An Evaluation of Variables Affecting Women's Preferences for

Humans Partners vs. Sex Toys

Kasey Leech

A Dissertation Submitted to the Faculty of

The Chicago School of Professional Psychology

In Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in Psychology

October 19, 2020

An Evaluation of Variables Affecting Women's Preferences for

Humans Partners vs. Sex Toys

A Dissertation Submitted to the Faculty of

The Chicago School of Professional Psychology

In Partial Fulfillment of the Requirements

For the Degree of Doctor in Philosophy in Applied Behavior Analysis

Kasey Leech

2020

Approved By:

Julie A. Ackerlund Brandt, Ph.D., Chairperson
Associate Professor, Applied Behavior Analysis

Annette Griffith, Ph.D., Member
Associate Professor, Applied Behavior Analysis

Robyn Catagnus, Ph.D., Member
Associate Professor, Applied Behavior Analysis

Acknowledgements

Dedication

This publication is dedicated to my children, Kadence and Colton; thank you both so much for believing in me and loving me. I also recognize my dad, Charles L. Burke, who passed away long before he could see me be successful.

Abstract

Researchers have begun to explore how humans discount sex; however, these evaluations have not yet extended to considering sexual acts using toys vs. sexual intercourse with another human. The current study will evaluate discounting choices between sexual acts with another human in comparison to sexual acts using toys. Participants completed three paired-stimulus preference assessments; the first included hypothetical sexual partners (men, women or both based on the participant's sexual preferences), the second included sex toys and the last was inclusive of the participants top three and bottom three selections from the human and sex toy preferences assessments. Following the preference assessments, participants completed two discounting tasks, once involving delay and the second involving risk. Results demonstrated that participants were less likely to choose a lower preferred partner immediately and instead would choose the delay (the sex toy). Additionally, an overwhelming majority of participants (regardless of sexual history) would not willingly engage in risk (people associated with a possible STI).

Table of Contents

List of Tables

Chapter 1: Nature of the Study

Sex is a topic that is sometimes considered taboo in our society and as such is commonly avoided and not discussed (DeLamater, 1981). Several variables within society impact the way individuals express themselves sexually; those variables may include religious or family beliefs or legal statutes (DeLamater). Based on those variables, an individual may or may not engage in behavior that is rule-governed, meaning they may behave in a manner that follows rules that have been put forth instead of contingencies experienced (Blackely & Schlinger, 1987). Although it is difficult to predict how any given individual will react regarding sexual interaction based societal rules, we may be able to identify *impulsive* sex acts which may result in the transmission of sexually transmitted infections (STIs) or unplanned pregnancies, and offer safer options; for example, the use of toys designed to provide the biological reaction from sexual gratification.

Previous research has evaluated an individuals' preferences for potential sexual partners and the amount of money they would pay to engage in sexual intercourse with those partners (Jarmolowicz et al., 2015). Participants included college students from a large midwestern university who completed the study on a computer within a computer lab on campus. First, participants completed a 16-picture paired stimulus preference assessment. Each trial presented two clothed individuals with the caption, "Who would you like to have sex with?" All of the 16 pictures were paired with each of the other pictures. At the end of the session, a preference hierarchy was developed based on the participants' selections. After completing the preference assessment, the participants completed a sexual discounting task. For the discounting task, two choices were presented; one option included sex with a less preferred partner immediately and the second option was sex with a more preferred partner after a delay of X (e.g., day(s), week(s),

month(s), or a year). Data were evaluated by how the less preferred but immediate partner titrated through the participants' rankings based on their choices. All choices made by the participant were placed in a ranking order of most preferred to least preferred. When completing the discounting task, if the participant chose the most preferred but delayed partner, the less preferred but immediate partner increased up the participants rank order. If the participant did not choose the delay for the most preferred partner, the less preferred but immediate partner moved down the participants ranking. At the beginning of each delay series, the option for the less preferred but immediate partner reset to the median- preferred partner and the delay to the most preferred partner increased (Jarmolowicz et al., 2015). A sexual risk survey based on their sexual history over the previous six months was also used to measure impulsive behavior and these data were compared with data from a monetary discounting task. Results were that individuals who had more sexual partners in the past six months also discounted at a much higher rate, indicating they were more impulsive, and women discounted sex less rapidly than men, meaning men were more impulsive; however, this finding was tentative as the male proportion of participants was small. Another limitation with this study was the make-up of the population, who were exclusively heterosexual and relatively young (under 25) and some of the discounting questions regarding paying for sex (e.g., prostitution) were less likely to apply to their history. Additional research is warranted to include individuals with varied sexual preferences (e.g., heterosexual, homosexual, bisexual, etc.) and using stimuli and situations which are more likely to be relatable to the participants. Additionally, the idea that women devalue sex differently than men is an interesting one. There may be factors which affect how women view sex, and they may engage is less risky sexual behavior because of those factors. However, if a woman does engage in risky sexual behavior, there is an increased risk of a variety

of STIs. Presenting the availability of toys which are developed to mimic sexual gratification as a replacement for another human may be beneficial for women who reportedly engage in risky sexual behavior. However, the relative preference between sex toys and potential human partners has not been heavily researched (Leech, 2020) and may play a part in the potential substitutability of those sex toys.

Problem Statement

As DeLamater (1981) stated, sexual interactions in society are often times still considered quite taboo and the addition of sexual gratification devices (such as sex toys) are further taboo. However, we must consider what the impact is of having such negative connotation with such topics. When topics are considered taboo, the desire to become educated decreases. For this area specifically, the lack of education can lead to harmful outcomes. Additionally, the lack of education on sexual interactions with others may lead a woman to be more likely to engage in sexual gratification with a device in lieu of interaction with another human. Likewise, with the taboo that is associate with risky sexual choices could account for the lack of education women seek. Forhan et al., (2009) evaluated the presence of five common STI in females ages 14 to 19 years old. The results demonstrated that, of the 838 females, there was a 24.1% prevalence of STIs. With statistics like that, it becomes evident that we need to work on identifying a solution. Are females engaging in risky sex due to the taboo that is associated with the topic? Has sex become all too common? Has risky sex become a topic we no longer question? This study will take steps in identifying impulsivity of females ages 18-99 years when given choices between sexual intercourse and the use of sexual gratification devices when paired with risk, monetary rewards, and deprivation.

Purpose of the Study

The proposed study will first examine results from pictorial preference assessments to evaluate preferences for potential sexual partners and various sex toys. Second, a sexual risk survey will be conducted and compared with a discounting task to extend on previous research. Additionally, results from assessments regarding preferred and non-preferred partners and sex toys will be assessed to hypothesize the value of sex with humans and toys in regard to delay and STI risk.

Research Questions and Hypotheses

Research Question1: Does the likelihood of an STI increase selections for sex devices over sex with a person?

$H_1$1: The likelihood of an STI does increase the selections for sex devices over sex with a person.

Research Question 2: Do delays have effects on how valuable sex with a person is?

$H_1$2: Delays will increase the value of a preferred person.

Research Question 3: Do factors such as sexual history and demographics make it possible to predict risky sexual choices?

$H_1$3: Past sexual history and demographics do help predict how risky a person might be sexually.

Research Question 4: Can sex toys replace sex with humans (i.e., be substitutable)?

$H_1$4: Sex toys can replace sex with humans (i.e., be substitutable).

Definition of Key Terms

Complimentary Reinforcement. Pleasure obtained from activities in tandem (Lee et al., 2018).

Conditioned Reinforcement. Occurs when a primary reinforcer is paired with a neural stimulus, and that stimulus takes on the reinforcing characteristics of the primary reinforcer (Skinner, 1965).

Delay Discounting. The degree to which individuals devalue delayed consequences and is often related to impulsive decision making (Madden et al., 2003).

Motivating Operation. Environmental event that establishes or abolishes the reinforcing or punishing effect of another event and evokes or abates behavior related to that event (Michael, 2000).

Unconditioned Reinforcement. Stimulus which has reinforcing effects that are innate (Skinner, 1965).

Significance of the Study

Often times, we hear that today's dating scene is considered the "hook up" culture (Fielder et al., 2013) and with the rise of STIs (American Sexual Health Association **[ASHA]**, 2020) it has become important that idea of safe sex be targeted. What was once a taboo subject, has become more accepted and engaged in. Specifically, women in their college years, or 20's, are more likely to engage in this behavior (Fielder et al., 2013) which puts them at a higher risk of contracting an STI. The findings of the current study are significant because we can use this information to identify the vulnerable populations and offer replacements, or substitutions to the risky sexual acts with which one might engage.

In return, this could lower the chances of contracting an STI and eliminate the need for mental health resources due to the feelings of shame a person feels after a "hook up" (Fielder et al., 2013). Due to the impact of STIs on a women life, even if it is not death, it is critical to have a dialogue and continuous research on how to prevent the contraction and spreading of the diseases, it is possible that this study can begin to complete that task.

Summary

In Chapter 1, the overall current study was presented. Discussion of sex, and the idea of how taboo in society the subject still is was discussed (DeLamater, 1981). This is an important point, because we must identify why this subject is so taboo even though it is a normal part of life and development. Additionally, the topic of the "hook up" culture was explained. Although sex is still so taboo, we see that the college age population is often engaging in "hook up" with people partners that they may not know which could lead to STIs as well as other health concerns (both physical and mental) (Fielder et al., 2013). Although a person's preferences for sexual interaction may impact the likelihood of engaging in risky sexual interactions (Jarmolowicz et al., 2015), it is still important to identify if a substitute could be offered (i.e., sex toys) to a risky sexual interaction that could lead to harmful side effects (i.e., STIs).

Additionally, in this chapter we reviewed the hypothesis for the current study, the purpose of the study, the definition of terms (related to this study), and last, the significance of the study.

Over the next several pages, the current study will be presented. First, chapter 2 will present literature related which supports the current study, not just with previous data but also from the lack of data which support the need for the current study. Next, chapter 3 will present a detailed look at the methodology was used. For example, the participants, data analysis, and

procedures will be explained in detail. Last, in chapter 4, the findings of the study will be

discussion (i.e., results, discussion to include implications and limitations).

Chapter 2: Review of the Literature

The Center for Disease Control and Prevention (CDC) reports that 24,000 women become infertile due to undiagnosed STIs every year (ASHA, 2020). With those numbers increasing each year, it is a socially significant reason to conduct research to identify factors that result in such occurrences. Gardner and Steinberg (2005) conducted a study in which individuals across both genders and ages (13 to above 24 years old) were provided with a questionnaire which identified taking risks and making risky decisions. The results were that adolescents were more likely to engage in risky behavior and make risky choices; however, the limitation of this study was that the adult age range capped at 24 years old and it is important to consider risky decisions that more mature adults may engage in as well. Reportedly, women will more often initiate sexual activity in adolescence (Forhan et al., 2009), which aligns with the potential increase of risky sexual behavior (Gardner & Steinberg). Combined, these results suggested suggesting that young women may be at a higher risky for contacting STIs, and potentially adding to infertility statistics. Young women's anatomy leaves them especially vulnerable to contracting an STI because the female anatomy is – in general – not as visible as a man's; and therefore, some symptoms are not as prominent, leaving them more vulnerable to viruses and bacteria that is associated with risky sexual behavior (ASHA, 2020). Additionally, women are less likely to present with symptoms associated with common STIs (e.g., chlamydia and gonorrhea) which results in them not seeking appropriate treatment; and although many STIs are not fatal, when left untreated there are often other lifelong effects like infertility, Pelvic Inflammatory Disease (PID), and potential risks to a fetus during pregnancy (ASHA, 2020). It is critical to identify reasons why some women engage in risky behaviors while others do not, and how we can help them engage in safer, complementary, behaviors.

As mentioned, younger women are often more impulsive and likely to participate in the act of "hooking up" (Fielder et al., 2013). Although women are less likely to engage in these hook ups than men; when they do, it has significant impact on their physical health (e.g., higher risk for STIs) and their mental health due to the continued unacceptability associated with females engaging in casual sex (Fielder et al.). Additionally, women typically reported they would prefer their hook ups result in a romantic relationship, which may explain why some women who do not typically engage in casual, risky sexual interactions are still participants in these hook ups. Participants included 483 first-year female college students between the ages of 18 and 25.

The evidence supporting the higher risk physically and mentally associated with women based on anatomy and societal pressures provides further importance to researching this area. One reason may include impulsivity (Odum, 2011b). Impulsivity can be a genetic trait (Odum, 2011b) and which may explain why some women engage in risky sexual behavior; however, this possibility also means we may be able to predict how an individual will behave by evaluating impulsivity regarding sex, and potentially offer a complementary, alternative option (e.g., sex toys) to help ameliorate some of the risks and long-reaching health effects of risky sex.

Reinforcement

Skinner (1965) explained reinforcement as a process which can be demonstrated through direct evaluation. This can be done by presenting a stimulus to an organism under specific conditions and making access contingent upon engagement in a target behavior. By measuring the frequency of the target behavior and observing an increase in that behavior, then you would have an example of reinforcement. Additionally, reinforcers may be further delineated into two types, primary/unconditioned and secondary/conditioned. An unconditioned

or primary reinforcer is a stimulus which has reinforcing effects that are innate; meaning an organism does not have to learn and develop a preference or reinforcer efficacy. Examples of unconditioned or primary reinforcers include food, water, temperature regulation, attenuation of pain, and sexual interaction. Conditioned reinforcers include stimuli which a reinforcement effect must be learned or developed. Conditioned reinforcers occur when a primary reinforcer is paired with a neutral stimulus, and that stimulus takes on the reinforcing characteristics of the primary reinforcer (Skinner, 1965). For example, dog food is a primary reinforcer for approaching a food dish. Initially, the sound of the dog food bag does not have a reinforcing effect. However, when paired with the delivery of the dog food repeatedly, the sound begins to be reinforcing and the dog will approach the food dish even before the presence of the actual food.

There are various methods by which one could study conditioned reinforcement (Williams, 1994). This can be done by studying when the neutral stimulus was paired with primary reinforcer as well as when a conditioned reinforcer has been paired with a primary reinforcer. This was presented in two categories; first, when a stimulus that was previously paired with a primary reinforcer is made contingent on some behavior without the accompanying presence of the primary. The second method is when both a conditioned reinforcement and primary reinforcement contingency are applied to the same behaviors. When exploring the idea of conditioning new responses based on previously paired with a primary, Williams referred to early work by Skinner in which rats' behaviors were reinforced for approaching the food cup when the pellets were available as well as the presence of the pellet dispenser, over time the pellets were removed, and the rats would respond (approach food cup) with only the presence of the food dispenser sound.

The second type of conditioning procedures occurs when both primary and conditioned contingencies are present, and is considered second-order schedules (Williams, 1994). A second-order schedule is one in which both conditioning effects are working simultaneously and can also be isolated to compare the effects. For example, Kelleher (1966) presented pigeons with a fixed interval four-minute schedule of brief stimulus presentation (.7s white key light), 15 completions of which were required for food delivery. A second way this category can be explained is through chain schedules, which occur when a primary reinforcer follows the completion of a sequence of individual schedule requirements, such as when Gollub (1977) presented pigeons with a five-component chain with a FI 30-scheudle in each link of the chain. For current purposes, sex, or more specifically, the physical sensation experienced during sex is the primary reinforcer; if a sex toy is paired with sex, it can become a conditioned reinforcer. By considering this, and providing an alternative method of sexual gratification, we are presenting a possible intervention to decrease risky sexual behavior.

Much of the research on sexual reinforcers has been conducted with animals (Crawford et al., 1993a; Holloway & Domjan, 1993); however, many of these results may be extrapolated to humans. For example, the effectiveness of sexual reinforcers for the Japanese quail (Crawford et al., 1993b). Male quails were allowed free exposure to the females for 5 minutes to evaluate male copulatory behavior while the female's sexual receptiveness was simultaneously assessed. The results were that exposure to the female with immediate copulation was a stronger reinforcer than non-copulatory exposure and the males would spend virtually all their time near the observation room and no satiation appeared to occur (Crawford 1993b). This can be expanded on for the current study in terms of "picking up" a partner at social events. Consider a bar, men may

hit on women throughout the night, however once last call is announced, we see this behavior (attempting to pick up a partner for the night).

Different forms of exposure to females have also been evaluated for relative effectiveness (Holloway & Domjan, 1993). Again, Japanese quails were housed in cages and at a specific time each day, the doors aligned to provide access to a sexually receptive female. The male was allowed in the "copulation room" and for up to five minutes of copulation; however, some females were behind a wire cage, preventing copulation. Results were that males with free access to females would immediately engage movement toward the females: however, males that were provided restricted females only intermittently attempted to approach the females (Holloway & Domjan, 1993). Interestingly, even though copulatory behaviors were not able to occur for some quails, those quails would still try to approach the females sometimes, meaning that conditioning still occurred, just to a lesser extent. Again, we can connect this to social situations and an individual's attempts to pick up a partner. If we consider a woman that may have a reputation for engaging in sexual interactions with others often, we will likely see the same behavior of the quails that had free access to females (immediate approach). However, women that may not have that same reputation may be treated similar to the female quails that were restricted (i.e., not approached as quickly or often). Although a female may be identified as restricted or unrestricted, this does not mean that a male will stop his attempts at gaining access. These attempts can leave women (especially sexually impulsive ones) vulnerable to the risky sexual interactions. This is important because a female may have many opportunities to engage in (risky) sexual behavior; however, with the presence (or knowledge of imminent presence) of a sex toy may help to decrease the risky sex engagement more a safer option.

Patterns of human-male sexual behavior has also been studied (Plaud & Martini, 1999). Undergraduate psychology students wore a device around their penis that would measure and report arousal and were then presented with sexual pictures of varying asexual and sexual natures (neutral stimuli, nude women, and sexual engagement) in random order. After baseline measures, each participant was subjected to one of three conditioning procedures. During Procedure 1, participants were presented with the neutral stimulus (neutral picture of a penny jar) for 16 seconds followed by the unconditioned stimulus (sexually explicit visual stimuli) for 30 seconds. During Procedure 2, participants were presented with the unconditioned stimulus was presented prior to the neutral stimulus. During Procedure three, either the neutral or unconditioned stimuli preceded the other during a session based on a random ordering. Results were that all three conditioning procedures effectively reshaped sexual arousals (Plaud & Martini, 1999). This supports the hypothesis that a neutral item (such as a sex toy), may be paired with an unconditioned reinforcer (sexual gratification), can become a reinforcer. The previous study also examined the effectiveness of the different conditioning procedures; however, as women were excluded from this study, it is possible that there may be different results regarding the effectiveness of each procedure. It would be interesting to evaluate this in future research because such information can be critical to identify effective conditioning options for females to have safer options using a complimentary reinforcement.

Complementary reinforcement, or reinforcement provided by a tandemly available stimulus, is another concept that can be helpful when considering reinforcement and its effects (Lee et al., 2018). Complimentary reinforcement occurs when activities available in tandem (such as listening to music and hanging out with friends) and the reinforcement effect, or value of each, subsequently increases. Previously, complementary reinforcement has been evaluated in

relations to variables paired with substance abuse. One such study targeted potential associations

between parent's education and their adolescence's substance use. Participants included 40

public high school students in Los Angeles who ranged within gender, race, living situations,

family history of substance use and parental education. All participants were questioned for 30

days on if they engaged in "getting high" and answered questions about other pleasurable events

(e.g., hanging out with friends, playing musical instruments, etc.). Results were that low parental

education was positively correlated with complimentary reinforcement, meaning that adolescents

whose parents were less formerly educated where more likely to engage in getting high while

engaging in additional pleasurable activities; whereas adolescents whose parents were more

education were less likely to pair getting high with other activities. These results were extended

to conduct programs and substance abuse, meaning that high school students who engaged in

various conduct problems and were more likely to engage in substance abuse during these

pleasant events (i.e., Khoddam & Leventhal, 2016).

Whereas previous research on complementary reinforcement has focused on socially

based activities (Lee et al., 2018; Khoddam & Leventhal, 2016); that does not rule out the focus

of the current study, sex with a human or toy. When extrapolating this concept to sex, it is

important to highlight that many of the additional activities or stimuli that are complementary to

sex with a human (e.g., music, bathing, relaxing candles, etc.) also have the potential to be

complementary activities and stimuli for sex toys.

A more important concentration for the purpose of the current study is substitutable

reinforcers; meaning, if two reinforcers are substitutable one can readily be exchanged for

another and are functionally similar (Green & Freed, 1993). An evaluation on the substitutability

of food and leisure items was conducted by DeLeon et al., (1997). Participants completed three

preference assessments; food only, leisure only, and a combination of the two which consisted of

the top three food items and the top four leisure items. Results were that the lowest ranked food

item was selected more often than the highest ranked leisure item by 8 of the 14 participants,

meaning that even the "lowest" preferred food item was still preferred over all available leisure

items. This may be due to the fact that the two items do not satisfy the same automatic function.

For example, food satisfies the biological feeling of hunger, which is essential for survival;

whereas, leisure items satisfy the biological feeling of entertainment, which is preferred but not

essential for survival. For the current study this can be further extended to consider if sex with a

person can be substituted for use of a sex toy, considering their common function and shared

biological outcome, it may be possible to offer a sex toy as oppose to engaging in risky sexual

behaviors.

Motivating Operations

        In addition to reinforcement contingencies, motivating operations (MO) and their

effects on behavior and reinforcer efficacy are important to understand. A *motivating operation*

is an environmental event that establishes or abolishes the reinforcing or punishing effect of

another event and evokes or abates behavior related to that event (Michael, 2000). An MO can

have two possible effect on behaviors, this can be value altering or behavior altering (Fagerstrom

et al., 2010). *Value altering* affect is related to consequences of responding and is temporary

whereas behavior altering is related to the responses related to those consequences and is

considered to be more permanent (Fagerstrom et al.). An MO is defined as an environmental

variable that alters the effectiveness of the current stimulus and/or alters the current frequency of

the behaviors that has been reinforced/ punished by that stimulus and includes establishing and

abolishing operations (Fagerstrom et al.). Early on, behavior analysts referred to all motivating

events as an establishing operation (EO) which implied an increase in the effectiveness of a

consequence as a reinforcer or punisher (Laraway et al., 2003); however, establishing operation

is the term used for an *increase* in the effectiveness of a variable, whereas a *decrease* in

effectiveness of a motivating variable is an abolishing operation.

To clearly understand motivating operations, a clear understanding of how an organism

is alerted to the availability of a reinforcer is imperative. The process by which a stimulus signals

the availability of a reinforcer is *stimulus control,* and the specific type of stimulus that signals

that availability is a *discriminative stimulus* (Michael, 2000). In the presence of that

discriminative stimuli the organism will be more likely to engage in behavior that gains them

access to the reinforcer. This conditional behavior is the explanation of stimulus control.

Although a motivating operation is going to have an abative or evocative effect, it is important to

understand that the discriminative stimuli is what identifies that reinforcers are available

(Fagerstrom et al.). For example, finding a fast-food restaurant might be motivated due to

deprivation of food; however, the sign which showing the logo of a restaurant will be the

discriminative stimulus that identifies that reinforcers (food) are available.

Similar to reinforcers, MOs can also be conditioned and unconditioned. Unconditioned

motivating operations (UMOs) are identified as innate- meaning they do not have to be learned/

paired) and is associated with deprivation and satiation of food, water, activity, sleep,

temperature changes, as well as variables related to painful stimulation and sexual reinforcement

(Miguel, 2013). A conditioned motivating operation (CMO) must be learned or paired (Michael,

2000) and there are generally three types of CMOs, surrogate, reflexive and transitive. A

surrogate CMO acquires its properties through pairing with an unconditioned motivating

operation (UMO). The reflexive CMO make their own removal effective as reinforcement and

transitive CMO makes something else effective as reinforcement (Michael, 2000). For the

purpose of this research, we will focus on sexual reinforcement. Because the sex is an

unconditioned reinforcer and an affected by unconditioned motivating operation, one does not

need to be "taught" that sex is "fun" or "good," it is something we are born with wanting

innately. However, we do need to evaluate what variables may impact when we engage in sex.

Some of these variables may include preference of the stimulus (typically another person), risk

of STI transmission, propensity to impulsive behaviors, and past history of risky sexual behavior.

Preference Assessments

An individual's *preference* identifies stimuli that are of interest and value to that

individual (Chappell et al., 2009). Additionally, these stimuli are potential reinforcer or punisher

for an individual's behaviors when presented in relation to different behaviors (Chappell et al.,

2009). Chappell et al., (2009) goes on to say that reinforcement efficacy, or the known result, of

a stimulus will determine the likelihood that it will be approached when presented in a

preference assessment. Additionally, the authors discussed how antecedent variables (i.e., MOs)

can alter reinforcement efficacy of a stimulus through deprivation and satiation (Chappell et al.,

2009). A *preference assessment* is a set of procedures in which a stimulus is presented, and an

individual selects it if it is preferred, and a hierarchy may be developed based on how often a

stimulus is presented and selected (Cooper et al., 2019). There are various types preference

assessments which vary in depth from conducting an interview with a person referencing items,

providing multiple items in a free-operant situation, and conducted more controlled trial-based

procedures (Cooper et al., 2019).

Trial-based preference assessments are common considered the more valid and reliable

way to determine if an item is preferred, and then potentially a reinforcer (Cooper et al., 2019;

Fisher et al., 2011 A commonly referenced assessment is the paired-stimulus preference assessment (also called "forced-choice" or "paired-choice) in which two stimuli are presented and data are collected on which item is selected (Fisher et al., 1992). Although this procedure involves additional skills such as scanning and choosing in comparison to a single-stimulus preference assessment (Pace et al., 1985), by conducting a paired-stimulus preference assessment, one is able to describe the relative preference between items because each item in the assessment has been paired with every other item (Roscoe et al., 1999). Knowing the relative preference of stimuli allows for better prediction of which items may also function as a reinforcer (Roscoe et al.; Piazza et al., 1996; Fisher et al., 2011).

Another assessment which presents multiple stimuli within a trial is multiple-stimulus-without-replacement preference assessment (MSWO; DeLeon & Iwata, 1996). During an MSWO, all items being evaluated are presented, and slowly removed from the array until each has been selected. The resulting data may be put into a hierarchy, or ranking, similar to that developed following a paired-stimulus preference assessment (Fisher et al., 2011). Although both assessments provide a relative hierarchy, one method may be preferred over another depending on the context in which it will be implemented. For example, an MSWO tend to be a faster assessment because there is one trial per item, so if there are six items, there are six trials. In comparison, a paired-stimulus preference assessment with six items is 30 trials because each item is paired individually with every other item. However, the because the paired-stimulus assessment includes a direct comparison of each stimulus with every other, it is often considered the more precise assessment. Previously, an MSWO was used to evaluate the preference of potential sexual partners (Jarmolowicz et al., 2016); however, depending on how the stimuli are

presented, how many there are, or the preciseness desired from the results, it may be more appropriate to use a paired stimulus.

A variable which may affect preference strength, similar to how it affects reinforcer efficacy, is an establishing or motivating operation (Chappell et al., 2009). Paired-stimulus preference assessments were conducted with three participants with developmental disabilities across various "access" conditions to evaluate the effects of MOs on preference assessment results. All of the included edibles were regulated for the duration of the study; and prior to the preference assessments conducted in the access condition, participants were given ten-minute of continuous access to the edibles. During the no-access condition, participants were not provided this access period. During a second phase, a 20-minute delay was added during the access condition between the access period and the preference assessment. Results were that for two of the three participants, providing free access to the edibles decreased amount of selection during the preference assessment for the edibles consumed during the access period, even when the 20-minute delay was added (Chappell et al., 2009). This is an important consideration for risky sexual behavior. If there is a possible way to provide the reinforcer prior to situations in which risky sexual behavior occurs, a woman may be less likely to engage in the behavior, even if there is a delay between the access period and presentation of an opportunity for sex. For example, if a college-age woman uses a preferred sex toy for ten minutes before going out to the bar, she may be less likely to go home with a random man that night. Although preferences can be identified and ranked, there is no guarantee the item is reinforcing until it is used in the targeted situation; and in those situations, additional variables such as time and effort until access is provided also impacts responding. In order to account for those variables, delay discounting may be considered.

Delay Discounting

Delay discounting refers to the degree to which individuals "devalue" consequences based on a time delay and is often related to impulsive behavior and decision making (Madden et al., 2003); simply said, the longer the delay to access, the less valuable the stimulus. A similar devaluing of stimuli can also be observed with the amount of effort needed to gain access (Odum, 2011a) or risk associated with access to the stimulus (Odum, 2011a). Discounting can be measured using a variety of methods such as calculating a *k* value (Jarmolowicz et al., 2015), area under the curve (AUC; Jarmolowicz et al., 2015), or a split median (Ianobucci et al., 2015)). An inability to delay gratification (Green & Meyerson, 2013) or "impulsive" behaviors are associated with "steep" discounting and includes risky behaviors such as gambling, drugs, alcohol and unprotected sex (Odem, 2011; Jarmolowicz et al., 2015).

The amount to which an individual discounts various stimulus may be likened to a "trait" or an instinct with which an individual is born (Odum, 2011b). Within psychology, a personality trait is generally defined as a pattern of thoughts, feelings and behaviors which are predicted to occur under specific and/or unique circumstances (Odum, 2011b). The characterization of discounting as a trait may include using a test-retest technique to identify if discounting is displayed at consistent levels across contexts and time. Additionally, if discounting occurs across multiple commodities (e.g., money, sex, food), it may also speak to the presumption that discounting is a trait (Odum,2011b). Discounting has also been described as a trans-disease process, meaning it often occurs across disorders (Bickel et al., 2012); therefore, because discounting is associated with other risky behaviors, using it as an indicator of the likelihood an individual may engage in risky sexual behavior may be warranted. However, research regarding discounting in relation to sexual behavior has not been heavily researched (Jarmolowicz et al.,

2014; Jarmolowicz et al., 2015), the work that has been conducted replicates the patterns found across the more extension discounting research on substance abuse (Bickel & Odum, 1999; Dixon et al., 2003; Jarmolowicz et al., 2013; Johnson & Bickel, 2002; Madden et al., 2003).

Because the majority of discounting research has been conducted with stimuli that individuals abuse such as alcohol (Jarmolowicz et al., 2013; Richards et al., 1999), heroin (Bickel & Marsch, 2001; Bickel et al., 2012), money (Dixon et al., 2003; Johnson & Bickel, 2002), and smoking (Bickel & Odum, 1999); the extension of this research to sex, another stimulus which can be abused or addictive, seems logical. For example, 36 individuals were instructed to think of their ideal sex partner and completed a cross-commodity discounting task including questions such as "Would you rather have X number of sexual encounters now or $1000 after a six-month delay" (Jarmolowicz et al., 2014). The results were that participants discounted sex more rapidly than money, meaning the "value" of sex decreased more rapidly that the "value" of the money as the potential time delay increased. Additionally, data were analyzed using a median split based on the number of partners they had engaged in sexual acts with (i.e. four or fewer and more than four), these data demonstrated that those participants in the four or more-category had higher discounting rates. Discounting levels are often associated with the propensity to engage in impulsive choices and risky behavior (Richards et al., 1999), it is important to relate it to sexual behavior because identifying the stimuli and contexts in which it occurs provides valuable information in attempting to address the behavior of interest (Bickel et al., 2012).

Summary

Although sexual interaction *can* be risky, it's often not considered as such – at least to the same degree of risk – as other addictive behaviors (i.e., drugs, alcohol, gambling). However,

understanding the variable that affect risky sexual behavior are vital in developing potential

sexual education for young women. Additionally, if risky sexual behavior is occurring or is

likely to occur, it is important to have information about ways to decrease the likelihood that a

woman may engage in those behaviors. The purpose of the current study is to replicate and

extend previous research on preference, complementary reinforcers, and discounting in relation

to an individual's level of reported engagement in risky sexual behaviors, and to evaluate the

potential substitution of sex toys for sex with a potential partner.

Literature that is both connected and expands on the idea of risky sex and how this is

related to behavior analysis is vast. However, there has not been a heavy focus on how this

information can be applied as an intervention. The notion of preference assessment and how this

can be translated into sexuality is an interesting thought, and one that could be used to assist in

the prevention of STIs. Additionally, understanding how genetics, personality and overall

contingency shaped behaviors (based on MO's, stimulus control and reinforcement) is also

exceedingly important when approaching the topic of how to prevent STIs and increase sexual

education. Literature reviewed within chapter one is important because it demonstrates the

foundation and value of the behavior analytic foundation and where we can go from there. All of

those parts will be pulled together in the methods sections to determine possible interventions.

Chapter 3: Research Design and Method

Within the current research study, results from pictorial preference assessments were examined to evaluate preference for sexual partners versus sex toys. From that data, a hierarchy was constructed which demonstrated a person's preferences within and across commodities. From that information, two sexual discounting tasks were conducted (i.e., delays and risks) which were completed to extend on previous research of sexual discounting. Additionally, results from assessments regarding preferred and non-preferred partners and sex toys were assessed to hypothesize the value of sex with humans and toys in regard to delay and STI risk. Last, a sexual risk survey was completed to identify if there were correlations between sexual risk factors and actually engaging in those risks, meaning, are there predictor behaviors.

Research Questions and/or Hypotheses and their Rationales

The current study has four research questions and hypotheses. First, does the likelihood of an STI increase selections for sex devices over sex with a human? The hypothesis for Research Question One is that yes, the likelihood of an STI would increase a person's selection for a sex toy over sex with a human. Second, do delays have effects on how valuable sex with a person? The hypothesis for Research Question Two is, yes, delays will increase the value of a preferred person. Third, do factors such as sexual history and demographics make it possible to predict risky sexual choices? The hypothesis for Research Question Three is, yes, sexual history and demographics do help predict how risky a person might be sexually. Last, can sex toys replace sex with humans (i.e., be substitutable)? The hypothesis for Research Question Four is, yes, sex toys can replace sex with humans (i.e., be substitutable).

Participants

Participants targeted for this study included individuals that were female or born with female anatomy (i.e., transgender or nonbinary) whom had a history of sex toy use. Data of participants included 69 individuals, all of which identified as female and had a confirmed history of sex toy use. Demographic characteristics of participants are provided in Table 1. All participants were between the ages 18- 58 with the majority falling into the 28-37 (n = 41, 59%). Participants were closely split in terms of their preferences for sexual partners, with 32 indicating that they preferred men (46%) and 29 indicating that they preferred women (42%). Nine participants indicated that their preferences were both men and women (13%)

The majority of participants had a high school diploma or GED (n = 24, 35%) or a bachelor's degree (n = 20, 29%). Participants were given the option of 26 different religions; however, the majority of the participants fell into the category of Christianity.

Participants identified their marital status as married (n = 50, 72%), single (n = 14, 20%), or divorced (n = 5, 1%), their last sexual interaction and last organism was primarily within the previous six-months or less. The majority of the participants were working class (n = 24, 35%) or middle class (n = 34, 49%).

Recruitment was conducted via social media (e.g., Facebook) and participants completed all parts of the study on an online platform (e.g., engineered website). Prior to beginning the study, the participants were asked to complete an electronic informed consent document. As a safeguard, participants had the ability to exit the study at any point if they felt uncomfortable with the content.

Individuals were excluded from the study if they identified as male or if they were under the age of 18 (as exposure to sex toys is illegal for minors). The rationale of identifying only

women or those with female anatomy was because women are more at risk for STIs based on anatomy and (lack of) symptoms associated with STIs, which could lead to more severe long-term consequences (ASHA, 2020) Additionally, individuals that did not have a history of sex toy use were also excluded.

Setting

Due to recruitment being completed online, participants were able to complete the study at any time and from any location they desired; however due to the content, it was recommended that all participants completed the study in a private setting. Participants could also use any device they chose. This included, but was not limited to, smartphones, tablets, and computers (laptops or desktops). Additionally, due to the sensitive and taboo nature of the study topics, participants were also given privacy, as IP addresses were not tracked; this was done in an attempt to increase participant openness in answering questions.

Materials

There were a variety of materials required for this study which included electronic device for the participants to complete the survey, multiple surveys within the study (i.e., three preference assessments), the MCQ and the sexual risk survey.

Electronic Device

Participants were required to have a personal electronic device (e.g., computer, phone, laptop), stable internet connection, and a location where they felt comfortable completing the study (Reyes et al., 2017 Whitehouse et al., 2014). Participants would access the website for the study once they were ready. The website was individually constructed for the purpose of this study. A website designer independent of the study was contracted to develop the website based on the materials (i.e., pictures for the preference assessments, sexual risk survey, monetary

discounting task, sexual discounting task with delays and sexual discounting tasks with risks) and detailed directions provided by the principal investigator (which will be further explained as the phases of the study are explained). The independent web designer would send weekly results to the principal investigator which would need to be decoded and analyzed. Decoding the results consisted of receiving the output sheet from the website designer which listed all phases and trials with associated numbers which indicated what the choice was. All answers were listed as numbers and those numbers would need to be turned into actual answers (i.e., in the human preference assessment the number one was equal to the picture named Jonny; in the sexual risk survey an answer of 0 equaled the person taking no risk). Once the numbers were all transformed into names or yes/no answers, the data was further analyzed (which will be further explained). The website designer had no access to personal information, the picture decoding or data analysis information.

Surveys

Demographics. Participants were asked to complete a demographics survey which included questions pertaining to gender, education, religion, last sexual interaction, last orgasm, marital status, socio economic status and age (Smith, 2006). The demographics questions were populated based off of previous research completed concerning sexual interaction (Smith, 2006), due to the history of these demographics being tied to sexual activity they were included in this current study. The purpose of the demographics survey was having overall demographics from participants, as well as to use those demographics to identify a predictor for sexual risk. For example, does age or education predict more risky sexual behaviors?

Monetary Choice Questionnaire (MCQ). Three parts of the current study used the MCQ or a modified version of the MCQ to assess k-value or h-value (Kaplan et al., 2016). The

first MCQ was comprised of the Kirby Delay Discounting Questionnaire (Kirby & Marakovic, 1996). This questionnaire presented a lesser monetary amount immediately or a larger monetary amount at a later time. The purpose of this questionnaire was to assess the participants across a commodity that is heavily researched, which would provide a baseline. Upon completion of all MCQ's, the participants data was compared across all three to identify trends and similarities.

Modified Monetary Choice Questionnaire (MCQ) (sexual questions). Data for the sexual discounting task with delays were assessed using a modified choice questionnaire which was individualized per participant. The modified MCQ for sex, would present the participant with either a person (which could be a lowered preferred person from their preference assessment or a higher preferred person from their preference assessment) immediately or a sex toy (that was either a higher or lower preferred sex toy from their preference assessment) after a delay. The purpose of this was to assess if the participant was choosing a person immediately (regardless of preferences) or choosing the delayed (and safer) option.

Modified Monetary Choice Questionnaire (MCQ) (risk questions). Data for the sexual discounting task with associated risk (i.e., STI) were also assessed using a modified MCQ which integrated risk. The participants were given the option of a person (this could be a higher or lower preferred person which was taken from their preference assessment) with a percentage of a risk (of an STI) associated with them or the option of a sex toy that has no risk. The purpose of this was to assess if the participant would choose the hypothetical risk, and if they would, when would they choose the risk (i.e., a higher preferred person with a lower risk associated with them).

Preference Assessments. Participants were presented with three preference assessments (DeLeon et al., 1997; Jarmolowicz et al., 2013) all were administered in the same order for each

participant. The first preference assessment consisted of human partners, the second was sex toys

and the third and final preference assessment was an individualized assessment which was

comprised of the participants top three and bottom three preferences from the previous two

assessments. The purpose of the preferences assessments was to develop a hierarchy of

preferences. Preference assessments (tables 4 and 5) consisted of an assessment similar to what

was seen in Jarmolowicz et al. (2015). Consistent with previous research (DeLeon et al., 1997),

there were 12 pictures within each category (i.e., two human preferences as well as sex toy

preferences). In total, there were 12 pictures of men, 12 pictures of women and 12 pictures of sex

toys. Participants were given the option to choose the gender of the first preference assessment

(i.e., male, female or both). If a participant chose men, their first preference assessment consisted

of all 12 men. If a participant chose women, their first preference assessment consisted of all 12

women. If a participant chose both genders as their sexual preference, they were presented with

six men and six women that were randomly chosen with the computer program. Last, all

participants sex toy preference assessments included all 12 pictures of the sex toys. All pictures

were 3x5 in dimension and only of the individuals face or the sex toy and no background, this

was to provide less distraction and more ability to focus exactly on what was being presented.

Pictures included in the assessments containing humans (male, female or both) were chosen from

a Google images search and included a variety of ethnic background, physical features (i.e.,

length of hair, facial hair, glasses, eye color, etc.) and all human pictures had an apparent gender

(i.e., male or female). Sex toys included both vaginal and clitoral sex toys and these were also

chosen from a Google images search that included the most common sex toys used.

The preference assessments were administered independent of one another and in the

exact order for all participants (i.e., humans, sex toys, and mixed), meaning they were presented

separately; however, once the first two assessments were each completed, the participants

answers provided information for the third assessment. Following the completing the first two

preference assessments, the computer program would use the data (i.e., the hierarchy) from those

assessments to automatically set up the third preference assessment. The third assessment was

individualized for each participant and was comprised of the top three preferred people and the

bottom three preferred people as well as the top three preferred sex toys and bottom three

preferred sex toys.

      Sexual Risk Survey. Each participant completed a sexual risk survey to develop sexual

history demographics. The 24-item Sexual Risk Survey (SRS; Turchick & Garske, 2009) asked

participants a variety of questions concerning their sexual behavior. To score the SRS, the

principal investigator assigned answers of "yes" one point and the answers of "no" zero points.

Questions that had more than one answer were assigned increasing numbers (i.e., number of

partners 0-5 one point, 6-10 two points, 11-15 three points, 21-30 four points). These answers

were then totaled, and each participant was assigned their total number of risks.

Procedure

      Upon receiving the recruitment link via a social media platform, participants clicked on

the link and were taken to the online site. Prior to beginning the study, the participant completed

in the following order and informed consent and attestation that the participant was over the age

of 18 and female. Upon completion of the informed consent, participants would move on to the

demographic's questionnaire, and a monetary delay discounting task. The monetary delay

discounting task consisted of trials in which the participants were given a choice of a smaller

amount of money immediately (i.e., $10 today) or a larger amount of money with a specified

time delay ($100 next week; Kaplan et al., 2016). Once the participant successfully completed

those sections, they were taken to a screen reminding them that the material within the study may

not be suitable for individuals under the age of 18 or for public/work environments. Additionally,

participants were told that if they wished to terminate their session at any time, they may do so

by clicking the "opt out" button in the lower left corner. Advancing from this screen admitted

them to the following study components.

Preference Assessments

The first section of the study contained three preference assessments. The first preference

assessment was for potential sexual partners and the participant was presented with pictures of

humans. The gender of the humans presented was based on their reported preferred genders(s) in

the demographic's questionnaire. The second preference assessment was for sex toys and the

participant was presented with pictures of various sex toys and ask to choose the preferred one.

The third preference assessment contained the most preferred (top three) partners and sex toys as

well as least preferred (bottom three) partners and sex toys based on the results of the previous

two preference assessments.

Sexual Partner Preference Assessment

Upon entering this preference assessment, participants were presented with three options

of stimuli for the pictorial preference assessments in a drop-down menu (e.g., male or female).

The preference assessment included 12 pictures (3x5 pictures of only the individuals face and no

background) which was presented in pairs (i.e., forced choice preference assessment) and they

would choose the person they preferred based on pictures alone. The assessment continued until

each picture has been paired with each of the other pictures for a total of 67 trials. Upon

completion of the sexual partners pictorial preference assessment, the participant moved on to

the sex toys preference assessment.

Sex Toy Preference Assessment

The second preference assessment consisted of sex toys. Prior to starting the sex toy preference assessment, the individual viewed two pages that displayed the categories of sex toys (i.e., vaginal or clitoral) and pictures of the items with a brief description of how they are used. The preference assessment included 12 pictures (3x5 on a white background) which was presented in pairs during each trial and they would choose the device they preferred based on pictures alone. The assessment continued until each picture has been paired with each of the other pictures for a total of 67 trials. Upon completion of the sex toys pictorial preference assessment, the participant moved on to the mixed preference assessment.

Mixed Stimulus Preference Assessment

The third and final preference assessment consisted of a mixture of the previous two preference assessments. All material stayed the same (i.e., the size and presentation of the pictures). Based on the hierarchy developed in the first two preference assessments, the top three and bottom three preferred humans as well as the top three and bottom three preferred sex toys were placed in the third preference assessment.

Sex-related Assessments

The last phase of the study consisted of two sexual discounting tasks; one with delays to access and one associated risk of STI contraction. Last, participants complete a Sexual Risk Survey (Turchik & Garske, 2009) containing questions about to their sexual behavior.

Sexual Discounting Tasks

Similar to the data included in the mixed preference assessment, the high and low preferred (top and bottom three, respectively) sexual partners and high and low preferred (top

and bottom two, respectively) sex toys were used for the sexual delay and sexual risk

assessments.

Sexual Delay Task

During the sexual delay task, participants were presented with the paired option of a high

or low preference sex partner or toy. During each trial, a delay to access to a sex toy was

compared to immediate access to a sex partner. Each potential sex partner was paired with each

sex toy.

Sexual Risk Task

During the sexual risk task trials, participants were presented with the same sex partners

and toys as the previous task; however, instead of a delay in sex with the partner, a percentage of

risk of contraction of an STI (0%-30%) was presented, or sex toy with no associated risk.

Sexual Risk Survey

Last, participants completed a 24-item Sexual Risk Survey (SRS; Turchick & Garske,

2009) in which they answered a variety of questions concerning their sexual behavior within the

previous six months. These questions ranged from the number of partners they have had, if they

have engaged in unprotected sex, left events with a person they did not know for the intent of

sexual intercourse, as well as if they have ever used sex for money, power or love.

Data Analysis

Phase One: Descriptive Data Analysis

Within Phase One of data analysis, the focus was on descriptive analysis. This consisted

of reviewing and totaling (by category) the data from demographic questions that participants

were asked and answered. In addition, hierarchies of all preferences across the two commodities

were created. To do this, the researcher pulled the number of times each stimulus was chosen and

divided it by the total number of times it was presented (i.e., the human and sex toy preference

assessments were time chose/11; the mixed preference assessment was time choose/six). Upon

completion of the previous steps, the stimuli were ranked according to the percentages (DeLeon

et al., 1997; Jarmolowicz et al., 2013).

Percentage of selections (i.e., top three and bottom three from each category) in both the

first, second and third preference assessments were reviewed. Specifically, the percentages of the

humans and sex toys that were placed in the third preference assessment were compared to the

percentage previously selected in the first and second preference assessment. From that

information, the percentage of shift was identified (i.e., if a person went from being choose

100% of the times in preference assessment one but in preference assessment three that same

person was only selected 80% of the time, this would be a 20% decrease). Participants that

demonstrated a shift of 30% or more (Leech, 2020) during the third preference assessment (i.e.,

top three and bottom three from each category) were placed in Tables 5 and 6 for further data

analysis.

Phase Two: k-value and h-value Data Analysis (MCQ)

Phase Two of data analysis focused on *k* and *h* value and the MCQ. Upon completion of

the MCQ the data were put into the autoscorer to be analyzed. The MCQ autoscorer is used to

calculate the values associated with discounting. (*k*-value for delay discounting and *h*-value for

probability discounting).

Monetary Discounting

Data for the monetary discounting task were calculated using the MCQ automated scorer

(Kaplan et all, 2016) that calculates small-*k*, and large-*k*. The MCQ is an excel spreadsheet

created by Kaplan and colleagues and distributed by *Behavior Analysis in Practice* to assist

applied researchers in calculating k values ($V = A/(1 + kD)$). Data were coded as a 0 if the

participant choose the immediate reward (i.e., less money immediately) or a one if the participant

choose the delayed reward (i.e., more money after a delay). The data from the discounting task

were pulled by the researcher and entered into the MCQ to evaluate the small, medium, and large

k value for participants.

Sexual Discounting with Delays

Data (people and sex toys identified) for the sexual discounting task with delays were that

of the data also presented in the third preference assessment (i.e., high and low preferred humans

and sex toys). Data for the sexual discounting task with delays were calculated using a modified

version of the MCQ automated scorer (Kaplan et all, 2016). As previously described, MCQ is an

excel spreadsheet created by Kaplan and colleagues and distributed by *Behavior Analysis in*

Practice to assist applied researchers in calculating k values ($V = A/ (1 + kD)$). This autoscorer

was specifically set up to calculate 27 trials, however for the sexual discounting tasks, k-value

needed to be calculated at 24 trials. Therefore, the sheet was modified to calculate k-value at the

lower trials of 24. Data were coded as a 0 if the participant choose the immediate reward (i.e.,

less money immediately) or a one if the participant choose the delayed reward (i.e., more money

after a delay). The data from the discounting task were pulled by the researcher and entered into

the MCQ to evaluate the small, medium, and large k value for participants.

Sexual Discounting with Risks

Data (people and sex toys identified) for the sexual discounting task with associated risks

were that of the data that were also derived from the third preference assessment (i.e., high and

low preferred humans and sex toys). Data for the sexual discounting task with associated risk

were calculated using a modified version of the MCQ automated scorer (Kaplan et all, 2016). As

previously described, MCQ is an excel spreadsheet created by Kaplan and colleagues and distributed by *Behavior Analysis in Practice* to assist applied researchers in calculating k values ($V = A/(1 + kD)$). The sheet was modified to calculate h-value (i.e., probability discounting). The formula embedded in the modified autoscorer was h: $V = A/(1 + h\Theta)$. The risk probability discounting task data were transferred from the computer program output to an automated scorer in excel which calculated with h-value (small, medium and large h-values). Data were coded as a 0 if the participant choose the person which was always associated with some percentage of risk or a one if the participant choose the sex toy that was associated no risk. Probability discounting analyzes an individual's choice to choose an immediate access to something or a delay with an associated probability percentage, in this case we are looking at choosing the immediate access to a person with a risk of an STI associated with them or the delayed access to a sex toy which had no chance of an STI. The data from the online discounting task were pulled by the researcher and entered into the modified MCQ to evaluate the small, medium, and large h value for participants.

Phase Three: Median Split

Phase Three of data analysis incorporated the median split. The median split is used to separate group of scores or values into highs and lows. Meaning, the median is found, and the group is split at the point. From that, the researcher can identify where the majority (or highs) of the group is scoring (Jarmolowicz et al., 2013).

The median split was used to analyze the participant responses to the monetary discounting task as well as the sexual discounting task. Once the monetary and sexual discounting tasks were completed each participants small-k, and large-k scores were calculated using the formula embedded in the MCQ ($V = A/(1 + kD)$). The principal investigator then

transferred these data into SPSS to perform the median split (for both monetary and sexual discounting tasks). This analysis is used to demonstrate the highs and lows within a category, for the purpose of this study the higher or larger number of individuals that produced a k-values closer to 0 would indicate that a higher number of individuals within that group were choosing the more immediate or impulsive choice (i.e., sex with a person). If the higher or larger number of individuals produced a k-value closer to one, that would indicate that a higher number of individuals within that group were choosing the delayed choice (i.e., use of a sex toy at a delayed time).

Phase Four: Correlation Data Analysis

Phase Four of data analysis was used to complete a Pearson Correlation (REFERENCE). The median split data (i.e., small and large k-value) from the MCQ in addition to sexual discounting with delays task were analyzed to determine the relationship between the two variables; specifically, to determine if a relationship existed for discounting (or impulsive choices) across money and sex. Values range between -1 (strong negative relationship) and 1 (strong positive relationship), with a value at or close to zero would demonstrate a weak or no linear relationship at all.

Phase Five: Multiple Regression Data Analysis

Multiple Regression Analysis

A multiple regression analysis (Tiernan et al., 2011 was completed to identify potential predictors of risky sexual behaviors. This analysis was beneficial to the current study as it allowed for identification of possible predictors of risky sexual behavior which can in return provide a possible target (i.e., demographic) to focus on for future interventions.

Two multiple regression analyses were conducted using the median split data from the small-*k* and large-*k* of the sexual discounting with delays task (calculated using the modified MCQ) as the dependent variables. The first multiple regression analysis consisted of small-k being the dependent variable and the independent variables (possible predictors) being total risks, number of sexual intercourse partners and number of partners for other sexual acts. The second multiple regression analysis consisted of large-*k* being the dependent variable and the independent variables (possible predictors) being total risks, number of sexual intercourse partners and number of partners for other sexual acts. The purpose of the independent variables was to identify if they were possible predictors for the small or large-*k* (i.e., higher or lower discounting within higher or lower valued people).

Ethical Assurances

All recruitment for participation was completed on social media. Participants would click on the link from the social media platform and be taken to the website. The website was constructed to keep all participants completely anonymous. This meant that no one was alerted when a participant clicks on the social media link or entered the website. Furthermore, IP addresses were not collected from participants. Participants were given the option to leave their email addresses to receive updates concerning the study, however none of the participants elected to do so.

Data for the current study were analyzed over a variety of ways. Descriptive Analysis was used to gather information on the participants demographics as well as their three preference assessments. More in-depth data analysis was conducted using *k*-value (i.e., money and sex) and h-value (i.e., risks associated with sex) to determine devaluation of commodities as well as possible identification of impulsive (unsafe) choices. A third data analysis that was conducted

was the split median, in which the medians per group (i.e., monetary and sex with delays) were analyzed to identify the highs and lows or where the majority of the group was scoring in terms of k-value. Within Phase Four, a Pearson Correlation was conducted to with the k-values (small and large-k) identified in the monetary and sexual discounting tasks to determine a possible relationship across the two commodities. Finally, within Phase Five, a multiple regression was complete. The multiple regression was completed twice, once with the small-k and independent variables (i.e., total risks, number of sexual intercourse partners and number of partners for other sexual acts) and the second time with large-k and the independent variables. All analysis was completed for a specific and very important reason and the outcome gave direction on which direction interventions can go.

Chapter 4: Findings

Chapter 4 will review of the findings of the current study to include all of the data

associated with the data analysis section previously discussed. Results will be presented for the

69 participants across a variety of analyses to include preference assessments, discounting

(monetary, sexual and risk), median splits (sexual and monetary), correlations, and multiple

regression. Data is presented as a total (i.e., group) and not per participant. The findings are

meant to provide a foundation for meaningful discussion within chapter 5 when considering

possible interventions for risky sexual behavior.

Preference Assessments

Data from the preference assessments (specifically the items within the third preference

assessment) were analyzed to identify the significant shifts from the first/second preference

assessment to the third, which was defined as a 30% or more increase or decrease in percentage

selection. These data provided information on how hierarchies of preferred items may change

when presented with other highly preferred items from other commodities. This information

could provide validation on the ability of a sex toy to be substitutable (in the case of sex with

humans or the use of a sex toy). Per Table 5 and 6, the preferred human or sex toy is based on

each individual participant hierarchy. The percentage of shift was calculated per participant and

the data within the table are a reflection of how often each item shifted in percentage of

selections by more than 30%. Table 4 demonstrates the data of the preferred humans and sex

toys (top three choices from each category) and the number of shifts (over 30%) that occurred

per preferred item. Preferred human one demonstrated ten increases in selection and 20 decreases

in selection. Preferred human two demonstrated 12 increases in selection and 20 decreases in

selection. Preferred human three demonstrated 11 increases in selection and 24 decreases in

selection. Preferred toy one demonstrated zero increases in selection and 36 decreases in selection. Preferred toy two demonstrated one increase in selection and 32 decreases in selection. Preferred toy three demonstrated three increases in selection and 34 decreases in selection

Table 5 demonstrates the data of the non-preferred humans and sex toys (bottom three choices from each category) and the number of shifts (n = over 30%) that occurred per non preferred item. Non-preferred human 12 demonstrated seven increases in selection and one decrease in selection. Non-preferred human 11 demonstrated six increases in selection and one decrease in selection. Non-preferred human ten demonstrated 11 increases in selection and three decreases in selection. Non-preferred toy 12 demonstrated 46 increases in selection and one decrease in selection. Non-preferred toy 11 demonstrated 37 increase in selection and one decrease in selection. Non-preferred toy ten demonstrated 36 increases in selection and four decreases in selection.

Additional data (Table 9) that were observed from the third preference assessment were that one participant had a complete human hierarchy and five had a complete sex toy hierarchy. Concerning the most common first choice, 63% (n = 43) participants choose a human as their first choice. Likewise, 90% (n = 62) also chose humans as their last choice.

Monetary Discounting Task

The results of the MCQ for the present study were consistent to that of previous studies (Odum & Rainaud, 2003, Green & Myerson, 2013), in which results demonstrate that the larger the large-k values), the less steeply that the individuals discounted (i.e., the participants choose the delayed large amount over the immediate smaller amount). All tasks were broken down into small, medium and large k-values. All tasks can be explained as a smaller amount of money sooner or a larger amount of money after a delay. Upon entering all data in the MCQ and

identifying the *k*-values of each participant, a median split analysis was used to separate the

participants in high and low categories for each *k*-value.

Table 2 displays the data from the small-*k* task items. When looking at the column to the

left, the two sets of numbers that are present represent where the median is. The small-*k* value

median was set at .02. When looking at the frequencies section of the table, we see that the

majority of individuals (*n* = 35 out of 69; 50.7%) had small *k*-values from .00-.01. This

demonstrates that the majority of individuals within this group did discount steeply, meaning that

they chose the immediate reward (i.e., a smaller amount of money immediately) over the delayed

reward (i.e., a larger amount of money after a delay). The group that did not discount steeply was

comprised of 34 participants, or 49.3% of the group.

Table 3 displays the data from the large-*k* task items. When looking at the column to the

left, the two sets of numbers that are present represent where the median is. The large-*k* value

median was set at .0039. When looking at the frequencies section of table, we see that the

majority of individuals (*n* = 44 out of 69; 63.8%) had large *k*-values from .0039-.25. This

demonstrates that the majority of individuals within this group also did not discount steeply,

meaning that they choose the delayed reward (i.e., larger amount of money after a delay) over

the delayed reward (i.e., a smaller amount of money immediately). The group that did discount

more steeply was comprised of 25 participants, or 36.2% of the group.

Across large and medium *k*-value task items the majority participants typically chose the

delayed rewards (i.e., larger amount of money after a delay) over the immediate reward (i.e., a

smaller amount of money immediately). It should be noted that these numbers represent the

median or average scores of participants and we should remember, that the closer to 0 that a

person scores in discounting tasks, the more impulsive or more steeply they discount (Odum,

2011a). Although some participants fell into the group that did not discount steeply per the split

median, they may still have scores closer to zero (indicating steep discounting) than one

(indicating less steep discounting).

Sexual Stimuli Tasks

The delayed-time discounting task demonstrated one similar pattern across the majority

of participants. When the participants were presented with their least preferred person (persons

10-12 in their hierarchy) they always choose the sex toy, despite if it was a least preferred sex

toy. When the same participants were presented with their highest preferred person (persons 1-3

in their hierarchy) they always choose the person, despite it being paired with their most

preferred sex toy. Upon visual analysis of the automated scorer, participants would reliably

switch from the delay to the immediate choice at line 13 which is where the human partner went

from being a low preferred person (tenth in the person preference hierarchy) to a higher preferred

partner (3rd in the persons preference hierarchy). All tasks were further broken down in to small,

medium and large *k*-values. The tasks within the small-*k* group were tasks one through eight

(lower preferred people now or higher preferred toys with a delay). The tasks within the

medium-*k* group were tasks 9-16 (medium preferred people now or higher preferred toys with a

delay). Last, tasks within the high-*k* group were tasks 17-24 (higher preferred people now or

higher preferred toys with a delay). A median split analysis was used to separate the participants

in high and low categories for each *k*-value. Within each of the preceding tables results are

displayed by *k*-value (small, medium and large).

Table 6 displays the data from the small-*k* task items. When looking at the column to the

left, the two sets of numbers that are present that represent where the median is. The small-*k*

value median was set at .05. When looking at the frequencies section of table, we see that the

majority of individuals (*n* = 57 out of 69; 82.6%) had small *k*-values from .05-.12. This

demonstrates that the individuals within this group did not discount steeply. Instead, most of the

participants (*n* = 82.6%) choose the delayed rewards (sex toy) when presented with the human

(least preferred) or sex toys in this set of tasks.

Table 7 displays the data from the large-*k* task items. When looking at the column to the

left there are the two sets of numbers that are present that represent where the median is. The

large-*k* value median was set at .08. When looking at the frequencies section of the table, we see

that the majority of individuals (*n* = 37 out of 69; 53.6%) had *k*-values from .08. This

demonstrates that the individuals within this group did discount more steeply than the previous

groups. The majority of the participants (*n* = 53.6%) choose the immediate reward (higher

preferred person) when presented with the human (a higher preferred person) or sex toys in this

set of tasks.

Across small and medium *k*-value task items the majority participants typically chose the

delayed rewards (sex toy) over the immediate reward (a person). Data also demonstrate that as

the immediate reward or person became more preferred, that there was an obvious shift from

preference of a sex toy to preference of a human. From small-*k* to medium-*k* task groups the

delayed choice increased from 82.6% of participants choosing the delayed option to 97.1% of

participants choosing the delayed option. However, when presented with their most preferred

options, that percentage in which the participants choose the delayed option dropped to 36.6%.

Upon analysis of the risk probability discounting task (e.g., would you prefer this person

associated with a risk or your sex toy not associated with a risk), an overwhelming majority of

participants answered that they would never take a risk, even when associated with their most

preferred person (from the human preference assessment). Although there were some outliers

that did choose the risk of an STI when associated with a preferred person, this was not the

common answer from participants.

The majority of the participants ($n = 25$) reported having had sexual intercourse with five

or fewer individuals; however, five participants reported 40 or more previous partners, which is

substantially more and may have skewed the data. Most participants reportedly engaged in other

sexual behaviors with less than five people, similar to reported sexual intercourse partners. Some

participants reported that they used sex in relation to money ($n = 6$) or power ($n = 29$), meaning

they admitted to engaging sex to gain some form of monetary compensation or feeling of power

over their partner. The majority of participants ($n = 61$) reportedly used sex for love; although it

was not obvious if they meant to "make" people fall in love with you or because they were

already in love. The rest of the questions from the sexual risk survey surround various questions

associated with risk (answering yes would always be the riskier choice and answering no is the

safer choice). Concerning casual sex, participants answered yes to leaving social events with

someone they didn't arrive with ($n = 45$), having sexual intercourse with an acquaintance ($n =$

53), engaging in an unexpected sexual encounter ($n = 55$), having sex with uncommitted partners

($n = 47$), having sex with someone they didn't know very well ($n = 58$), having sex prior to

discussing risk factors ($n = 52$), having sex with someone who had many previous partners ($n =$

57), having sex with someone prior or being tested for STIs ($n = 50$), having sex with a partner

they do not trust ($n = 30$), and having sex with someone who was currently in a relationship with

someone else ($n = 42$). Other questions that were on the SRS consisted of specific sexual acts;

questions that participants answered yes to included having vagina sex without a condom ($n =$

69), having vaginal sex without a birth control method ($n = 64$), performing oral sex on a man

without a condom ($n = 70$), performing oral sex on a female without a condom ($n = 19$),

engaging in anal sex without a condom ($n = 47$), and engaging in anilingus without protection ($n = 22$).

When the SRS data was transformed to total risks per participant their scores ranged from 7 total risks to 34 total risks. Seven participants had a score of ten or less, thirty-five participants had total risks score of 11-20. Twenty-four participants received a total risk score of 21-30 and last, three participants had a total risk score of 32-34. From this data, a multiple regression was performed with the small and large k values from the sexual discounting with delays task.

Pearson Correlation

First, the MCQ and sexual discounting task with delays were analyzed via Pearson correlation to identify if there was a linear relationship between the various k-values (small-k/ large-k in monetary as well as in sexual discounting), these data are represented in Table 8. Upon review of Table 8 and the data, we can see that there were no statistically significant correlations between discounting values in money and sex. These are stand-alone commodities and there was no pattern in responding across the two.

Multiple Regression

A multiple regression analyses was conducted to evaluate how well sexual history may predict risky sexual behavior (i.e., steeper discounting). The predictors were total risks, number of sexual intercourse partners, and number of partners for other sexual acts. While small-k may identify a person, who chooses less risky behaviors and large-k may identify more risky behaviors, it is important to identify predictors to both populations. Meaning, are there certain behaviors that a less impulsive person will never engage in, while a more impulsive person will always engage in them?

Small-*k* Multiple Regression

The first multiple regression was conducted using the small-*k* as the dependent variable. The independent variables used the total risks per participants (derived from the SRS), number of sexual intercourse partners and number of partners for other sexual acts. The linear combination of the independent variables was not statistically significant, $F(3,65) = .520$, $p > .05$. The sample multiple correlation coefficient was .023, indicating only 2.3% of the variance in small-*k* can be accounted for by the linear combination of the independent variables.

Large-*k* Multiple Regression

The second multiple regression was conducted using the large-*k* as the dependent variable. The independent variables used the total risks per participants (derived from the SRS), number of sexual intercourse partners and number of partners for other sexual acts. The linear combination of the independent variables was not statistically significant, $F(3,65) = .915$, $p > .05$. The sample multiple correlation coefficient was .041, indicating only 4.1% of the variance in large-*k* can be accounted for by the linear combination of the independent variables.

Chapter Summary

Chapter 4 discussed the findings from the analysis of the data from the current study. Preference assessment data showed that significant decreases (30% or more) occurred in the preference humans and toys ranging from 20-34 participants having a decrease of 30% or more in their preferred preferences. Data also demonstrated that significant increases (30% or more) occurred in non-preferred toys in 36-47 participants. Finally, the data of the preference assessments also demonstrated that the majority of participants always choose the human preference as their first choice (n = 43) as well as their last choice (n = 62) when presented with the mixed commodities. Findings in the monetary discounting tasks were replicates of what has been demonstrated in the

past, most participants will choose the smaller sooner reward when the value is low (small-k) and

the larger later reward when the value is higher (large-k). However, this was not replicated in the

sexual discounting task. Within the sexual discounting task, the participants most likely choose

the larger later reward when the value was lower (a sex toy later over a non-preferred partner

immediately; small-k). However, when the value was higher (a higher preferred partner), the

participant would choose the sooner reward. When running a Pearson Correlation with the

monetary and sexual discounting tasks to identify a possible connection with behavior across the

two commodities, no correlation was identified. Using the SRS results and k-value, two separate

multiple regressions were completed, one used small-k as the dependent variable and the second

was large-k as the dependent variable. The independent variables were the same for both, which

were total risks, number of sexual intercourse partners and number of partners for other sexual

acts. Like the correlation, there was no statistical significance for any of the independent

variables, meaning, none were identified as predictors for the small or large-k. Finally, the risk

discounting task resulted in a unanimous outcome that none of the participants were willing to

accept a high or low preferred partner with the risk of an STI. Next, in Chapter 5, we will discuss

the limitations, and future research based on the results.

Chapter 5: Summary, Conclusions, and Recommendations

Results from the current study replicate and confirm much of what we already know concerning risky sexual behavior and the relation to other impulsive behaviors such as delay discounting of money (Bickel & Odum, 1999; Dixon et al., 2003; Jarmolowicz et al., 2013; Johnson & Bickel, 2002; Madden et al., 2003). More specifically, although women were the targeted population for this study, the results further confirm (across money, sex, and sex toys) that women devalue commodities less quickly which means that the delays to the preferred commodity ultimately do not matter. This could point in the direction of safe sex trainings being more effective in women as well as the replacement or substitute of a sex toy (i.e., in lieu of a risky sexual interaction) being more accepted.

Interpretation of Findings

The results from the current study also extend previous research by evaluating the likelihood an individual may select an alternative stimulus (e.g., sex toy) when presented with an associated delay or risk of sex with a potential partner. Jarmolowicz et al., (2015) suggested that women devalued sex less quickly than men, meaning that delays to access did not affect the value of sex as much for women as men. This is an important consideration and suggested that an evaluation of not only delay to sex, but the option of another stimulus in place of the delay may be important when providing alternative, safer options for sexual gratification, ultimately leading to supporting female sexual health and well-being. Additionally, by identifying relationships between specific demographics (e.g., age, religion) and histories of risky sexual behavior provides information to help better target and teach specific groups of women about sexual safety and education.

Data from Table 5 and Table 6 demonstrate the significant shifts in section (i.e., a higher choice dropping to a lower choice). What is interesting is that in the table for preferred people and sex toys we see a higher number of decreases in selection whereas in the non-preferred people and sex toys, we see a higher number of increases in selection. This is partially due to individuals decreasing their choice of people and instead choosing the sex toy during the third preference assessment. This information could provide evidence to if women will choose the safer option when presented with a risky sexual decision or the safer option of a sex toy. To further elaborate, this preference assessment had no associated risk and instead was just to develop a hierarchy of preferred and non-preferred people and sex toys. Several participants choose the safer option of the sex toy during the third preference assessment, which is supported by the significant number of shifts above 30%

The current study assessed the potential devaluation of sexual commodities (partner vs. toy) and the likelihood participants would substitute a toy for a partner based on delays or risks. The current results were consistent with previous research (Jarmolowicz et al., 2013), indicating that women may devalue commodities less rapidly than men. When presented with the MCQ the participants selected the delayed item (only within the small-k category did the participants choose the more immediate reward), which demonstrates less steep discounting. However, when participants were presented with the sexual discounting task with associated delays, there was a change in data the discounting, the participants only engaged in steep discounting during the large-k category (which included more preferred human sex partners). However, the current results were that, when presented with the "most" preferred partners, discounting or devaluing occurred more quickly than with lower preferred partners. This is important because it further supports the need for sexual education and awareness. If an individual is likely to engage in risky

sexual acts (i.e., hooking up with a person they do not know but are highly attracted to) it is important to provide training and education on the importance of birth control and other sexual protection such as male and female condoms.

While comparing the data of the sexual risk survey and the sexual discounting task, a fraction of the women who answered yes (i.e., that they have engaged in risky sex acts) to some of the riskier questions on the sexual risk survey still chose the delayed option of a sex toy versus immediate access to a partner. This is interesting because it contradicts what society assumes of an individual who engages in risky sex. The assumption would be that a person who admittedly engages in risky sex acts would also choose immediate access to a human sexual encounter over waiting for the use of a sex toy.

Some important findings of this study were that women who had fewer partners were more likely to choose the delayed item (i.e., the sex toy) over the immediate person. This could indicate that women who are less risky are either more cautious of sex or already have the knowledge of STIs and will choose the safer option (sex toy). Additionally, those who engage in riskier decisions are more likely to choose the immediate reward (for a highly preferred person) and this may leave them vulnerable to risk of STIs as well as other health concerns.

<center>**Recommendations**</center>

Limitations

Several limitations of this study should be considered when evaluating the data. First, the way in which the data were collected made identification of reason for variability hard. If there were less categorical data, the variability reasons may have been easier to identify.

Second, all participants did not have the same number of trials in the sexual partner preference assessment. Due to technology error, the participants who chose men or women only

(e.g., heterosexual or homosexual) were presented with 67 trials in the human pictorial preference assessment; whereas participants that chose both men and women (e.g., bisexual) were only presented with 50 trials. This error did not change the number of trials in the other preference assessments (e.g., sex toy and mixed); however, the preference hierarchies of the sexual partners for these participants may not have been as precise because there were some which were not paired with each other.

Third, due to error, values of each sex toy and participant were not done until the data analysis phase. All values were assigned in an arbitrary manner and it is possible that had the participants been presented with values of each person or sex toy, the results could have been different. Specifically, the values that were assigned to the participants are reflected of those described in Kirby Delay Discounting Questionnaire. More specifically, the monetary value listed in the Kirby Questionnaire was assigned to each participant and sex toy.

Last, limitation of this study was the lack of "not applicable" choices in the sexual risk questionnaire. For example, a person presented with "Have you ever had sex with a woman without a condom" may answer no due to never having had sex with a women period. However, it may be misleading to the analysis of the data by just accepting maybe the participant always uses condoms when engaging in sex with a female. A second concern with the sexual risk survey is the questions "have you ever used sex for love?" Participants may regard this question as: "do you have sex with those you are in love with and not the intended, or do you use sex to make people fall in love with you?".

Future research can be conducted in a variety of ways on this topic. First, it is suggested that this study be replicated with the addition of values being assigned to each individual and sex toy. This will give a more in depth look into actual discounting rates of individuals. Second,

future research should look more at the correlation between demographics (e.g., age, race, religion, socioeconomic status) and substance use (e.g., alcohol and drugs). A third future research idea is to better look at complimentary reinforcers and how they may be correlated to specific environments or situations (e.g., parties, first dates, in a bar). A fourth future research idea could be to consider the test-retest discussed in Odem (2011). By testing an individual and then retesting them at a different time we may be able to identify more substantially that discounting and impulsivity is a personality trait. This of course would lead to less confidentiality and possibly skew the data if returning participants were embarrassed by their answers. Additionally, if we find that this is a personality trait across multiple women (and multiple demographics) we may be able to biologically connect the trait across the entire gender. While this may seem impossible, it is quite the goal for women's health.

Directions for Future Research

One research could be to consider the taboo of sex toys and how likely it is that a woman may purchase and use one versus engaging in sexual acts with a man. This could be completed by participants completing a survey in which they identify the likelihood they would engage in purchasing a sex toy (from in store or online) as well as the likelihood they would use the sex toy.

A second more advanced research consideration would be to use this data and the data that was lost due to attrition (59 participants) to identify a better and more reliable way to conduct research concerning the subject of sex.

Finally, in the spirit of education and safe sex, an in-person training or workshop could be conducted. During the training, the participants would fill out their sexual risk survey and receive information pertaining to safe sex, as well as the variables associated with unsafe sex.

Based on this information, a follow up training would be conducted in which the participants would fill out a second sexual risk survey and the results would be compared to the initial submission (this would be considered a pre-test and posttest; however, it would consist of behavior pre-education on safe sex and behavior after). This data could demonstrate if the participants were able to retain and apply the information from the training to their real life (i.e., safer sex practices) and maintain it.

Finally, due to the most research focusing on the college population, a proactive intervention or a way to target this problem, is to bring back and enforce sex education in high school. If people are (as our data suggests) unwilling to engage in risky sexual acts (with potentially infected partners) that leads us to believe that the rationale behind engaging in the risky acts are due to not being educated on the subject of risks and the effects. By educating the female population early on, we may be able to avoid progression of STIs in the female college population.

Conclusion

Although there were several limitations within this study, it still presents some interesting evidence regarding how women value sex with partners and toys. Moreover, women that engage in riskier sexual behavior are more likely to engage in impulsive behavior (immediate sex with a person, regardless of risk).

To review the original research questions, let us refer back to the original hypothesis

Research Question1: Does the likelihood of an STI increase selections for sex devices over sex with a person?

$H_1$1: The likelihood of an STI does increase the selections for sex devices over sex with a person.

56 participants chose no risk (meaning they took the delay/ sex toy) for all trials even for most preferred humans. Of those that did choose a risk- the risk involved a higher preferred person with a low risk.

This suggests that people will not willingly engage in risky behaviors (even those who admit to engaging "risky" sexual behaviors identified in the SRS).

Research Question 2: Do delays have effects on how valuable sex with a person is?

$H_1 2$: Delays will increase the value of a preferred person

Results for this study were what has been displayed in past results and that is that women devalue less rapidly than men (meaning they will wait for the larger later reward and it does not lose value). What was demonstrated by the participants in this study (based on people being offered now or sex toy being offered with a delay) is that the delay did not affect the impulsive decisions. Instead, what was identified is that the option of the partner that the participant was offered was what affected the persons choice. Meaning, if it was a lower preferred person then a participant was more likely to wait the delay to have access to a sex toy (even if it was a lower preferred toy). However, if it was a highly preferred person, the participant would choose the immediate choice.

Research Question 3: Do factors such as sexual history and demographics make it possible to predict risky sexual choices?

$H_1 3$: Past sexual history and demographics do help predict how risky a person might be sexually.

Based on the data observed from participants, the only significant demographic was marital status does impact the "total risk" which suggests that demographics and past sexual

history actually does not predict risky sexual choices. Again, this supports that instead of

researching demographics or sexual risk, maybe the key component is situational.

Research Question 4: Can sex toys replace sex with humans (i.e., be substitutable)?

$H_1$4: Sex toys can replace sex with humans (i.e., be substitutable).
        While it cannot be definitively said that the sex toys can be substituted for sex with a

human, what can be said is that when a lower preferred person was offered, the sex toy was

reliably chosen. Meaning that the sex toy was a valid substitute for an orgasm over a non-

preferred person. However, when a highly preferred person was offered, the sex toy was not

chosen.

The results of this study demonstrate a variety of outcomes and directions. One being,

that we cannot target specific populations or past history to predict how a person will behavior

sexually. Instead, what should be focused on is that women are vulnerable in many ways and can

be impacted in several ways by an STI. That information alone should be used to target the

female (or those with female anatomy) population for education and support. These results

continue to support the notion that education and support regarding sexual health, risks, and

alternatives need to be promoted to the female community.

References

American Sexual Health Association. (2020). Women and STIs. Retrieved from

http://www.ashasexualhealth.org/sexual-health/womens-health/women-and-stis/ on

February 21, 2020.

Andakyan, L., Fyrling, M., & Benjamin, K. (2016). Further evaluation of the displacement of

leisure items by food during stimulus preference assessments with children with autism.

Journal of Developmental Physical Disabilities, 28, 461-467.

Anokhin, A., Grant, J., Mulligan, R., & Heath, A. (2014). The genetics of impulsivity: evidence

for heritability of delay discounting. *Biological Psychiatry*, 77(10), 887-994

Bickel, W., Jarmolowicz, D., Mueller, T., Koffarnus, M., & Gatchalian, K. (2012). Excessive

discounting of delayed reinforcers as a trans-disease process contributing to addiction and

other disease-related vulnerabilities: emerging evidence. *Pharmacology Therapy*, 134(2),

287-297.

Bickel, W., & Marsch, L. (2001). Toward a behavioral economic understanding of drug

dependence: delay discounting processes. *Addiction*, 96, 73-86.

Bickel, W., & Odum, A. (1999). Impulsivity and cigarette smoking: delay discounting in current,

never and ex-smokers. *Psychopharmacology*, 146, 447-454.

Blackely, E., & Schlinger, H. (1987). Rules: function-altering contingency-specifying stimuli.

The Behavior Analyst, 10(2), 183-187

Bojak, S., & Carr, J. (1999). On the displacement of leisure items by food preference during

multiple stimulus preference assessments. *Journal of Applied Behavior Analysis*, 32(4),

515-518.

Center for Disease Control and Prevention. (2017). STDs in women and infants. Retrieved from

    https://www.cdc.gov/std/stats17/womenandinf.htm on February 21, 2020.

Chappell, N., Graff, R., Libby, M., & Ahern, W. (2009). Further evaluations of the effects of

    motivating operations on preference assessment outcomes. *Research in Autism Spectrum*

    Disorders, 3, 660-669.

Cooper J. O., Heron T. E., & Heward, W. L. (2019. Applied behavior analysis (3rd ed.) Upper

    Saddle River, NJ: Pearson.

Crawford, L., Holloway, K., & Domjan, M. (1993a). The nature of sexual reinforcement.

    Journal of Experimental Behavior Analysis, 60(1), 55-66.

Crawford, L., Holloway, K., & Domjan, M. (1993b). Sexual approach conditioning: omission

    contingency tests. *Animal Leaning and Behavior*, 21(1), 42-50.

DeLamater, J. (1981). The social control of sexuality. *Annual Review Sociology*, 7, 263-290.

DeLeon, I., & Iwata, B. (1996). Evaluation of a multiple stimulus presentation format for

    assessing reinforcer preferences. *Journal of Applied Behavior Analysis*, 29(4), 519-533.

DeLeon, I., Iwata, B., & Roscoe, E. (1997). Displacement of leisure reinforcers by food during

    preference assessments. *Journal of Applied Behavior Analysis*, 30(3), 475-484.

Derby, K., Wacker, D., Andelman, M., Berg, W., Drew, J., Asmus, J., Prouty, A., & Laffery, P.

    (1995). Two measures of preference during forced-choice assessments. *Journal of*

    Applied Behavior analysis, 28(3), 345-346.

Dienlin, T., Masur, P., & Trepte, S. (2017). Reinforcement or displacement? The reciprocity of

    FtF, IM, SNS communication and their effects on loneliness and life satisfaction. *Journal*

    of computer Mediated Communication, 22(2), 71-87.

Dixon, M., Marley, J., & Jacobs, E. (2003). Delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis,* 36(4), 449-458.

Fagerstrom, A., Foxall, G., & Arntzen, E. (2010). Implications of motivating operation for the functional analysis of consumer choice. *Journal of Organizational Behavior Management*, 30, 110-126.

Fielder, R. L., Walsh, J. L., Carey, K. B., & Carey, M. P. (2014). Sexual hookups and adverse health outcomes: a longitudinal study of first-year college women. *Journal of sex research*, *51*(2), 131–144. https://doi.org/10.1080/00224499.2013.848255

Fisher, W., Piazza, C., Bowman, L., Hagopian, L., Owens, J., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for person with severe and profound disabilities. Journal of Applied Behavior Analysis, 25(2), 491-498.

Fisher, W. W., Piazza, C. C., & Roane, H. S. (2011). Handbook of applied behavior analysis. New York: Guilford Press.

Forhan, S., Gottlieb, S., Sternberg, M., Xu, F., Datta, D., McQuillan, G., Berman, S., & Markowitz, L. (2009). Prevalence of sexually transmitted infections among female adolescents aged 14 to 19 in the united states. Pediatrics, 124(6), 1505-1512.

Garnder, M., & Steinberg, L. (2005). Peer influence on risk taking, risk preference and risky decision making in adolescence and adulthood: an experimental study. *Developmental Psychology*, 41(4), 625-635.

Green, L., & Freed, D. E. (1993). The substitutability of reinforcers. *Journal of the Experimental Analysis of Behavior, 60*, 141–158. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1322151/

Green, L., & Myerson, J. (2013). How many impulsivities? A discounting perspective. *Journal of Experimental Analysis of Behavior*, 99(1), 3-13.

Holloway, K., & Domjan, M. (1993). Sexual approach conditioning: unconditioned stimulus factors. *Journal of Experimental Psychology*, 19(1), 38-46.

Jarmolowicz, D. P., Bickel, W. K., & Gatchalian, K. M. (2013). Alcohol-dependent individuals discount sex at higher rates than controls. *Drug and alcohol dependence*, *131*(3), 320–323.

Jarmolowicz, D. P., Landes, R. D., Christensen, D. R., Jones, B. A., Jackson, L., Yi, R., & Bickel, W. (2014). Discounting of money and sex: effects of commodity and temporal position in stimulant-dependent men and women. *Addictive behaviors*, *39*(11), 1652–1657. https://doi.org/10.1016/j.addbeh.2014.04.026

Jarmolowicz, D., Lemley, S., Asmussen, L., & Reed, D. (2015). Mr. right versus Mr. right now: A discounting-based approach to promiscuity. *Behavioral Process, 115*, 117-122.

Jarmolowicz, D., Lemley, S., Mateos, A., & Sofis, M. (2016). A multiple-stimulus-without-replacement assessment for sexual partners: purchase task validation. *Journal of Applied Behavior Analysis*, 49(3),

Johnson, M., & Bickel, W. (2002). Within-subject comparison of real and hypothetical money rewards in delay discounting. *Journal of Experimental Analysis of Behavior*, 77(2), 129-146.

Khoddam, R., & Leventhal, A. M. (2016). Alternative and complementary reinforcers as mechanisms linking adolescent conduct problems and substance use. *Experimental and clinical psychopharmacology*, *24*(5), 376–389. https://doi.org/10.1037/pha0000088

Koegel, R., Dyer, K., & Bell, L. (1987). The influence of children-preferred activities on autistic children social behavior. Journal of Applied Behavior Analysis, 20(3), 243-252.

Lanuza, E., Novejarque, A., Martinez-Ricos, J., Martinez- Hernandez, J., Augustin-Pavon, C., & Martinez-Garcia, F. (2008). Sexual pheromones and the evolution of the reward system of the brain. The chemosensory function of the amygdala. *Brain Research Bulletin*, 75, 460-466.

Laraway, S., Snycerski, S., Michael, J., & Poling, A. (2003). Motivating operants and terms to describe them: some further refinements. *Journal of Applied Behavior Analysis,* 36(3), 407-414.

Lee, J. O., Cho, J., Yoon, Y., Bello, M. S., Khoddam, R., & Leventhal, A. M. (2018). Developmental Pathways from Parental Socioeconomic Status to Adolescent Substance Use: Alternative and Complementary Reinforcement. *Journal of youth and adolescence*, *47*(2), 334–348. https://doi.org/10.1007/s10964-017-0790-5

Leech, K. (2020). Possible displacement of sexual interaction by sex toys: a study of preference Unpublished manuscript. Department of Psychology, The Chicago School of Professional Psychology, Chicago, Illinois.

Madden, G., Gegotka, A., Raiff, B., & Kastern, L. (2003). Delay discounting of real and hypothetical rewards. *Experimental and Clinical Psychopharmacology*, 11(2), 139-145.

Manson, S., McGee, G., Farmer-Dougan, V., & Risely, T. (1989). A practical strategy for ongoing reinforcer assessment. *Journal of Applied Behavior Analysis*. 22(2), 171-179.

McTiernan, A., Leader, G., Healy, O., & Mannion, A. (2011). Analysis of risk factors and early predictors of challenging behaviors for children with autism spectrum disorder. Unpublished manuscript. National University of Ireland, Galway.

Michael, J. (2000). Implications and refinements of the establishing operation concept. *Journal of Applied Behavior Analysis*, 33(4), 401-410.

Miguel, C. (2013). Jack Michael's motivation. *Analysis of Verbal Behavior*, 29(1), 3-11.

Odum, A. (2011a). Delay discounting: I'm a k, you're a k. *Journal of Experimental Behavior Analysis, 96*(3): 427-439.

Odum, A. (2011b). Delay discounting: trait variable? *Behavior Processes*, 87(1), 1-9.

Odum, A., & Rainaud, C. (2003). Discounting of delayed hypothetical money, alcohol and food. *Behavioral Processes*, 63, 305-313.

Pace, G., Ivancic, M., Edwards, G., Iwata, B., & Page, T. (1985). Assessment of stimulus preference and reinforcer value with profoundly retarded individuals. *Journal of Applied Behavior Analysis*, 18(3), 249-255.

Piazza, C., Fisher, W., Hagopian, L., Bowman, L., & Tolle, L. (1996). Using a choice assessment to predict reinforcer effectiveness. *Journal of Applied Behavior Analysis*, 29(1), 1-9.

Plaud, J., & Martini, J. (1999). The respondent conditioning of male sexual arousal. *Behavior Modification*, 23(2), 254-268.

Price, M., Pound, N., & Scott, I. (2014). Female economic dependence and the morality of promiscuity. *Sexual Behavior*, 43(7), 1289-1301

Reyes, J., Vollmer, T., & Hall, A. (2017). Comparison of arousal and preference assessment outomes for sex offenders with intellectual disabilities. *Journal of Applied Behavior Analysis*, 50(1), 27-37.

Richards, J., Zang, L., Mitchell, S., & de Wit, H. (1999). Delay or probability discounting in a

model of impulsive behavior: effect of alcohol. *Journal of Experimental Analysis of

Behavior*, 71(2), 121-143.

Roane, H., Vollmer, T., Ringdahl, J., & Marcus, B. (1998). Evaluation of a brief stimulus

preference assessment. *Journal of Applied Behavior Analysis*, 31(4), 605-620.

Roscoe, E., Iwata, B., & Kahng, S. (1999). Relative versus absolute reinforcement effects:

implications for preference assessments. *Journal of Applied Behavior Analysis*, 32(4),

479-493.

Smith, T. (2006). American sexual behavior: trends, socio-demographic differences and risk

behavior. *General Social Survey*, 25.

https://www.norc.org/PDFs/Publications/AmericanSexualBehavior2006.pdf

Turchik, J. A., & Garske, J. P., (2009). Measurement of sexual risk taking among college

students. *Arch. Sex. Behave*. 38, 936–948.

Weller, R., Cook, E., Avsar, K., & Cox, J. (2008). Obese women show greater delay discounting

that health-weight women. *Appetite*, 51, 563-569.

Williams, B. (1994). Conditioned reinforcement: experimental and theoretical issues. *The

Behavior Analyst*, 17(2), 261-285.

Windsor, J., Piche, L. M., & Locke, P. A. (1994). Preference testing: A comparison of two

presentation methods. *Research in Developmental Disabilities*, 15, 439–455.

Whitehouse, C., Vollmer, T., & Colbert, B. (2014). Evaluating the use of computerized stimulus

preference assessments in foster care. *Journal of Applied Behavior Analysis*, 47(3), 470-

484.

Tables

Table 1

Table 1 displays the results from the demographics survey based on answers from participants

that completed the study in its entirety

Demographics						
Gender	Female	Others				
	70	0				
Education	No diploma	Diploma or GED	Associates	Bachelors	Masters	Phd
	0	25	13	20	10	2
Religion	Agnostic	Atheist	Christianity	Neo-Paganism	Non-Religious	Other
	4	3	38	1	15	8
Last sexual interaction	n/a	>6mths	6mths-1yr	1-3 years	5>	
	0	63	3	1	3	
Last orgasm	n/a	>6mths	6mths-1yr	1-3 years	5>	
	0	69	1	0	0	
Marital status	Single	Married	Divorced			
	14	51	5			
Socio economic status	Lower	Working	Middle	Upper-Middle	Upper	
	2	24	35	7	2	
Age	18-27	28-37	38-47	48-57	58-67	
	11	41	13	4	1	

Table 2

Table 2 displays the results from the small k value for the monetary discounting task.

Monetary Discounting Small-k		
	Frequencies	Percent
.00-.01	35	50.7
.02-.25	34	49.3

Table 3

Table 3 displays the results from the large k value for the monetary discounting task.

Monetary Discounting Large-k		
	Frequencies	Percent
.00-.00	25	36.2
.0039-.25	44	63.8

Table 4

Table 4 displays the results regarding increases and decreases of selections of preferred humans

and toys from the first and second preference assessment to the third.

Preferred Humans and Toys Shifts: 30% or more		
	Increase	Decrease
Preferred Human 1	10	20
Preferred Human 2	12	20
Preferred Human 3	11	24
Preferred Toy 1	0	36
Preferred Toy 2	1	32
Preferred Toy 3	3	34

Table 5

Table 5 displays the results regarding increases and decreases of selections of preferred humans and toys from the first and second preference assessment to the third

Non-Preferred Humans and Toys Shifts: 30% or more		
	Increase	Decrease
Non-Preferred Human 12	7	1
Non-Preferred Human 11	6	1
Non-Preferred Human 10	11	3
Non-Preferred Toy 12	46	1
Non-Preferred Toy 11	37	1
Non-Preferred Toy 10	36	4

Table 6

Table 6 displays the results from the small k value for the sexual discounting task.

Sexual Discounting Small-k		
	Frequencies	Percent
.01-.03	12	17.4
.05-.12	57	82.6

Table 7

Table 7 displays the results from the large k value for the sexual discounting task.

Sexual Discounting Large-k		
	Frequencies	Percent
.08-.08	37	53.6
.09-.56	32	46.6

Table 8

Table 8 displays the results from the analysis of the MCQ and sexual discounting tasks using the

Pearson Correlation

Correlation Between MCQ and Sexual Tasks	
	Pearson Correlation
small-k MCQ/ small-k Sexual Tasks	*0*
small-k MCQ/ large-k Sexual Tasks	*0.19*
large-k MCQ/small-k Sexual Tasks	*0.085*
large-k MCQ/large-k Sexual Tasks	*-0.009*

*all correlations were significant at "at least .05"

Table 9

Table 9 displays results from the third preference assessment

Third Preference Assessment		
	Number	Percentage
Only Human	*1*	*>1%*
Only Sex Toys	*5*	*>1%*
Human as first choice	*43*	*63%*
Sex toy as first choice	*26*	*38%*
Human as last choice	*62*	*90%*
Sex toy as last choice	*7*	*10%*

ProQuest Number: 28261070

ProQuest

ProQuest 28261070

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346