the same gesture of planning a camping trip and I was never able to log whether or not I had completed the gesture. (Anisa)

The issue of being stuck on old suggestions seemed to occur after several weeks of using the AGP app, because the participants reporting this issue (Anisa & Allen, the first couple to download the AGP app; and, JacQuan & Mandy, the second couple to begin use of the AGP app) were the couples with the most extended use of the AGP app. JacQuan corroborated Anisa with his following quote: “Sometimes if you tap on one in the notification center, the app will open, but the ‘suggestion’ it says is still one from before. My app is stuck on a suggestion I got a few days ago.”

Seeing the follow up before the suggestion. Another issue that occurred in one or two cases was the user seeing the follow-up survey prior to seeing to the suggestion being

referred to in the follow up. JacQuan reported that he saw the “did you do it” question before he saw the suggestion he unknowingly received 24 hours previous. This issue could be fixed in multiple ways: (a) the AGP app could give the participant the option to have the app re-send the follow up survey (i.e., by having an “Ask Me Later” option in the survey in addition to the “Yes” and “No” options); (b) the AGP app could wait 24 hours after the suggestion notification is opened before sending the follow up survey, as opposed to sending the follow up notification 24 hours immediately after sending the suggestion notification; and/or, (c) the follow up survey item should identify the specific suggestion to which it refers.

Receiving redundant suggestions. The AGP app is meant to send randomly selected suggestion notifications to the user, which should naturally lead the user to receiving a variety of suggestions. However, some participants reported getting the same suggestion multiple times in a row. As seen in the following quote, participants are expecting a variety of suggestions and will otherwise be slightly disappointed with their experience: “Some ideas on my ap [sic] popped up multiple times and I wish it would have been more varied ideas” (Carrie). This problem was also experienced during the researcher’s trial of the app, which confirmed that the issue of redundant suggestions is unique and in addition to the issues of unopenable notifications and the AGP app being stuck on old suggestions.

Users in personalized condition getting standard suggestions. An important function of the AGP app is sending out standard suggestions to participants in the SC and sending out a partner’s personalized suggestions to the participants in the PC. In the current study, the personalized condition seldom sent the personalized suggestions, and

instead was sending standardized suggestions the majority of the time, as seen in the following quote: “I’ve gotten a couple more agp suggestions and I’m pretty sure they’ve all been the general ones” (JacQuan). Similarly, all the participants in the PC who indicated the type of suggestions they were receiving reported that “I am only getting generic suggestions” (Phyllis). In a follow up interaction with the researcher, Carrie reported, “I think they were 95% standard suggestions,” which may indicate that a very small portion of personalized suggestions were being sent by the AGP app. Given that Carrie’s report (in the previous sentence) implies some uncertainty, it is possible that none of participants received any personalized suggestions. (Also, it may be important to note that none of the participants in the SC made any reports that could indicate that they were receiving personalized suggestions.)

c.) User troubleshooting and re-downloading. In total, 26 External Testers (11 couples, 2 individuals, and 2 researchers) downloaded the AGP app through the TestFlight Beta Testing app; however, the AGP app had been downloaded 35 times during external testing (as indicated by iTunes Connect). These mismatching numbers (i.e., 26 External Testers & 35 downloads) indicate that some users downloaded the AGP app multiple times. Several participants indicated re-downloading the AGP app as a form of user-troubleshooting. In the following quote, Brittany expressed the hopeful expectation that deleting and re-downloading the AGP app would correct the problems she was experiencing: “Hopefully it will work if I re download it” (Brittany). Similarly, while working with the researcher to correct an error, JacQuan suggested, “Should I try deleting the app and re-downloading it? Or will that just mess things up?”

This subtheme indicates that app users are often inclined to use re-downloading an app as a form of troubleshooting; and given that not all of the counted re-downloads are accounted for, some users will use this troubleshooting technique without first discussing the app errors with researcher or developer. In the current study, re-downloading the app led to a unique error such that creating a username, deleting the app, then signing in with the same username resulted in re-assignment to a condition—a potential reason for why some of the participants in the PC did not receive personalized suggestions. Solution to this and similar issues can come in multiple forms: (a) signing in to the AGP app should not lead to a redundant couple-matching process; (b) once a paired couple of usernames are assigned to a condition, the assignment should be permanent regardless deleting and re-downloading the app; and, (c) the AGP app interface should include navigation options that give the user the ability to skip over or go back to pages in the app.

Though some users were motivated to attempt troubleshooting during their use of the AGP app, it is likely that participant disengagement due to errors occurred more often than repeated attempts to use the AGP app. For example, Anisa stated, “I had deleted the app a few weeks ago since it wasn’t performing properly.” Anisa’s quote is notable considering she reliably used of the AGP app during its initial release and for nearly a month—twice the expectation—during its full release.

Suggestions and feedback. Participants in the current AGP app study were given several opportunities to make general comments about their experience with the AGP app. Despite the various problems arising during app usage, participants tended offer more positive feedback than negative. Participants frequently indicated that using

the AGP app was indirectly beneficial to their relationship by way of inspiring a greater attention toward the relationship. The subthemes for this major theme of suggestions and feedback are titled as follows: (a) Great idea! “Made me think of things to do; Made me want to do more”; (b) General barriers: “Some of the [standard] suggestions are things I would not do,” the “busy work week” problem, and distance relationships; and, (c) Specific suggestions and ideas from users.

a.) Great idea! “Made me think of things to do; Made me want to do more”

(Arnold). The most consistent theme from participants’ open responses was their positive reaction to the AGP app idea and concept. In the titular quotation, Arnold put simply how using the AGP app had increased his desire to be a better partner. Several participants regarded the AGP app as inspirational for prioritizing their marriage/relationship amid busy lives, as described in the following quote:

This is a fantastic idea. Hard working spouses have busy lives and this reminder helps prioritize a need that can easily be overlooked. Even if a suggestion is not acted on immediately, it adds a sense of urgency like a notice for when a bill becomes overdue. (Maya)

Several aspects of the AGP app were identified specifically as beneficial. As exemplified in the following quote, receiving reminders from the AGP app was seen as a positive aspect of the AGP concept: “Best part was the ideas and reminders to do loving things for my husband and perhaps try new things” (Mandy). Anisa highlighted her appreciation of increasing the exchange of unexpected affectionate gestures between couples; she stated, “I like the overall concept of the app. I think it’s a very sweet idea to provide suggestions on things that may be unexpected gestures for some couples.”

Similarly, Carrie noted how the AGP app inspires intentionality and commitment to the relationship: “I liked the idea, I liked how it drove both my partner and I to be more

committed to purposely planning romantic events. ...I think it's a great idea overall!"

Furthermore, JacQuan indicated that answering the personalized survey items was pivotal in achieving his positive experience, "I would definitely suggest that everyone fill out the part that indicates what you would like your partner to do."

Alongside a generally positive estimation of the AGP app, one of the participating couples noted that the app may be a beneficial tool for couples who are struggling with poor communication: "We both agreed it would be a really great tool if we were in some sort of rut and needed to work harder or had a tougher time saying what we think or feel" (Emily). This additional review of AGP app experience highlights how the AGP app could be used in clinical settings. In addition, Emily's quote may indicate that use of the AGP app has the potential to be stigmatized as a tool for couples who should "work harder."

b.) "Some of the [standard] suggestions are things I would not do," the "busy work week" problem, and distance relationships. The present subtheme is characterized by participants' responses that indicated barriers to the efficacy of the AGP app.

Standard versus couple-specific suggestions. Standard suggestions were generally viewed as being only occasionally beneficial since they were often non-applicable, less appealing to the specific couple, or "kinda vague or off gestures" (Brittany). However, even the less usable suggestions provided some level of benefit in the way of reminding couples to actively work on their current romantic relationship. JacQuan summed up the general reaction to the standard suggestions in the following feedback:

Some of the suggestions are things I would not do or things I know my partner would not appreciate as much as other things. But it did remind/help me to think of and do other things. Overall it just reminds me to be more aware of what I could do. ... I think the general suggestions were not that applicable to me, personally, which affected how many of them I actually did. Having suggestions specific to us as a couple would definitely increase my usage of the app.

However, as I said, the app still generally increased my awareness of doing any romantic gesture, which was good.... What did not work was that many of the suggestions were not applicable to us as a couple. The app would be better if it were specific to us. (JacQuan)

In corroboration with JacQuan's testimony, Carrie wrote, "I thought some of the tips were creative and helped me brainstorm what would work best for us to increase our quality time and passion," which indicates that even non-applicable standard suggestions beneficial in offering new ideas for the couples. In slight contrast with JacQuan, Emily wrote, "It's hard to be 100% serious suspecting our exact words are going to come back to each other as suggestions," and later added, "It's kind of fun though and filling out the ideas was silly." Emily's responses (in the previous sentence) is somewhat ambiguous given that they may indicate that (a) she thought that completing the personalized survey items was awkward, or (b) completing the personalized survey items was a novel and arousing activity for her and her partner.

The "busy work week" problem, parenthood, and long-distance relationships.

Some participants indicated that their current temporal and proximal contexts limited their potential gains from using the AGP app. Jerry noted that his "busy work week" reduced his ability "to make time for tips" he received through the AGP app. As another consideration, Emily noted the strain of parenthood on acting on affectionate gestures in the following: "Part of the problem for us, and it's just our circumstance, is that the things we miss and would like to do together are challenged by a baby. That's just part of the deal with a kid." Finally, the constraints of having a long-distance relationship were addressed by three of the couples. For example, Maya stated that the AGP app "Would have worked better if I wasn't traveling," while others indicated that the standard suggestions were rarely doable given the distance between the couple.

c.) Specific suggestions and ideas from users. Users made several specific suggestions about what they would want in future models of the AGP app. This subtheme is characterized by participants' requests for specific changes to be made to the AGP app as well as their novel ideas for improving the AGP app experience.

- Three comments directly indicated the desire for the ability “to look back at old gestures” (Brittany).
- Two comments proposed the idea of having an ability to check off gestures as they are accomplished—for example, Arnold suggested, “Maybe a list of things to do for the whole period instead of one every few days. Then we can check them off as we have time to do them.”
- Many comments indicated a desire for a smoother app experience with at least two specifically requesting the ability to open notifications, surveys, and suggestions by clicking on the AGP app itself as opposed to going to the Notification Center.
- One comment proposed a desire for being able to access feedback with growth charts and graphs from their data: “I thought it might be cool to see our growth/history on our survey responses from week to week” (Carrie).
- Several other comments asked for a drop-down menu and, generally, more options from the home screen.
- A somewhat ambiguous comment suggests the need to “Take poll on new gestures” (Brittany).

In the following quote, JacQuan sums up the most commonly mentioned suggestions and ideas from users:

There needs to be an option/drop down menu where you can "revisit" previous suggestions. A suggestion may not be right for one day, but better on another and it would be good to be able to go back and see them. A "to do list" of sorts, I think would make sense where you could scratch off a suggestion once it is completed.

(JacQuan)

Additional Issues Beyond the Major Themes

Several issues and “bugs” occurred within the full release of the AGP app that were not identified by the participating couples. Some issues were recognized and corrected prior to having any affect on participant; other concerns were simply unaddressed by the present study’s participant sample.

Survey errors and delayed distribution. One of the surveys was intended to be completed in isolation from other surveys, but it was opening a second survey and the match-up page when it was submitted. Given that a survey leading into a redundant match up process would be confusing to participants and problematic for condition assignment, no surveys were administered until the researcher and developer were certain that this error had been corrected. Prior to any of the surveys being sent out to participants, the survey error was corrected; however, this delay in survey release limited the survey data, but it did prevent additional frustrations that would occur if couples were prompted to re-confirm their match after every survey. One survey was administered via email to regain some of the lost data.

Formatting issues. Some formatting issues were not directly addressed by participants. For example, the follow-up survey had a small portion of text spanning off screen. This issue in particular was both obvious and non-disruptive such that the survey

item was still easy to understandable. These two reasons are likely the reason that none of the participants specifically mentioned this issue.

Generating new invitation codes. Though new invitation codes could be generated with re-sending the email invitation, the process was lengthy and not realistic for a larger scale release. There should be another way of generating new invitation codes aside from deleting and re-adding emails to the External Tester list. Larger, future trials of the AGP app may require release through the App Store or a more efficient procedure for generating new invitation codes.

All participants female. Nearly all of the participating individuals indicated the same gender, as recorded by the AGP app. The specific survey item used to indicate gender is a unique interface item that, given the results, seems to be ineffective. This survey item interface must be changed prior to future trials.

Grammar in the personalized suggestions. In the present study, few if any personalized suggestions were received by participants, but the lack of feedback regarding personalized suggestions does not remove the concern that they may be confusing to participants. The AGP app uses direct quotes from the responses in the personalized survey items when it generates the list of personalized suggestions. Frequently, the personalized suggestions are received as incomplete sentences with discordant verb tense from the intended syntax. For example, a personalized suggestion may read “Your partner feels loved when you: eating ice cream together before bed time.” The grammar error in the deliverable personalized suggestions must be addressed prior to future trials with the AGP app.

Chapter Four

Discussion

The Affectionate Gesture Planner (AGP) smartphone application is intended to be a practical intervention for reversing the decline in couple satisfaction over time. The AGP app builds on concepts from social exchange theory and the investment model—namely, the idea that increased benefits and investment will increase satisfaction and commitment (Rusbult, 1983)—by prompting couples to complete loving acts for each other, and thus increasing the mutual exchange of beneficial investments to the relationship. The AGP app is among the first in a generation of smartphone app-based interventions being seen in mental health research (see also, Kirwan, et al., 2012). The AGP app was designed to increase the exchange of benefits between partners in a romantic couple and, in doing so, increase relationship satisfaction for both partners.

Reflections on Development and Implementation of the AGP App

The present study of the AGP app evaluated the important functions of the AGP app. Some features of the AGP app functioned successfully while others failed in one part or another. The following two paragraphs identify a list of successful and unsuccessful functions of the AGP app.

Successes and failings. The AGP app successfully recorded the usernames & passwords of the users while not allowing redundant usernames and not continuing until a unique username and password were created. The AGP app successfully had the users read and accept the informed consent document prior to continuing use. The AGP app succeeded in recording survey data that was submitted from the individuals' apps. The AGP app successfully matched couples with the following process: (a) Partner A enters

the username of the Partner B into the app, (b) the app then sends Partner B a push notification indicating that Partner A has initiated a match, (c) Partner B then confirms (or denies) the match by responding to the push notification from Partner A, and (d) the AGP app pairs the data and condition of couple. The AGP app successfully performed random assignment of couples to condition (either personalized or standardized).

Though, the AGP app successfully recorded the personalized suggestions for each individual, it failed to send personalized suggestions to the couples in the personalized condition. In this study, all or nearly all suggestions sent out from the AGP app came from the pool of standardized suggestions. The AGP app randomly selected standard suggestions to send to users, but some users indicated that some of the suggestions were redundant. The AGP app successfully sent out follow up surveys 24 hours after sending suggestions, however many suggestions went unseen making the follow up surveys unreliable. The most egregious error in the full release of the AGP app was that push notifications were not successfully opening. This error made it so that the AGP app was unreliable in administering surveys and suggestions through push notifications. However, when surveys were successfully administered, they were able record the data and organize the data under the correct username.

Unexpected changes in method. Prior to external testing of the app, the process of planning and implementation encountered several unexpected concerns. Originally, the AGP app was intended to be usable by all persons with cell phones; then it was limited to smartphones; and then, it became further limited to iPhones. App programming and coding of the AGP app had begun by creating .html sheets in Cordova, which could have been used by both iOS and Android but at a slower pace than each

OS's native language of code. Due to variant programming languages, creating an app for only iPhone users was a best plan of action to ensure that use of the app was not affected by having different operating systems. However, app development experienced delays when the change in programming was set in motion. Similarly, throughout app development, programming was periodically complicated by staying up to date with XCode versions and iOS updates. Also, computer-based iPhone simulators were unreliable in mimicking user experiences due to the fact that push notifications cannot be tested in this modality. Use of Internal Testing was done to fix these issues.

In the original idea for the AGP app, the AGP intervention was meant to be more involved such that notifications would only be received at times designated by the participant; but, this would have complicated the programming, added to requirements for app usage, and potentially backfire by decreasing user-friendliness. Significantly fewer survey measures than had been planned were included in the present study due to the necessity of a user-friendly experience for app users.

Future Directions

The AGP app will continue to be developed and improved so that other pressing research questions may be answered. A fully developed AGP app will allow for the possibility of randomized intervention studies that can test the efficacy the standardized prompts versus the personalized prompts. Furthermore, longitudinal research will be needed to compare the efficacy of the two conditions weighed against each other as well as against a true control group. Future studies will aim to discover whether participants receiving standardized prompts or those receiving personalized prompts will perform

more affectionate gestures for their romantic partners. Further, studies will investigate whether performing affectionate gestures will increase couple satisfaction.

Further research and development of the AGP app will have implications for couple and family therapy practice and family life education. The AGP app could be construed to be similar to contingency contracting, which has not commonly led to lasting positive results (Gottman, 1999; Wood, Crane, Schaalje, & Law, 2005).

However, previous research has shown that contingency contracting can be beneficial to mildly distressed couples and in conjunction with manualized treatment for couples with moderate/severe relational distress (Wood, Crane, Schaalje, & Law, 2005). Furthermore, the continuous presence of reminders provided by the app addresses the need to continue treatment recommendations outside a therapeutic context. Thus, the AGP app may be able to provide a continuity of care to couples in therapy before and after termination.

Funding

All coding of the app has been completed on personal computers. The only university resource used to create the app is the time contributed to the project by Dr. Trent Parker. The primary investigator and Dr. Trent Parker are, at this time, the sole legal owners of the AGP app and its resources.

APPENDICES

Appendix A

Demographics

Age: years-old

What is your race/ethnicity?

What is your gender?

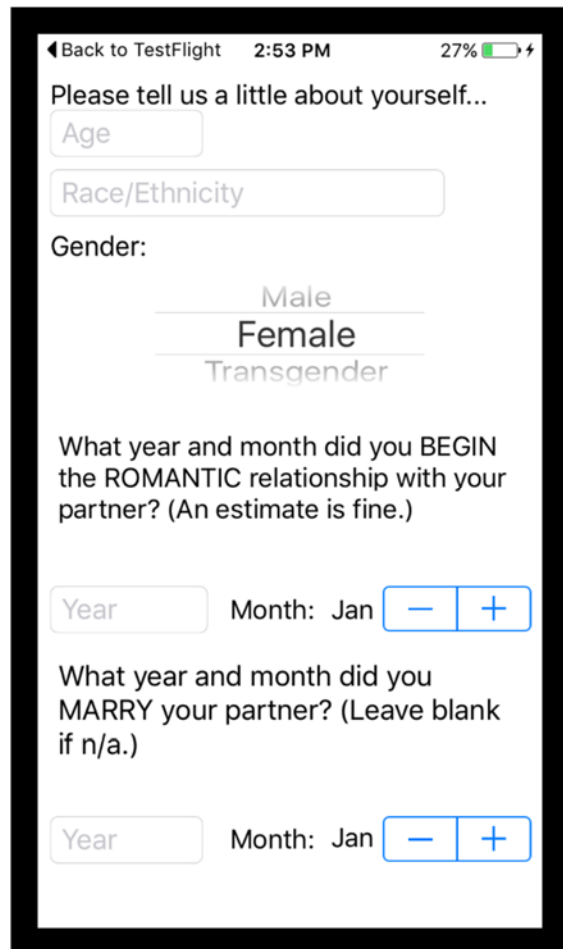
- Female Male Transgender Transsexual Other Non-binary

What year and month did you BEGIN the ROMANTIC relationship with your partner?

Year Month

What year and month did you MARRY your partner? N/A

Year Month



Appendix B

The AGP Biweekly Survey

During the past week, how often did you feel that your marriage was in a rut (or getting into a rut), that you do the same thing all the time and rarely get to do exciting things together as a couple?

Often ○ ○ ○ ○ ○ ○ ○ ○ Never

To what extent does each word describe you current romantic relationship?

Exciting

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Passionate

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Adventurous

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Interesting

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Playful

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Sexual

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Spontaneous

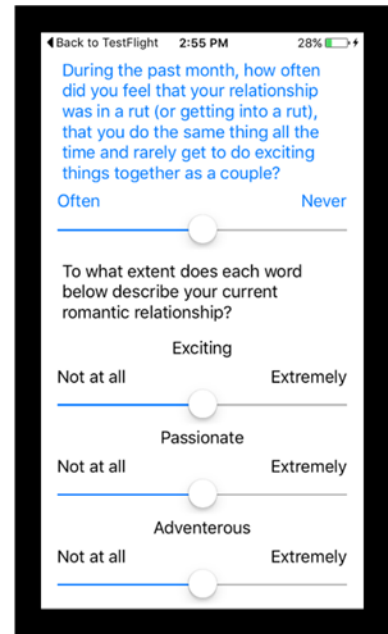
Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Boring

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely

Romantic

Not at all ○ ○ ○ ○ ○ ○ ○ ○ Extremely



1. About how many push notifications (i.e., suggestions, reminders, surveys) have you received for the AGP app in the past week?

2. How many prompted gestures from the AGP app have you performed in the past week?

None All

3. How many gestures from the AGP app would you guess that your partner has performed in the past week?

None All

4. Have you done anything extra (i.e., beyond what AGP has prompted) for your partner in the past week? If yes, brag a little and list off what you did—"Yes" with a quick list is better than writing complete sentences, but anything works. If no, just write "no."

5. About how many hours overall have you devoted to planning and performing romantic gestures for your partner in the past week? Hours

6. How has the Affectionate Gesture Planner affected your life and love this week? A quick list, brief comment, or short essay will help make the AGP app better in the future.

7. Which partner received greater benefit during the use of the AGP app in the past week?

My partner got a much better deal

Equally beneficial

I got a much better deal

8. Which partner is receiving greater benefit during the use of The Affectionate Gesture Planner app overall?

My partner is getting a much better deal

Equally beneficial

I'm getting a much better deal

9. Do you have any feedback about the Affectionate Gesture Planner app?

A quick list, brief comment, or short essay will help make The Affectionate Gesture Planner better in the future.

Appendix C

CSI 4

These responses are critical for helping us develop the Affectionate Gesture Planner app further so that it will be beneficial for other couples. These responses are confidential and will not be shared with your partner.

Please consider only the last 2 to 5 days as you answer each of the four questions.

1. All things considered, what is your degree of happiness with your relationship?

Extremely Unhappy Perfect

2. I have a warm and comfortable relationship with my partner.

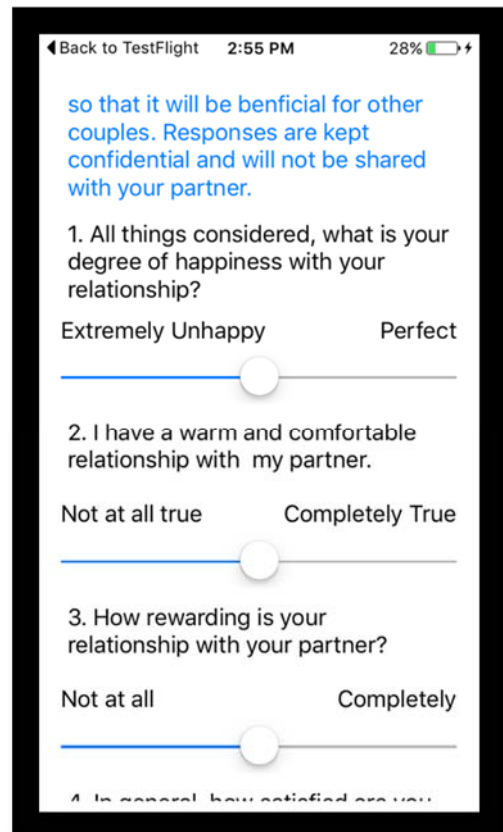
Not at all True Completely True

3. How rewarding is your relationship with your partner?

Not at All Completely

4. In general, how satisfied are you with the relationship?

Not at All Completely



Appendix D

The Affectionate Gesture Planner Personalized Condition (PC):

You will be creating and choosing a total of 20 affectionate gestures that make YOU feel loved when your partner does them. When you're done, the app will be sending the ideas that you input below to your partner. This process will take about 10 to 15 minutes.

Take a minute to think of ways your partner makes you feel loved day to day. What did you two do for each other when you were courting and falling in love? What are some ideas for anything you two could do as a couple that could be adventurous, passionate, sexual, exciting, interesting, playful, romantic, or spontaneous. Start by filling in the blanks then create some of your own.

For example, I feel loved when my partner sneaks up and hugs me from behind.

What makes you feel loved?

1. I feel loved when my partner

2. I can tell how much my partner loves me when she/he

3. It's adventurous when my partner

4. It's passionate when my partner

5. It's sexy when my partner

6. It's exciting when my partner

7. It's interesting when my partner

8. It's playful when my partner

9. It's romantic when my partner

10. It's spontaneous when my partner

11. It's fun when my partner

12. It feels loving when my partner

13. I like it when my partner

14. A perfect date with my partner would include

15. I long for my partner to

What makes you feel loved?

16

17

18

19

20

21

22

23

24

25

Both Conditions:

Throughout the next three months, AGP app will send push notifications to your phone to remind you to do affectionate gestures for your partner. Then, twenty-four hours later, a follow up notification will be sent through the app to ask you if you did the suggested gesture. Don't worry about doing every single gesture, but try your best to do more than half!

Via push notification, all participants will have the CSI 4 (about 15 seconds long) randomly administered to them about once a week, and the WLC (about 5 minutes long) sent every other week. All participation is voluntary and greatly appreciated.

Appendix E

Dear AGP Participant:

You and your partner are being invited to take part in the Affectionate Gesture Planner (AGP) study because you are in a committed romantic relationship (dating, married, cohabitating, etc.). Information and data collected from the AGP app will be used to help improve the app and for future research purposes. There are no known risks to participating in this study, however information transmitted on the internet always includes some risk of interception – a concern that we have done our best to minimize. There may be cost with regard to data usage from your mobile carrier generated by downloading AGP app, and memory on your phone will be used.

Taking part in the AGP study offers the potential benefit of improving relationship quality for you and your partner—similar studies have been able to produce lasting increases in relationship satisfaction. There is no guarantee that you will get any benefit from taking part in this study. Your willingness to take part may help therapists and other professionals better understand the nature of romantic love. We hope to have about 100 couples complete this study, so your answers are important to us and will be especially influential for future designs and purposes of the AGP app. By agreeing to participate in this study, you are agreeing to answer the survey questions as truthfully as possible. Of course you have the choice about whether or not to complete the various tasks, or survey/questionnaires, but if you do participate, you are free to skip any questions or discontinue at any time. All survey responses will be kept confidential to the extent allowed by law, and when we write about the study you will not be identified.

The total amount of time you will be asked to volunteer for this study is approx. 10 minutes a week for 12 weeks. The first two

weeks of data collection will be especially useful for improving the app experience. You will begin by completing an initial questionnaire (approx. 2–5 minutes) then prompted to invite your partner to join you in the study. The next step will take either about 1 minute or about 10 minutes based on whether you and your partner are randomly assigned to the Standardized or Personalized group. During the 12 week study, a 4-item survey (approx. 1 minute) will be sent to you weekly, and an 11-item survey (approx. 10–15 minutes), will be sent to you once every other week. At the end of 12 weeks, all participants in the present study will be given the opportunity to continue using the AGP app and all future updates indefinitely.

Thank you in advance for your assistance with this important project. If you have questions about the study, please feel free to ask. My contact information is given below. If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the staff in the University of Kentucky Office of Research Integrity at 859-257-9428 or toll-free at 1-866-400-9428.

Sincerely, Patrick R. Bortz
(Primary Investigator)
M.S. Candidate
Department of Family Sciences
University of Kentucky
Phone: 859-257-7755
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Nathan D. Wood
(Faculty Advisor)
Associate Professor
Department of Family Sciences
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Appendix F

Standard Prompts

Unplug the phone for an evening and just talk to one another. Try to be a good listener. Remember, understanding must precede advice.

Send your partner a love letter or poem.

Buy your partner your favorite perfume or cologne.

Buy your partner a CD of favorite romantic music and listen to it together.

Rent a comedy film and watch it together.

Be aware of when your partner needs emotional support. And be an empathic listener.

Plan a date with your partner where you do something new for both of you (ie, kayaking, hiking, drive to a town you've never seen and share a meal there, etc).

Go to your partner's workplace and 'steal him/her' or arrange ahead for a romantic lunch.

Wear an outfit you know your partner thinks looks good on you.

- . Feed dessert foods to each other.
- . Sit in a Jacuzzi or hot tub together, with bathing suits on if that's more comfortable for you.
- . Light candles next to the bed, then cuddle together on the bed and talk, just holding each other.
- . Build a fire and have a picnic dinner on the floor in front of it.
- . Set a date to sit at the back of a movie theater and make out as if you were teenagers again.
- . Thoroughly explore the art of kissing.
- . Give your partner a shoulder rub.
- . Go for a walk together and hold hands.
- . Share an evening of dancing together in your home or at the club.
- . Draw a bubble bath and bathe your partner.
- . Bring flowers home today.
- . Spend the morning together in bed chatting about whatever comes up.

- . Find a time to put your arms around your partner and tell him or her how sexually irresistible (handsome, beautiful) he or she is to you right now.
- . Compliment your partner, genuinely.
- . Go on a romantic date, just the two of you. Remember, a romantic atmosphere does not need to be expensive.
- . Have a pillow fight.
- . Give each your partner a foot massage.
- . Describe what you love about your partner's face.
- . Brush and stroke each other's hair.
- . Sit facing one another and stroke each other's faces.
- . Buy a surprise present for your partner.
- . Talk about how and where you most like to be touched just for receiving affection.
- . Make it possible for your partner to take an afternoon or a day off to do whatever he or she wants or needs to do.
- . Catch your partner doing something right and convey your appreciation or admiration.
- . When parting at the beginning of the day, learn one thing interesting that your partner will do today and part with a kiss that lasts at least six seconds.
- . Find or write a poem that expresses a genuine appreciation of your partner.
- . Rent a special movie and watch it together.
- . Plan a date that you know your partner will love.
- . Plan a weekend getaway.
- . Find out your partner's favorite novel and begin or continue reading it.
- . Buy tickets to a play that your partner wants to see.
- . Look through a catalogue or online shopping site that your partner likes and order something from it.
- . Rent a series of comedy films to watch together.
- . Plan a picnic for the two of you.
- . Bring home something special for your partner (like flowers).
- . Get tickets to an exciting concert.
- . Give your partner a full day off from household chores.

- . Make a sexy music CD just for your partner.
- . Give your partner a special massage. (If you don't know how, get a book and learn.)
- . Buy a surprise present for your partner.
- . Plan a reunion party of all your partner's friends.
- . Find out your partner's favorite movies and watch one of them together.
- . Leave little notes all over the house that have the small endearments and genuine appreciation.
- . Take a leisurely bath together.
- . Go out to dinner and plan to ask your partner questions about how their life is going.
- . Plan a candlelight dinner.
- . Go out dancing.
- . Plan a weekend camping trip together. Or just pretend you're on a camping trip together, and maybe even make a blanket fort.
- . Go clothes shopping for your partner and buy something you would like to see him (her) in.
- . Bring home your partner's favorite dessert (like chocolates), prepare their favorite tea or coffee, and serve him (her).
- . Write a love letter and mail it to your partner.
- . Go on a campaign to discover what really turns your partner on, and make sure you learn.
- . Prepare a surprise breakfast.
- . Plan some way that you would like to improve your home.
- . Surprise your partner with two tickets to some interesting place or event.
- . Plan a surprise party for your partner.

Gottman Salsa:Mild Cards and Opportunity Cards

(Below is the full list of Gottman Salsa:Mild Cards and Opportunity Cards. Added content is underlined. Omitted content is identified by strikethrough line.)

Unplug the phone for an evening and just talk to one another. Try to be a good listener. Remember, understanding must precede advice.

Send your partner a love letter or poem.

Buy your partner your favorite perfume or cologne.

Buy your partner a CD of favorite romantic music and listen to it together.

Rent a comedy film and watch it together.

Be aware of when your partner needs emotional support. And be an empathic listener.

Plan a date with your partner where you do something new for both of you (ie, kayaking, hiking, drive to a town you've never seen and share a meal there, etc).

Go to your partner's workplace and 'steal him/her' or arrange ahead for a romantic lunch.

~~Get away to a B & B or hotel for the weekend.~~

Wear an outfit you know your partner thinks looks good on you.

Feed dessert foods to each other.

Sit in a Jacuzzi or hot tub together, with bathing suits on if that's more comfortable for you.

Light candles next to the bed, then cuddle together on the bed and talk, just holding each other.

Build a fire and have a picnic dinner on the floor in front of it.

Set a date to sit at the back of a movie theater and make out as if you were teenagers again.

Thoroughly explore the art of kissing.

Give your partner a shoulder rub.

Go for a walk together and hold hands.

Share an evening of dancing together in your home or at the club.

Draw a bubble bath and bathe your partner.

Bring flowers home today.

~~Have your partner bring you coffee and the newspaper in bed in the morning on a weekday.~~ Spend the morning together in bed chatting about whatever comes up.

Find a time to put your arms around your partner and tell him or her how sexually irresistible (handsome, beautiful) he or she is to you right now.

Compliment your partner, genuinely.

Go on a romantic date, just the two of you. Remember, a romantic atmosphere does not need to be expensive.

Have a pillow fight.

Give each ~~other~~ your partner a foot massage.

Describe what you love about your partner's face.

Brush and stroke each other's hair.

Sit facing one another and stroke each other's faces.

Buy a surprise present for your partner.

Talk about how and where you most like to be touched just for receiving affection.

Catch your partner doing something right and convey your appreciation or admiration.

When parting at the beginning of the day, learn one thing interesting that your partner will do today and part with a kiss that lasts at least six seconds.

~~Find out your partner's favorite play and go see it.~~

~~Return to your honeymoon place or revisit a favorite location.~~

~~Plan a Valentine's getaway.~~

~~Sign up for a class together.~~

~~Learn a new language and culture together. Visit that country together if possible.~~

Find or write a poem that expresses a genuine appreciation of your partner.

Rent a special movie and watch it together.

Plan a date that you know your partner will love.

Plan a weekend getaway.

Find out your partner's favorite novel and begin or continue reading it.

Buy tickets to a play that your partner wants to see.

Look through a catalogue or online shopping site that your partner likes and order something from it.

Rent a series of comedy films to watch together.

Plan a picnic for the two of you.

Bring home something special for your partner (like flowers).

Get tickets to an exciting concert.

~~Take a ballroom dancing class together.~~

Give your partner a full day off from household chores.

Make a sexy music CD just for your partner.

Give your partner a special massage. (If you don't know how, get a book and learn.)

Buy a surprise present for your partner.

Plan a reunion party of all your partner's friends.

Find out your partner's favorite movies and ~~see~~ watch one of them together.

Leave little notes all over the house that have the small endearments and genuine appreciation.

Take a leisurely bath together.

Go out to dinner and plan to ask your partner questions about how their life is going.

Plan a candlelight dinner.

~~Find out your partner's favorite hero(ine) and read a book about him (her).~~

Go out dancing.

Plan a weekend camping trip together. Or just pretend you're on a camping trip together, and maybe even make a blanket fort.

Go clothes shopping for your partner and buy something you would like to see him (her) in.

Bring home your partner's favorite dessert (like chocolates), prepare their favorite tea or coffee, and serve him (her).

Write a love letter and mail it to your partner.

Go on a campaign to discover what really turns your partner on, and make sure you learn.

Prepare a surprise breakfast.

Plan some way that you would like to improve your home.

~~Go to a wine tasting party.~~

~~Plan a cruise or vacation.~~

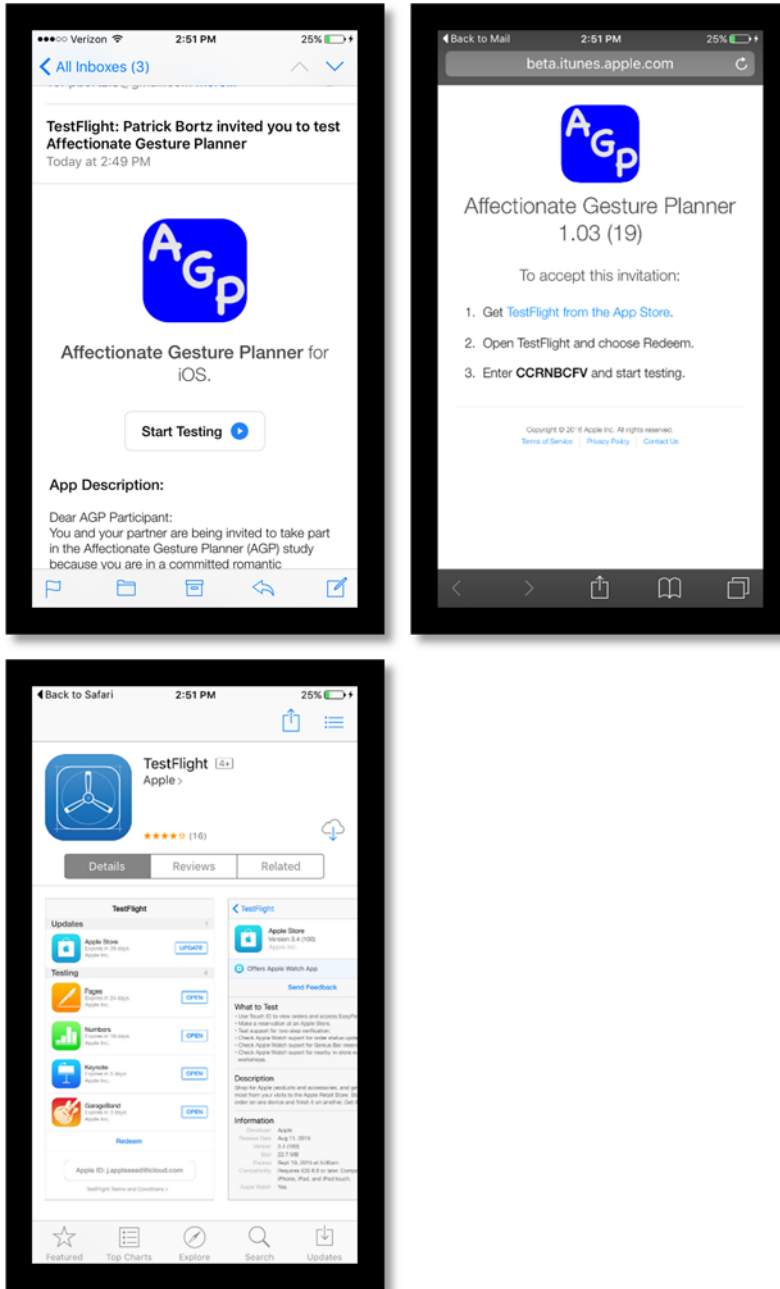
Surprise your partner with two tickets to some interesting place or event.

Plan a surprise party for your partner.

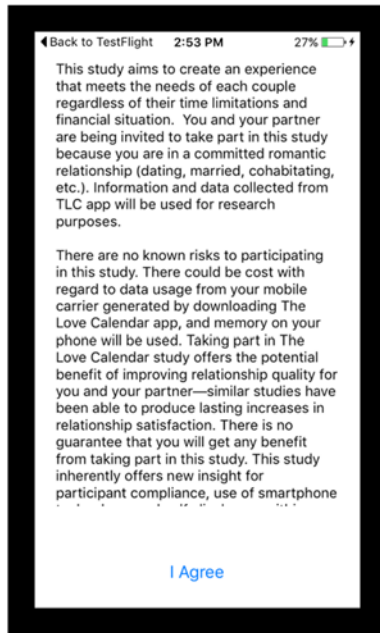
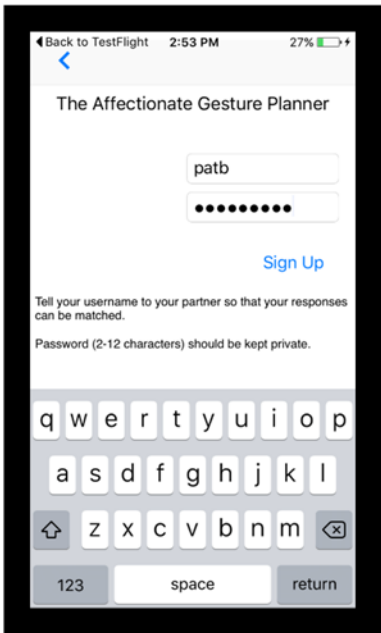
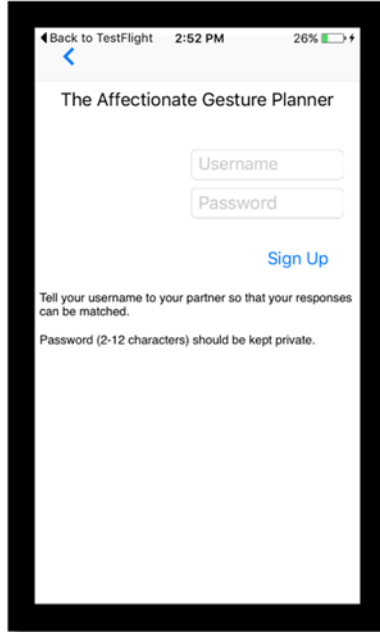
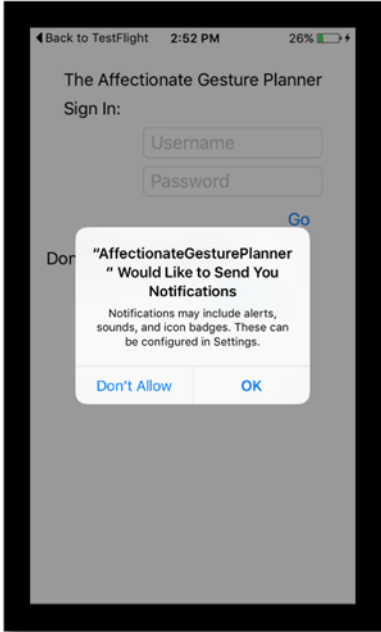
Appendix G

Screenshots From the AGP App

Email from iTunes Connect



Signing into the app, consent, initials survey. (The CSI-4, not shown, comes after the demographics page and before the excitement scale seen below. Some “submit” buttons and content are not showing given that the page is scrollable.)



Back to TestFlight 2:53 PM 27%

Please tell us a little about yourself...

Age

Race/Ethnicity

Gender:

Male

Female

Transgender

What year and month did you BEGIN the ROMANTIC relationship with your partner? (An estimate is fine.)

Year Month: Jan

What year and month did you MARRY your partner? (Leave blank if n/a.)

Year Month: Jan

Back to TestFlight 2:55 PM 28%

During the past month, how often did you feel that your relationship was in a rut (or getting into a rut), that you do the same thing all the time and rarely get to do exciting things together as a couple?

Often Never

To what extent does each word below describe your current romantic relationship?

Exciting

Not at all Extremely

Passionate

Not at all Extremely

Adventurous

Not at all Extremely

Partner Match-up Process

Verizon 2:55 PM 28%

Partner Match Up


Enter your partner's username:

[Match](#)

Verizon 2:55 PM 28%

Partner Match Up

Enter your partner's username:

patb  [Match](#)

q w e r t y u i o p

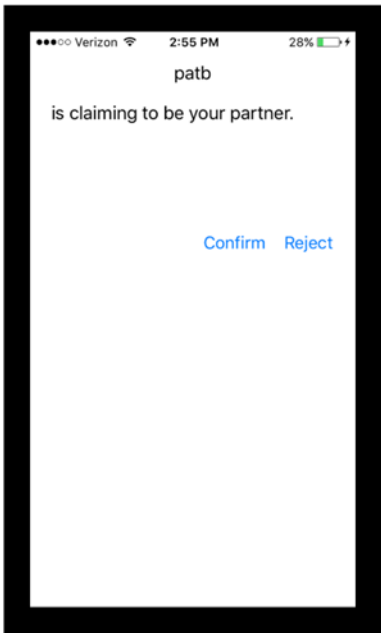
a s d f g h j k l

z x c v b n m

123 space return



After sending an invite, participant will see this waiting page until their partner confirms the match as seen below.



Personalized condition

Verizon 2:55 PM 28%

What makes you feel loved?

1. My partner makes me feel loved when they...

2. I can tell how much my partner loves me when she/he ...

3. My partner is being adventurous when they...

4. My partner is being passionate when they...

5. My partner is being sexy when they...

Verizon 2:56 PM 30%

14. A perfect date with my partner would include

15. I long for my partner to

Next

q w e r t y u i o p
a s d f g h j k l
z x c v b n m
123 space return

Verizon 2:56 PM 30%

What makes you feel loved?

Keep going! Write some other ideas of day to day activities that would make you feel intensely loved if they were performed by your partner. "I feel loved when they..."

16.

17.

18.

19.

20.

21.

22.

23.

24.

Verizon 2:59 PM 32%

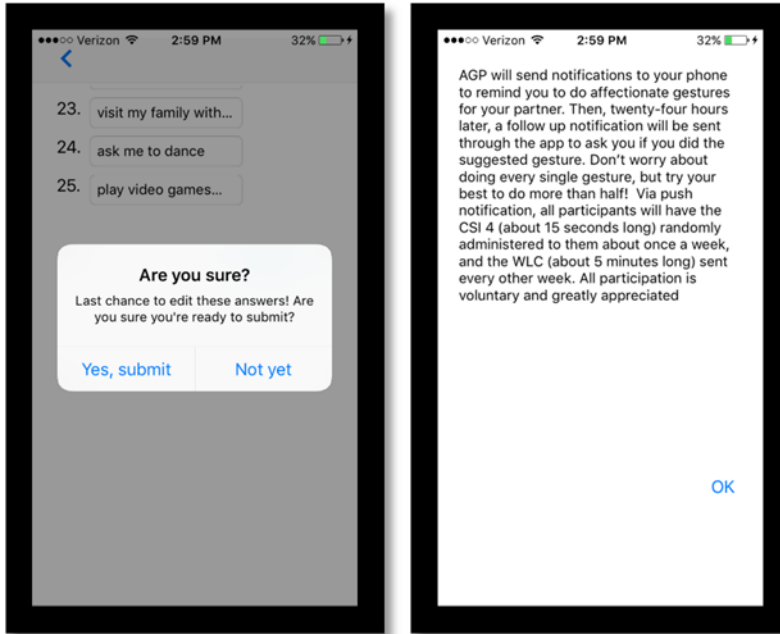
23.

24.

25.

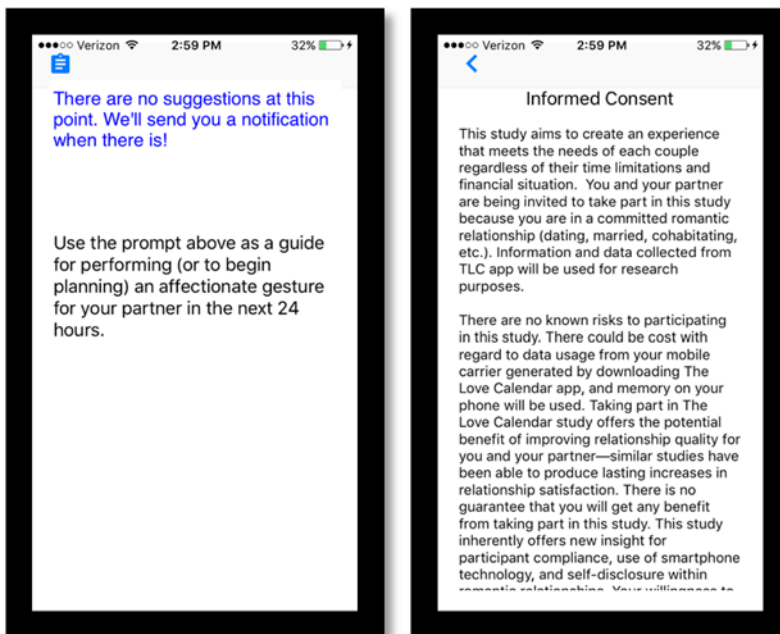
Submit

q w e r t y u i o p
a s d f g h j k l
z x c v b n m
123 space return



Standardized condition only sees the final screen in this sequence, because their responses are already created using Gottman's Salsa Cards.

AGP Home screen when no suggestions are available



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