TEMPORAL SEXUAL DISCOUNTING IN RISK BEHAVIOR IN YOUNG PEOPLE

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Abstract

The purpose of this research is analyzing the sexual discount in risky sexual behavior among young men and women. A condom sexual discounting task was administered with three hypothetical assumptions, as well as a questionnaire to identify your risky sexual behavior in 360 youths, men and women between 16 and 33 years old from Mexico. Men have a shorter delay in hours, days and months to have sexual activity without the use of a condom compared with women. For men sexual discount is indifferent to their risky sexual behavior. The women showed differences in condom use and the number of sexual partners, in two of the three delay conditions. These results may contribute to the understanding of sexual discount for interventions that promote an increase in condom use in young people.

KEY WORDS: *delay discounting, condom use, sexual risk-taking, behavioural economics*.

Resumen

El propósito de la presente investigación es analizar el descuento temporal sexual en la conducta sexual de riesgo entre hombres y mujeres jóvenes. Se administró la tarea de descuento temporal sexual del uso de condón con tres supuestos hipotéticos, así como un cuestionario para identificar su comportamiento sexual de riesgo a 360 jóvenes, hombres y mujeres entre 16 y 33 años de edad de México. Los resultados obtenidos indican adecuadas propiedades psicométricas en a tarea de descuento sexual. Los hombres tienen una menor demora en horas, días y meses para tener actividad sexual sin el uso de condón en comparación con las mujeres. Para los hombres parece que el descuento sexual es indiferente en su conducta sexual de riesgo. Las mujeres mostraron diferencias en el uso del condón y en el número de parejas sexuales, en dos de los tres tiempos de demora. Se espera contribuir en la comprensión del descuento sexual para el desarrollo de intervenciones que promuevan un incremento del uso consistente del condón en jóvenes.

PALABRAS CLAVE: *descuento temporal, uso de condón, conducta sexual de riesgo, economía conductual*.

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Introduction

The inconsistent use of the male condom is considered as a sexual risk (Palacios et al., 2007) and it constitutes a public health, that to a high degree leads to sexually transmitted diseases (STDs), and the unexpected pregnancies (Saura et al., 2019). Antecedent models have been proposed (Albarracín et al., 2001; Bandura, 2001; Fishbein, 2000; Palacios, 2019; Parsons et al., 2000; Xu et al., 2017) with the purpuse of reducing the incidente of STDs using the condom. Recently as part of the decisicion making process, the delay discounting is directly associated with the behavioral sexual risk, with a tendency to choose short term rewards despite possible long-term consequences (Herrmann et al., 2015), for this reason, delay discounting provides a useful framework for describing risky sexual behavior and decision-making, as it suggests that delaying is consequencial because it diminishes its value or has an impact on behavior (Odum, 2011).

The temporal discounting is known as the preference of a smaller but immediate gratification to a greater but delayed gratification (Gutnik et al., 2006). This mechanism in preference to immediate gratification prevents a person from evaluating possible losses. For example, a young man may prefer to have sex without a condom because it is more pleasurable (Palacios, 2019), completely ignoring the risk that this entails in the future, be it an STI or an unwanted pregnancy (Cruz et al., 2015). For this reason, the temporal discounting can be incorporated into risky sexual behavior (Johnson & Bruner, 2012).

Traditionally, temporal discounting tasks consist of letting people repeatedly choose between two rewards, the immediate one being smaller than the later one, with larger rewards (Kahneman, 2003; Kahneman & Tversky, 1979; Lawyer et al., 2010; Takahashi, 2009). These tasks are carried out with monetary (McClure et al. 2007; Thaler, 2016) and hypothetical (Johnson & Bickel, 2002; Lawyer et al., 2010) decision bases (Slovic et al. 2004) to analyze decision making. Monetary discount tasks have been used to evaluate financial behavior (Jones et al., 2018) and the use of hypothetical monetary rewards is more used due to the difficulties that a real reward entails (Johnson & Bickel, 2002).

Monetary discount tasks have been applied in a variety of aspects related to health options, such as the consumption of addictive substances (Bickel et al., 2014; MacKillop et al., 2011). Temporal discounting tasks has contributed to understanding the profile of people with alcohol use disorders. This approach reveals that addiction results from an inability to delay the gratification (assessed through temporal discounting) (Bickel et al., 2014; MacKillop, 2016). For example, it has been found that people who have some type of addiction have a higher temporaral discount (Noda et al., 2020), except marijuana users, who demonstrates a temporal discounting equal to that of the control group (Johnson et al., 2010).

It is worth mentioning that the rates that evaluates the choice of non-tangible rewards, such as vignettes of hypothetical situations, could help predict other types of tasks with hypothetical rewards or losses (Weatherly et al., 2010). For this

reason, economic discount rates are related to discount rates on consumables (alcohol or food), but they do not help predict the sexual discount rate because the rewards are not tangible. However, in a temporal discounting task where both monetary and sexual rewards were studied, no difference was found between them, suggesting that temporal discounting may have a specific domain (Dariotis & Johnson, 2015). Recently, the delay discount paradigm has been extended to risky sexual behavior (Hahn et al., 2019; Herrmann et al., 2015; Jarmolowicz et al., 2015). In the first instance, studies have been conducted proposes that the temporal discount may be relevant in sexual situations where a condom may not be available and an individual can choose between having sexual relations immediately without a condom or waiting to have sexual activity later with a condom (Johnson et al., 2016). One research on sexual discounting task conducted in 2012 by Johnson and Brunner, in 62 cocaine-addicted individuals, indicated that participants preferred unprotected sex with people they found most attractive and with whom they most wanted to have sex. Similarly, they reported a greater preference to unprotected sex with people who reported less probability of having an STD.

Delay discounting has been evaluated in previous studies using sexual temporal discounting tasks (Dariotis & Johnson, 2015; Johnson & Bruner, 2013; Johnson et al., 2015). The discount task for sexual delay was developed to evaluate the influence of delay in the options related to the use of condoms, as well as the probability of acquiring an STD in ocasions of casual sexual relations. Studies that have used this task (Collado et al., 2017; Herrmann et al., 2014), indicated that condom use was less likely as delay in availability of condoms increased. Other studies have found that the availability of a condom affected participants' temporal discount rates during the sexual intercourse (Berry et al., 2019; Hahn et al., 2019; Lemley et al., 2018). Regarding the differences between men and women, it was found that men are more likely to temporarily discount than women (Johnson & Bruner, 2013; Wilson & Daly, 2004; Sweeney et al., 2020).

On the other hand, in Mexico, the temporal discounting has been shown to be an effective strategy to study impulsive behavior, since it analyzes how a reward loses subjective value as delivery is delayed (López-Montoya et al., 2016). In our context, temporal discounting tasks have been carried out in people who manifests some kind of addiction. In the present studies, a greater temporary economic discount was demonstrated among those who used cocaine (Cruz et al., 2015). Likewise, in another study (González et al., 2015), greater discount was found in the reward where the same economic amount was offered in consumable value, for example a bottle of "Ron" with value of $500 vs. $500 pesos MX (24.70 USD; 20.5 EUR).

Currently, research on the temporal discounting in sexual behavior at the international level is limited and in Mexico it is almost none. In our country there is evidence on temporal discounting tasks in addictions, however, there is a lack of measurements that incorporate sexual discounting tasks and their relationship with

risky sexual behaviors. In this regard, because of the ability to delay gratification is known to be crucial for exercising self-control (Price et al., 2016), we believe that a temporal discounting task where hypothetical situations are applied will help predict the sexual discount rate among the mexican youth, since there is no systematic empirical evidence of any difference between how subjects discount hypothetical rewards and real rewards (Bickel et al., 2009; Johnson et al., 2002; Lagorio & Madden, 2005). Knowledge about sexual discounting is relevant because the behavioral result has a direct impact on the acquisition of an STD. Likewise, the measurement of the temporal discounting will help predict public health problems (Lawyer et al., 2010), adjusted to our sociocultural context (Palacios & Martínez, 2017). Temporal discounting is a useful task to identify people who are more likely to engage in risky sex and, to the extent that temporal discounting is modifiable, it could be used to conduct behavioral interventions to reduce the possibility of acquiring STDs (Jones et al., 2018).

The results of this research will provide evidence about sexual behavior that follows a temporal discounting model. Therefore, the objective of this research is to analyze the sexual tempora discounting in risky sexual behavior among young men and women. This study is one of the first to research on sexual discounting in Mexico and also in Latin America. Finally, due to the fact that the sexual discount task does not have background on reliability and validity in our country, it is established as a secondary objective to analyze these psychometric properties.

It is proposed as a hypothesis that young people who present a lower sexual delay will have a higher frequency of sexual relations, a greater number of partners and less condom use in sexual relations among men and women. In addition, guided by what was found in previous studies (Collado et al., 2017; Dariotis & Johnson, 2015), men will have a shorter delay in the sexual discounting task in the decision to use a condom in sexual relations compared to women.

Method

Participants

In the calculation of the sample size, a total population of 900 university students registered during 2020 was considered. A prevalence of 50 % of risky behavior was evaluated (Palacios, Bravo & Andrade, 2007), a confidence interval of 95 % with an error of 5 %, which resulted in a sample of 270 participants. From this data, an intentional non-probabilistic sampling of 360 young people was used, 20.8% men and 79.2% women, with an age range between 16 and 33 years and a mean of 20.39 years (SD= 2.5). The 55.2% are from Chiapas state, 30.9% are from Querétaro City, 3.3% from Mexico City, 3.1% from the State of Mexico, 1.7% Guanajuato, 1.4% Puebla and the remaining 4.4% are made up of participants from different states of the country (Jalisco, Oaxaca, Morelia, Hidalgo, Torreón and Mérida). The 48.3% reported having a partner, of these, 41.9% are

dating, 1.4% are open, 2.2% are married and 3.1% are in a free union. Pregnant students or those who reported any mental health condition were excluded.

Instruments

a) *Risky sexual behavior*. The age of onset sexual activity, the frequency of sexual intercourse and the number of sexual partners in a lifetime were asked. The measurement made has been used previously in studies on Mexican samples (Palacios et al., 2007; Palacios & Álvarez, 2018).
b) *Condom use.* The consistency of the use of the male condom in any type of sexual intercourse (vaginal, anal or oral) on a regular basis during their sexual life was determined, a Likert scale of five response levels (Never to always), derived from scales validated in population Mexican (Palacios & Ortego, 2020).
c) *Sexual Discounting Task*. We administered the delayed sexual discounting task through three hypothetical situations, due to its easy replication from the version used by other authors (Herrmann et al. 2014; Johnson et al., 2015). Participants were provided with the following instructions:

For this task, a series of hypothetical situations will be shown, we ask that in these situations you consider that you are single and available, in addition to the fact that the possibility of a pregnancy is null.

Now imagine that you meet a person in a bar; his personality is pleasant, he makes you laugh, he makes you feel comfortable, he seems attractive to you, there is a good connection between the two and you come to the conclusion that you like that person. The person invites you to his house to continue getting to know each other and you notice that his attitude is seductive, he gets closer to you and gives you all the signs that he wants to have sex with you. You stopped and told the person that you want to use a condom to have sex, he/she tells you that at the moment he/she doesn't have a condom. In this situation, how long would you wait until you get a condom to have sex with him/her?

For each of the hypothetical situations, the young people had to decide between having sexual activity immediately without a condom and not having sex with that person. Five response alternatives were provided in ascending order on a Likert-type scale: *5) I would have sex immediately without a condom, 4) I would wait up to 1 hour to get a condom and have sex with that person, 3) I would wait up to 3 hours to get a condom and have sex with that person, 2) wait up to 6 hours to get a condom and have sex with that person, and 1) decide not to have sex with that person.*

For the following two hypothetical assumptions of sexual temporal discount, variations were made from the initial task presented. For these two tasks, delays were shown in ascending order of days (*immediately, 1 day, 3 days, 6 days, no sexual activity*) and months (*immediately, 1 month, 3 months, 6 months, no sexual activity*).

Procedure

It is a non-experimental cross-sectional and descriptive research design. The information was obtained over two months, a period during which the investigation was carried out. Data collection was carried out by adapting the instrument to *Google digital form* that was shared via social networks, with an approximate response time of 20 minutes. In the form, it was explained to them that the questionnaire was to find out some personal and sexual health characteristics and they were asked to answer honestly, since their answers would be used for research purposes.

The informed consent of the participants was used. The research protocol was established in accordance with the Regulation of the General Health Law, in its section on research in human beings (Secretaria de Salud, 2011). Likewise, the work protocol is registered with the Research Committee of the Universidad del Valle de México, Querétaro campus, with the registration number CSUVM01I2018.

Data analysis

Descriptive statistics (proportions, measures of central tendency and dispersion) were used according to the type of distribution, to summarize the information on sexual behavior. Internal consistency was calculated using the Cronbach's Alpha. In addition, comparisons were made with the Mann-Whitney U test to identify the sexual discounting task between men and women. It was considered to use each delay (hours, days, months) separately. Finally, a nonparametric analysis of variance (Kruskal-Wallis) was performed to compare the sexual discount task for men and women by frequency of intercourse, male condom use, and number of sexual partners. Comparisons made with *p* values < .05 were considered significant differences.

Results

Regarding the sexual behavior of the studied sample, the results showed that the age of onset of sexual activity was an average of 16.93 years old (*SD*=1.8), 69.4% of the young people reported having had sexual relations in their life and 79.3% of them reported having them with their boyfriend/girlfriend, followed by 11.6% who reported having them with an occasional partner, and to a lesser extent with an acquaintance (4.0%), spouse (2.8%) and friend (2.4%).

Regarding frequency, 39.8% reported having sex once or twice a month, followed by 21.1% who reported having them once or twice a week, 17.1% once or twice every fifteen days, 16.7% reported that they only had sex once and lastly, 5.2% reported having sex daily or almost daily. The average number of sexual partners was 4.97 (*SD*=6.9), with a median of 3.00 (range 1-55). The type of sexual intercourse was mostly vaginal and oral (55.4%), only vaginal (23.5%),

vaginal, anal and oral (15.5%), oral and anal (2.8%), only oral (1.6%), vaginal and anal (0.8%) as well as only anal (0.4%). Regarding condom use, the subjects used it always (39.0%), most of the time (31.1%), sometimes (14.3%), almost never (8.0%) and never (7.6%).

Table 1 shows the percentage for the three delay times, where it is observed that for the delay in hours, 24.2% would wait 1 hour to have sexual activity. As for the days, 27.5% would wait 6 days and 18.3% would take 1 day. Finally, when analyzing the discount in months, it was found that 27.8% would wait 6 months and 15.8% would wait only 1 month. As for the young people who decided to have immediate sexual relations without a condom available, its evident that the highest percentage (4.2%) is located in waiting for months. Within these results, it stands out that as the waiting time increases in hours, days or months, the percentage of young people who choose to have sexual activity immediately and without a condom also increases.

In order to obtain evidence of reliability of the sexual discounting task, Cronbach's alpha reliability was analyzed. The results showed an internal consistency index of .74 (95% CI= .69-.78). Regarding the criterion validity of the sexual discounting task, comparisons were made between men and women, as well as with three sexual risk behaviors differentiated between men and women.

Table 1
Percentage distribution in the sexual temporal discounting task

Sexual temporal discounting	Delay times of the three tasks		
	Hours	Days	Months
No sexual intercourse	60.0	41.0	48.6
Delay in 6 hours	8.3	27.5	27.8
Delay in 3 hours	5.0	8.9	3.6
Delay in 1 hour	24.2	18.3	15.8
Immmediate sexual intercourse	2.5	3.9	4.2

Table 2 shows significant estatistic diferences between men and women in the temporal discounting ($p < .05$). Its observable that men have a shorter delay in hours (Mann-Whitney U test= 6777.00, Z= -5.56, $p < .001$), days (Mann-Whitney U test= 6240.50, Z= -5.84, $p < .001$) and months (Mann-Whitney U test= 8124.50, Z= -3.44, $p < .01$) compared to women.

Regarding the differences in the sexual discounting in the three types of delay (hours, days and months) and the pattern of sexual behavior analyzed in men; the data did not show significant differences for any of these conditions (Table 3). *Delay in hours:* frequency of sexual intercourse (χ^2 [4, n= 75]= 3.234, p= .52), condom use (χ^2 [4, n= 75]= 2.266, p= .68), as well as the number of sexual partners (χ^2 [4, n= 75]= 1.739, p= .78). *Delay in days:* frequency of intercourse (χ^2 [4, n= 75]= .719, p= .94), condom use (χ^2 [4, n= 75]= 3.383, p= .49) and the number of sexual partners (χ^2 [4, n= 75]= 1.093, p= .89). *Delay in months:*

frequency of sexual intercourse (χ^2 [4, *n*= 75]= 7.936, *p*= .16), condom use (χ^2 [4, *n*= 75]= 7.582, *p*= .18), in addition to the number of sexual partners (χ^2 [4, *n*= 75]= 1.144, *p*= .95).

Table 2
Differences in the sexual temporal discounting in men and women

Sexual temporal discounting	Men (*n*= 75)			Women (*n*= 285)		
	M	*DT*	*Mdn*	*M*	*DT*	*Mdn*
Hours	3.22	1.3	3.00	4.19	1.2	1.00
Days	3.14	1.1	3.00	4.02	1.2	2.00
Months	4.53	1.5	2.00	4.97	1.4	1.00

When analyzing the differences in the sexual discount in the three delays (hours, days and months) in women (Table 4). The data showed significant differences for the *delay in hours*, in condom use (χ^2 [4, *n*= 285]= 9.693, *p*= .04) and the number of sexual partners (χ^2 [4, *n*= 285]= 10.226, *p*= .03). Not so for the frequency of sexual intercourse (χ^2 [4, *n*= 285]= 3.210, *p*= .52).

Table 3
Differences in the sexual temporal discounting for sexual behavior in men

Temporal discounting / Sexual behavior	No sexual intercourse		Delay 6ours		Delay 3 hours		Delay 1hour		Immediate sexual intercourse	
	Mdn	M	Mdn	M	Mdn	M	Mdn	M	Mdn	M
Hours										
Frequency	2.00	32.26	2.00	31.50	2.50	33.94	2.00	25.94	3.00	40.50
Condom	4.00	28.82	5.00	33.07	5.00	36.31	4.00	27.66	4.50	33.25
Couples	4.00	31.82	3.00	26.29	2.50	24.75	5.00	32.38	15.50	32.50
Days										
Frequency	2.00	33.70	2.00	29.84	2.50	30.56	2.00	28.19	3.00	34.50
Condom	4.00	30.80	4.00	28.10	5.00	39.38	4.00	28.39	4.00	29.17
Couples	4.00	26.90	3.00	31.02	3.00	27.50	5.00	31.03	10.00	38.00
Months										
Frequency	3.00	37.96	2.00	27.97	3.00	36.50	1.50	13.75	2.50	29.63
Condom	5.00	31.62	4.00	28.02	5.00	45.50	500	45.50	4.00	23.75
Couples	3.00	30.15	3.00	29.34	5.00	32.25	3.00	29.25	8.00	38.75

In respect to the *delay in days*, differences were identified in condom use (χ^2 [4, *n*= 285]= 9.905, *p*= .04), but not for the frequency of sexual intercourse (χ^2 [4, *n*= 285]= 7.974, *p*= .09) and the number of sexual partners (χ^2 [4, *n*= 285]= 8.058, *p*= .08). Finally, for the *delay in months*: no differences were found in risky sexual behavior in the frequency of sexual intercourse (χ^2 [4, *n*= 75]= 2.407, *p*= .79), condom use (χ^2 [4, *n*= 75]= 8.824, *p*= .11) and the number of sexual partners (χ^2 [4, *n*= 75]= 9.981, *p*= .07).

Table 4
Differences in the sexual temporal discounting for sexual behavior in women

Temporal discounting / Sexual behavior	No sexual intercourse		Delay 6ours		Delay 3 hours		Delay 1hour		Immediate sexual intercourse	
	Mdn	M	Mdn	M	Mdn	M	Mdn	M	Mdn	M
Hours										
Frequency	2.00	91.79	2.50	100.63	2.00	91.90	2.50	107.82	2.00	90.08
Condom	4.00	101.33	4.00	102.95	5.00	132.10	4.00	82.83	3.00	57.58
Couples	2.00	88.72	3.00	95.08	3.00	98.10	4.00	112.35	5.50	140.92
Days										
Frequency	2.00	85.89	3.00	104.31	2.00	93.72	3.00	113.12	2.00	85.19
Condom	4.00	100.05	4.00	105.99	4.00	99.44	4.00	82.16	2.50	52.88
Couples	2.00	87.63	3.00	100.68	2.00	89.89	3.00	107.09	5.00	133.67
Months										
Frequency	2.00	91.31	2.00	101.36	2.00	96.86	2.00	107.69	2.00	90.67
Condom	4.00	97.85	4.00	107.68	4.00	109.18	4.00	83.42	3.00	64.50
Couples	2.00	88.82	2.00	92.22	3.00	102.68	4.50	128.39	5.00	117.00

Discussion

The casual sexual relationship is common among young people (Palacios et al., 2007; Lemley et al., 2018), this risky practice exposes them to a higher proportion of STDs and unplanned pregnancies (Saura et al., 2019). In the sample studied, the mean age of onset of active sexual life was 16.93 years old, slightly higher than other national studies (Palacios et al., 2007; Palacios & Álvarez, 2018; Palacios & Ortego, 2020) where the mean is 15 years of age. Likewise, the studied sample reported having sexual intercourse once or twice each month, consistent with what was reported by the same authors.

The mean number of sexual partners of the reserched sample was 4.97, with a median of 3 partners, similar to what was found by other authors (Lemley et al., 2018; Palacios, 2019; Palacios & Álvarez, 2018), however, Palacios et al., 2007, found a mean of 1.67 sexual partners. In contrast, Jarmolowicz et al., 2015 and Sweeney et al., 2020 found a mean of 4.09 and 6.00 sexual couples, respectively. Regarding condom use, only 39% of the studied sample always used a condom, consistent with the results of Mexican authors (Palacios, 2019; Palacios et al., 2007; Palacios & Álvarez, 2018) who report rates of consistent use of condom between 27.8% and 42.3%.

Regarding the evidence of validity of the sexual discounting task used in the present study, two aspects of it were evaluated. In the first place, the content validity was conformed by three times of delay to use a condom (hours, days and months), through hypothetical assumptions (Bickel et al., 2009; Johnson & Bickel, 2002; Johnson et al., 2016; Lawyer et al., 2010) that allows young people to decide whether to have sex immediately without a condom or wait to get a condom before having sex, making the sexual discounting task an easy assessment to replicate (Johnson & Brunner, 2012; Sweeney et al., 2020; Wilson & Daly, 2004). Based on this proposal, it is considered that the measurement of the sexual discounting task is consistent with what has been previously reported (Collado et

al., 2017; Dariotis & Johnson, 2015; Herrmann et al., 2014; Herrmann et al., 2015; Johnson & Bruner, 2012, 2013). The evidence found suggests that the application for the first time of a delayed discount task to use a condom in young people from Latin America and specifically in the mexican context is a success, since it can be incorporated as a factor to understand risky sexual behavior in adolescents. Implementing the temporal discounting task for condom use in young Mexicans provides cultural relevance (Palacios and Martinez, 2017) of measurements made in other contexts.

For the validity referred to a criterion of the task proposed in this study, two procedures were established, the first was through the differences in sexual discount between men and women. The data found suggests that men report shorter delays in having sexual intercourse, even without a condom. The difference in discount for delay between men and women corroborates what was found in several studies on sexual discount (Collado et al., 2017; Johnson & Bruner, 2013; Sweeney et al., 2020; Wilson & Daly, 2004), confirming the hypothesis propoused, which maintains that men discount more than women, granting criterion validity to the measure used in this research. The second was through risky sexual behavior (frequency, condom use and number of sexual partners) carried out by young people. The evidence found in the sexual discounting task and the differences in risky sexual behavior reported here show inconsistent results.

In the case of men, it seems that the sexual discount is invariant in risky sexual behavior, both for frequency, condom use and sexual partners in the three moments of delay; although there is a trend for the number of sexual partners (the shorter the delay, the greater the number of sexual partners). The explanation is that, men are indifferent to delay and the value they assign to a reinforcer is the same regardless of delivery times. In the present study there may be cases of men who did not discount the value of the reinforcement depending on its delay, that is; there are men who have a non-systematic discount (González et al., 2015). To address this inconsistency, we propose that future studies should include different delay times, perhaps with immediate reinforcers. In addition, it may be necessary to look for alternative measurements or to carry out statistical analysis excluding those who under this hypothetical assumption decided not to have sexual relations.

In reference to sexual discounting in women, our data replicated the findings reported by previous studies (Collado et al., 2017; Dariotis & Johnson, 2015; Herrmann et al., 2014; Herrmann et al., 2015; Jarmolowicz et al., 2015; Johnson & Bruner, 2012, 2013; Sweeney et al., 2020) corroborating two risky sexual behaviors (condom use and number of sexual partners) in two of the three delay times. The evidence indicates that in the sexual discount in hours, those who decided to have immediate relations under the hypothetical assumption, are those who use a condom sometimes; in a similar way with some authors (Herrmann et al., 2014; Johnson et al., 2015), who found it in women who have unprotected sexual intercourse, with a high risk of contracting an STD. It seems that this same group of women, and even those who almost never use a condom in their sexual

relations, decide to choose immediate reinforcers, that is; when the magnitude of the reinforcer is small. The foregoing seems to indicate that the sexual discount task is sensitive to the delay times for having sexual relations with a condom. This suggests that discounting for delay of condom-protected sex acts as a factor in risky sexual behavior among young people (Dariotis & Johnson, 2015; Johnson & Bruner, 2012, 2013). When the rate of temporal discounting was compared with reinforcers of greater magnitude (delay in months), the findings seem to indicate that sexual discounting does not clearly explain the trend of risky sexual behavior, similarly for the case of men, it is that is, the frequency of intercourse is indifferent to the reinforcement shown.

The women who mentioned having a greater number of sexual partners seem to choose rewards without delay (having immediate intercourse, without a condom in between), when the waiting time is in hours, with a similar trend when the delay is in days or in months, although the latter did not show to be statistically significant. These findings are similar to previous studies (Jarmolowicz et al., 2015; Johnson & Bruner, 2012, 2013; Lemley et al., 2018) that indicate that the greater the promiscuity, the greater the temporal discount.

As can be seen in the evidence shown, the proposed hypothesis that supports that a shorter sexual delay will have a higher frequency of sexual intercourse, a greater number of partners and less condom use in sexual intercourse, is partially supported in our data, particularly in the results found with men. For women, the results are consistent with the postulated hypothesis. In the case of the frequency of sexual intercourse, for both men and women, no difference was found between the times of delay delivered, so the null hypothesis is maintained. Future studies may confirm how delay discounting is relevant to understanding risky sexual behavior.

The study had some limitations to consider. The first refers to the number of men who participated in the selected sample, since it is small (75 young people) considering the cities included in the research, so future studies it will have to be expanded. Based on the sample size obtained, it therefore seems appropriate that, in order to corroborate the results, the study should be replicated in larger samples from different cities. Based on this limitation, the results could be considered as preliminary. The second limitation is perhaps the most important to discuss and corresponds to the sexual discounting task used in the study. Within the options of delay to choose, the option of not having sexual intercourse was included as part of the task, this incorporation does not seem to work as an option within the sexual discount, since it showed inconsistencies (non-systematic values in men). For future studies we propose to eliminate this option to have a better evaluation of the temporal discounting. The following limitation was the writing of hypothetical situations of delay in months, since it is not consistent with the frequency of sexual intercourse reported by the sample, which is twice a month or every week. We consider it a better option to replace the delay time in months with the delay time in minutes, in this way you could have the choice to have unprotected sex immediately or wait 5, 10, 30 or 60 minutes until you have a condom. Therefore,

criteria could be adapted to such tasks, which would improve the internal validity of the research that uses this measure (Lawyer et al., 2010). Another possibility is to include a question that makes it possible to assess whether the participant has had sexual relations of the type proposed in the discounting task in the past, and if so, what decision did they choose? The answer options for this question could be: 1) Have intercourse immediately without a condom, 2) seek a condom and have intercourse once obtained, 3) have intercourse if it was not achieved, or 4) do not have intercourse if it was not achieved. Inquiring about past behavior will help reduce the distance with the hypothetical assumption raised and make the situation closer, based on its previous behavior. On the other hand, since the sexual discounting task is a self-report, it is possible that there is a social desirability bias, so there may be an underreporting in the levels of delay reported by the participants.

Among the strengths of the research, we can mention that it is the first study with these characteristics carried out in Mexico and Latin America on a sexual temporal discounting task and its link with risky sexual behavior in young people, which also used valid, reliable tasks and adapted to our socio-culture to determine the delayed sexual discount. The findings found provide evidence to previous studies (Collado et al., 2017; Dariotis and Johnson, 2015; Herrmann et al., 2014; Herrmann et al., 2015; Jarmolowicz et al., 2015; Johnson & Bruner, 2012, 2013; Sweeney et al., 2020), obtaining results similar to those reported here. The relevance of this research is based in demonstrating that the sexual discounting is an alternative that complements behavioral change theories (Albarracín et al., 2001; Bandura, 2001; Fishbein, 2000; Parsons et al., 2000; Xu et al., 2017), so it could be considered to explain condom use and the number of sexual partners as sexual risk behaviors. The findings are useful as preliminary results; however, they would be debatable if it is intended to be generalized to the juvenile population. In any case, the results obtained must be taken with caution.

As a line of research to follow, we will analyze in depth the application of the temporal discount with sexual behavior, we will seek not only to investigate the temporal discount, but also to include probabilistic discount questions as a measure of aversion to risk or uncertainty (Kahneman, 2003; Kahneman & Tversky, 1979; Takahashi, 2009). In addition, we will seek to understand the value of the reinforcement (immediate or delayed), involved in the assessment of an STD, as well as its usefulness in the development of interventions to increase codon use in adolescent women and men. In this sense, we propose in a preventive setting that if an adolescent is willing to wait hours or even days to obtain a condom to have sexual activity, it is possible that the prevalence of use increases.

Consistent with an approach based on behavioral economics (Bickel et al., 2014; Gutnik et al., 2006; Kahneman, 2003; MacKillop, 2016; Takahashi, 2009; Thaler, 2016), this research reveals the first research on the sexual discounting in risky sexual behavior among young men and women in Mexico. It should be noted that men have a shorter delay in hours, days and months compared to women. The results based on the differences between risky sexual behavior partially

support the previously stated assumption, which establishes that young people who present less sexual delay will have greater risky sexual behavior, however, the findings only support the propoused hypothesis in the women, which indicates that those who have a greater number of sexual partners and less condom use in sexual relations decide to choose immediate rewards for sexual activity.

References

Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, *127* (1), 142-161. doi: 10.1037/0033-2909.127.1.142

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*, 1-26. doi: 10.1146/annurev.psych.52.1.1

Berry, M. S., Johnson, P. S., Collado, A., Loya, J. M., Yi, R., & Johnson, M. W. (2019). Sexual probability discounting: A mechanism for sexually transmitted infection among undergraduate students. *Archives of Sexual Behavior*, *48*(2), 495-505. doi: 10.1007/s10508-018-1155-1

Bickel, W. K., Johnson, M. W., Koffarnus, M. N., MacKillop, J., & Murphy, J. G. (2014). The Behavioral economics of substance use disorders: Reinforcement pathologies and their repair. *Annual Review of Clinical Psychology, 10*, 641-677. doi: 10.1146/annurev-clinpsy-032813-153724

Bickel, W. K., Koffarnus, M. N., Moody, L., & Wilson, A. G. (2014). The behavioral-and neuro-economic process of temporal discounting: A candidate behavioral marker of addiction. *Neuropharmacology*, 76, 518-527. doi: 10.1016/j.neuropharm.2013.06.013

Bickel, W. K., Pitcock, J. A., Yi, R., & Angtuaco, E. J. C. (2009). Congruence of BOLD response across intertemporal choice conditions: Fictive and real money gains and losses. *Journal of Neuroscience, 29*(27), 8839-8846. doi: 10.1523/jneurosci.5319-08.2009

Collado, A., Johnson, P. S., Loya, J. M., Johnson, M. W., & Yi, R. (2017). Discounting of condom-protected sex as a measure of high risk for sexually transmitted infection among college students. *Archives of Sexual Behavior, 46*(7), 2187-2195. doi: 10.1007/s10508-016-0836-x

Cruz, D. M., Chainé, S. M., & Gutiérrez, J. N. (2015). Descuento temporal asociado al uso de cocaína [Temporal discount associated with the cocaine use]. *Revista Mexicana de Análisis de la Conducta, 41*(1), 86-101.

Dariotis, J. K., & Johnson, M. W. (2015). Sexual discounting among high-risk youth ages 18-24: Implications for sexual and substance use risk behaviors. *Experimental and Clinical Psychopharmacology*, *23*(1), 49-58. doi: 10.1037/a0038399

Fishbein, M. (2000). The role of theory in HIV prevention. *Aids Care*, *12* (3), 273-278. doi: 10.1080/09540120050042918

González, J., Ávila, R., & Morales-Chainé, S. (2015). Descuento temporal y probabilístico de dinero y alcohol de usuarios en tratamiento [Temporal and probabilistic discount of money and alcohol of users in treatment]. *Revista de Psicología, 24*(1), 1 -14. doi: 10.5354/0719-0581.2015.36869

Gutnik, L. A., Hakimzada, A. F., Yoskowitz, N. A., & Patel, V. L. (2006). The role of emotion in decision-making: A cognitive neuroeconomic approach towards understanding sexual risk behavior. *Journal of Biomedical Informatics*, *39*(6), 720-736. doi: 10.1016/j.jbi.2006.03.002

Hahn, H., Kalnitsky, S., Haines, N., Thamotharan, S., Beauchaine, T. P., & Ahn, W. Y. (2019). Delay discounting of protected sex: Relationship type and sexual orientation influence sexual risk behavior. *Archives of Sexual Behavior*, *48*(7), 2089-2102. doi: 10.1007/s10508-019-1450-5

Herrmann, E. S., Hand, D. J., Johnson, M. W., Badger, G. J., & Heil, S. H. (2014). Examining delay discounting of condom-protected sex among opioid-dependent women and non-drug-using control women. *Drug and alcohol dependence*, *144*, 53-60. doi: 10.1016/j.drugalcdep.2014.07.026

Herrmann, E. S., Johnson, P. S., & Johnson, M. W. (2015). Examining delay discounting of condom-protected sex among men who have sex with men using crowdsourcing technology. *AIDS and Behavior*, *19*(9), 1655-1665. doi: 10.1007/s10461-015-1107-x

Jarmolowicz, D. P., Lemley, S. M., Asmussen, L., & Reed, D. D. (2015). Mr. right versus Mr. right now: A discounting-based approach to promiscuity. *Behavioural Processes*, *115*, 117-122. doi: 10.1016/j.beproc.2015.03.005

Johnson, M. W., & Bickel, W. K. (2002). Within-subject comparison of real and hypothetical money rewards in delay discounting. *Journal of the Experimental Analysis of Behavior, 77*(2), 129-146. doi: 10.1901/jeab.2002.77-129

Johnson, M. W., & Bruner, N. R. (2012). The sexual discounting task: HIV risk behavior and the discounting of delayed sexual rewards in cocaine dependence. *Drug and Alcohol Dependence*, *123*(1-3), 15-21. doi: 10.1016/j.drugalcdep.2011.09.032

Johnson, M. W., & Bruner, N. R. (2013). Test-retest reliability and gender differences in the sexual discounting task among cocaine-dependent individuals. *Experimental and Clinical Psychopharmacology*, *21*(4), 277-286. doi: 10.1037/a0033071

Johnson, M. W., Bickel, W. K., Baker, F., Moore, B. A., Badger, G. J., & Budney, A. J. (2010). Delay discounting in current and former marijuana-dependent individuals. *Experimental and Clinical Psychopharmacology, 18*(1), 99-107. doi: 10.1037/a0018333

Johnson, M. W., Johnson, P. S., Herrmann, E. S., & Sweeney, M. M. (2015). Delay and probability discounting of sexual and monetary outcomes in individuals with cocaine use disorders and matched controls. *PLoS ONE,* 10(5), 1-21. doi: 10.1371/journal.pone.0128641

Johnson, P. S., Sweeney, M. M., Herrmann, E. S., & Johnson, M. W. (2016). Alcohol increases delay and probability discounting of condom-protected sex: A novel vector for alcohol-related HIV transmission. *Alcoholism: Clinical and Experimental Research, 40*(6), 1339-1350. doi: 10.1111/acer.13079

Jones, J., Guest, J. L., Sullivan, P. S., Kramer, M. R., Jenness, S. M., & Sales, J. M. (2018). Concordance between monetary and sexual delay discounting in men who have sex with men. *Sexual Health*, *15*(3), 214-222. doi: 10.1071/SH17111

Kahneman D. (2003). A psychological perspective on economics. *The American Economic Review*, 93, 162-168. doi: 10.1257/000282803321946985

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263-292. doi: 10.1142/9789814417358_0006

Lagorio, C. H., & Madden, G. J. (2005). Delay discounting of real and hypothetical rewards III: Steady-state assessments, forced-choice trials, and all real rewards. *Behavioural Processes, 69(2), 173-187*. doi: 10.1016/j.beproc.2005.02.003

Lawyer, S. R., Williams, S. A., Prihodova, T., Rollins, J. D., & Lester, A. C. (2010). Probability and delay discounting of hypothetical sexual outcomes. *Behvioral Processes, 84(3), 687-692*. doi: 10.1016/j.beproc.2010.04.002

Lemley, S. M., Jarmolowicz, D. P., Parkhurst, D., & Celio, M. A. (2018). The effects of condom availability on college women's sexual discounting. *Archives of Sexual Behavior*, *47*(3), 551-563. doi: 10.1007/s10508-017-1040-3

López, M., A., Chainé, S., Ávila, R., & Nieto, J. (2016). Descuento temporal y probabilístico en el abuso a la nicotina [Temporal and probabilistic discount in nicotine abuse]. *Revista Mexicana de Análisis de la Conducta, 42*, 13-35.

MacKillop, J. (2016). The behavioral economics and neuroeconomics of alcohol use disorders. *Alcoholism: Clinical and Experimental Research, 40*(4), 672-685. doi: 10.1111/acer.13004

MacKillop, J., Amlung, M. T., Few, L. R., Ray, L. A., Sweet, L. H., & Munafò, M. R. (2011). Delayed reward discounting and addictive behavior: A meta-analysis. *Psychopharmacology, 216* (3), 305-321. doi: 10.1007/s00213-011-2229-0

McClure, S. M., Ericson, K. M., Laibson, D. I., Loewenstein, G., & Cohen, J. D. (2007). Time discounting for primary rewards. *Journal of Neuroscience*, *27*(21), 5796-5804. doi: 10.1523/JNEUROSCI.4246-06.200

Noda, Y., Barr, M. S., ElSalhy, M., Masuda, F., Tarumi, R., Ogyu, K., Wada, M., Tsugawa, S., Miyazaki, T., Nakajima, S., & Mimura, M. (2020). Neural correlates of delay discount alterations in addiction and psychiatric disorders: A systematic review of magnetic resonance imaging studies. *Progress in Neuro-psychopharmacology & Biological Psychiatry*, *99*, 109822. doi: 10.1016/j.pnpbp.2019.109822

Odum, A. L. (2011). *Delay discounting: Trait variable? Behavioural Processes, 87(1), 1-9.* doi: 10.1016/j.beproc.2011.02.007

Palacios, D. J., & Martínez, M. R. (2017). Descripción de características de personalidad y dimensiones socioculturales en jóvenes mexicanos [Description of personality characteristics and sociocultural dimensions in young Mexicans]. *Revista de Psicología*, *35*(2), 453-484. doi: 10.18800/psico.201702.003

Palacios, D. J., & Ortego, G. N. (2020). Diferencias en los estilos de negociación sexual y autoeficacia en el uso del condón en hombres y mujeres universitarios de Querétaro, México, 2018 [Differences in sexual negotiation styles and condom use self-efficacy in university men and women from Querétaro, Mexico, 2018]. *Revista Colombiana de Obstetricia y Ginecología*, *71*(1), 219-230. doi: 10.18597/rcog.3327

Palacios, D. J., Bravo, F. M., & Andrade, P. P. (2007). Consumo de alcohol y conducta sexual de riesgo en adolescentes [Alcohol consumption and risky sexual behavior in adolescents]. *Psychology International*, *18*(4), 1-13.

Palacios, J., & Álvarez, M. (2018). Addictive behaviors associated with possibility of sexually transmission diseases in Mexican young people. *Health and Addictions Journal, 18*(2), 111-120. doi: 10.21134/haaj.v18i2.384.

Palacios, J. (2019). Predictors of personality and self-efficacy of sexual risk behavior in Mexican adolescents. *Annals of Psychology, 35*(1), 131-139. doi: 10.6018/analesps.35.1.319471.

Parsons, J. T., Halkitis, P. N., Bimbi, D., & Borkowski, T. (2000). Perceptions of the benefits and costs associated with condom use and unprotected sex among late adolescent college students. *Journal of Adolescence, 23*(4), 377-391. doi: 10.1006/jado.2000.0326

Price, M., Higgs, S., Maw, J., & Lee, M. (2016). A dual-process approach to exploring the role of delay discounting in obesity. *Physiology & Behavior, 162*, 45 - 61. doi: 10.1016/j.physbeh.2016.02.020

Saura, S., Jorquera, V., Rodríguez, D., Mascort, C., Castellà, I., & García, J. (2019). Percepción del riesgo de infecciones de transmisión sexual/VIH en jóvenes desde una perspectiva de género [Perception risk of sexually transmitted infections/HIV in young people from a gender perspective]. *Atención Primaria*, *51*(2), 61-70. doi: 10.1016/j.aprim.2017.08.005

Slovic, P. Finucane, M. L. Peters, E., & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis: An International Journal*, *24*(2), 311-322. doi: 10.1111/j.0272-4332.2004.00433.x

Sweeney, M. S. Berry, P. S. Johnson, E. S. Herrmann, S. E. M Johnson, & W. Johnson (2020). Demographic and sexual risk predictors of delay discounting of condom-protected sex. *Psychology & Health*, *35*(3), 366-386, doi: 10.1080/08870446.2019.1631306

Takahashi, T. (2009). Theoretical frameworks for neuroeconomics of intertemporal choice. *Journal of Neuroscience, Psychology, and Economics, 2*(2), 75. doi: 10.1037/a0015463

Thaler, R. H. (2016). Behavioral economics: past, present, and future. *American Economic Review*, *106* (7), 1577-1600. doi: 10.1257/aer.106.7.1577

Weatherly, J. N., Terrell, H. K., & Derenne, A. (2010). Delay discounting of different commodities. *The Journal of General Psychology, 137*(3), 273-286. doi: 10.1080/00221309.2010.484449

Wilson, M., & Daly, M. (2004). Do pretty women inspire men to discount the future? *Proceedings. Biological Sciences*, *271*(Suppl. 4), S177-S179. doi: 10.1098/rsbl.2003.0134

Xu, Y., Chen, X., Yu, B., Joseph, V., & Stanton, B. (2017). The effects of self-efficacy in bifurcating the relationship of perceived benefit and cost with condom use among adolescents: A cusp catastrophe modeling analysis. *Journal of Adolescence, 61*, 31-39. doi: 10.1016/j.adolescence.2017.09.004