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AN EVOLUTIONARY PSYCHOLOGY PERSPECTIVE ON CONSUMER
VULNERABILITY TO FRAUD

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Abstract

Many studies have sought to identify demographic and dispositional factors rendering some individuals more prone to fraud victimization than others, with conclusions varying across different fraud types. Building from a Fundamental Motives Framework, this study investigates the effect of mating motives on risk-seeking and impulsiveness as risk factors for fraud victimization, focusing on effect differences between young adults and old adults. The results from a between-group experiment do not show enough evidence to support neither increased impulsiveness and risk-taking, and therefore, increased victimization likelihood, nor differences in the influence of a mating frame of mind between young and old adults.

Keywords: fraud victimization, fundamental motives, impulsivity, risk attitudes

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Introduction

Every year, millions of consumers become victims of one or more types of fraud with many experiencing multiple incidents of the same fraud. With the advent of technology, the dissemination of fraudulent and misleading information has been made relatively easy as perpetrators are now able to reach potential victims across geographical divides. The internet, particularly, has increased scammers' attempts to persuade consumers to behave online in ways conducive of financial or other malicious exploitation (Williams et al.,2017). Fraud schemes are very costly to consumers and societies at large. According to the Australian Bureau of Statistics, in 2008, personal losses reached almost \$1b among victimized Australian individuals, and the Australian community lost \$8.5b due to consumer fraud (Smith & Budd, 2008). In the United States, direct annual costs of fraud amount to \$40 - \$50 billion, this is excluding money spent to prevent it and other indirect costs such as time lost (Deevy et al., 2012). Victims of such schemes do not only suffer financial, but also significant psychological distress (Deevy et al., 2012; Williams et al., 2017). Understanding the nature of the risk factors is crucial in order for regulatory and consumer protection agencies to adjust and, therefore, maximize the effects of their anti-fraud measures, thus reducing successful consumer victimization. Nonetheless, there is lack of conclusive studies regarding the factors that lead some consumers to be more susceptible to fraud than others. This paper takes a new approach and applies an evolutionary perspective building upon the Fundamental Motives Framework.

The evolutionary psychology perspective makes a clear distinction between proximate or immediate and fundamental motivation behind a certain behavior. It poses that consumers' choices and preferences are more deeply rooted in psychological adaptations with regards to solving social challenges passed on by our ancestors. There exists scientific evidence for specialized human psychological systems for managing different evolutionary challenges, which encompass evasion of physical harm, avoidance of disease, friendship building, status

attainment, mate acquisition, mate retention, and caring for family (Griskevicius & Kenrick, 2013). These are in the core of the Fundamental Motives Framework. A fundamental motive can be triggered by external or internal cues signaling threats or opportunities regarding a given evolutionary challenge. There are systematic differences in how one behaves in order to fulfil these different motives and a solution to one challenge may hinder the solution to another (Griskevicius & Kenrick, 2013). For instance, while trusting can help make friends, it can also increase risk of being physically harmed.

One important implication of the Fundamental Motives Framework is that ultimate motives can alter decision-making processes, thus helping to explain the nature of decision biases and errors. Hence, behaviors regarded as irrational in other domains, may be considered design features from an evolutionary perspective (Griskevicius & Kenrick, 2013). Such is the case of loss aversion, discussed later in this paper. Moreover, despite all humans having the same evolutionary motives, the effects of each motive on one's decision-making process is expected to differ across individuals depending on different factors such as current life stage (Griskevicius and Kenrick, 2013). From an evolutionary perspective, there are three different life stages each associated with solving different evolutionary challenges and, therefore, with the activation of different motivational systems. The self-protection system is activated early in the somatic growth stage, which lasts from birth to puberty. The mate acquisition system emerges in the beginning of the mating stage, which lasts from puberty to parenthood. In the parenting stage, including grand parenting in humans, the mate retention and kin care systems are activated. Griskevicius & Kenrick (2013) suggest that at different life stages, people are more sensitive to different motivational systems, which come with a set of behaviors and decision-making processes that dictate one's reaction to a presented cue. For instance, teenagers and young adults might be more impacted by a mate-acquisition motive given its importance during the mate-acquisition stage. Contrarily, they may be less influenced by the self-protection

motive because attracting mates often drives them to seek out danger (Griskevicius & Kenrick, 2013). By contrast, those in the parenting stage are likely to be more concerned with their safety and health in order to raise their offspring and, therefore, might be more influenced by the self-protection motive and less by the mate-acquisition system (Griskevicius and Kenrick, 2013).

Building from Griskevicius and Kenrick's (2013) previous work, I investigate the effect of the mate-acquisition motive on fraud victimization. Since this motive has been shown to increase impulsivity and risk-taking, which have been linked to increased victimization, I hypothesize that a mate-acquisition motive increases victimization likelihood. Particular focus is given to age differences in order to contribute to the literature from this evolutionary approach. Since it was suggested that the mate-acquisition motive has higher influence on teenagers and young adults, given that they are in the mating life stage, I hypothesize that young adults will be more impulsive and risk-seeking and, therefore, more vulnerable to fraud than old adults. Then, this study can inform optimal targeting for consumer fraud prevention policies and measures such as awareness campaigns and educational programs. For instance, scams where mating cues may be present, such as dating scams, may be more effectively diffused if prevention measures are targeted to young adults who may be more likely to take risks and act impulsively without regarding the legitimacy of the situation. In case of students, for example, identification of scams they are more susceptible to may be implemented in their curriculums. As vulnerability to victimization is also complicated by how much one is targeted, I also explore whether young adults are more likely to be targeted than old adults. In the scope of the current study, fraud is the deliberate deception of victims with promises of unnecessary, grossly misrepresented, never intended to be provided, or nonexistent goods, services, or other benefits (Johnson (2004) in Schoepfer and Piquero, 2009).

Literature Review

- **Fraud Victimization and Age**

There is a general misconception that older consumers are more susceptible to fall victim to fraud that stems from previous anecdotal evidence (Pak & Shadel, 2007). However, the current literature provides mixed conclusions about whether younger or older people, and which age groups in general, have a higher likelihood of being victimized, especially when looking into specific types of fraud.

In one of the pioneering studies on the correlation of age with fraud victimization, Titus et al. (1995) found a negative correlation between age and fraud victimization. They found that younger individuals are three times more likely to suffer losses as they are more likely to be approached (in Anderson, 2016; in Deevy et al., 2012). In a random sample of 400 from a telephone survey, Wyk and Benson (1997) also found that younger individuals do have a higher likelihood of being fraud targets. However, the researchers did not find a correlation between age and successful victimization. Similarly, Wyk and Mason (2001), found a higher likelihood of experiencing consumer fraud victimization attempts in younger consumers and no significant correlation between age and successful victimization. Nevertheless, they found that risk of consumer victimization decreased with age, being 18 to 24-year-olds at higher risk than 35 to 44-year-olds who were at higher risk than 65 to 74-year-olds. A survey conducted by the Federal Trade Commission (FTC) in 2011 found that, except for fraudulent prize promotions, victimization rates in the various groups of fraud included in the survey were generally higher for individuals under 65 years old than for those 65 and older. Additionally, individuals over 55 years old were also found less likely to have been victimized in the two prior surveys of the organization (Anderson, 2013).

On the other hand, other research, specially on specific types of fraud, have yielded different results. In Lee and Soberon-Ferrer (1997)'s analysis of the data from the American Association of Retired Persons (AARP) (1993)'s Survey of Older Consumer Behavior, they found that older consumers were at higher risk of being victimized. Their results from an

ordered logit analysis showed that 17% of young respondents fell under the lowest vulnerability group while only 6% of their older counterparts were in the same group. In contrast, only 7% percent of the young respondents belonged to the highly vulnerable group whereas the older consumers amounted to 25% of that group. Likewise, AARP's (1996) results from a survey with 745 victims of telemarketing fraud show that older consumers had a higher likelihood of being victimized by telemarketing fraud than younger consumers. While people 50 and older comprised only 36% of the general population, they constituted 56% percent of the victims (in Titus & Gover, 2001). Another study on the determinants of victimization by different types of advance fee schemes found that individuals over 65 years old were more likely to fall victim to "other advance fee scams" which included lottery scams, whereas individuals 45-54 years old were more likely to be victimized by "dating scams" such as relationship scams, and those 18-24 were more likely to fall victim to "online transaction scams" such as charity and job offer scams (Ross and Smith, 2011). The results from AARP's 2011 Foundation National Fraud Victim Study also supports that older consumers are more vulnerable to specific types of fraud. They found victims of lottery fraud, investment fraud, and prescription drug/identity theft fraud to be significantly older than the general population (Pak and Shadel, 2011).

As Deevy et al. (2012) identified, older consumers seem to be less victimized in general studies across all fraud types, whereas higher proportions of older victims are found in studies that have examined victims by fraud type such as investment, lottery, and telemarketing fraud. One explanation for these trends may lie in the data collection methods and reporting behavior (Pak and Shadel, 2007; 2011) beyond the scope of this paper. However, one exception was found in Schoepfer and Piquero's (2009) study, which suggested that younger consumers are more likely to be victimized even when predicting specific types of fraud. Therefore, the role of age on fraud vulnerability remains inconclusive.

- **Risk-Seeking, Loss Aversion, Impulsivity and Fraud Victimization**

“Another important characteristic of fraud victimization is the victim’s own facilitation. Victims make the initial contact or take steps that lead to the initial contact...” (Schoepfer & Piquero, 2009)

Wyk and Benson (1997) suggest that the lifestyle theory of crime victimization can be applied to fraud victimization. According to this theory, being targeted by criminal offenders is a necessary factor in falling victim to fraud. Wyk and Benson (1997) found that even though they did not necessarily become fraud victims, the people more likely to report being the target of fraud were those who also reported greater willingness to take financial risks. Because “what appears to matter most in determining successful victimization is receiving an attempt in the first place,” (Wyk and Benson 1997) individuals with favorable attitude towards risk-taking increase their likelihood of being successfully victimized due to increased exposure to fraud perpetrators. Using the National Public Survey’s data by the National White-Collar Crime Center, Schoepfer and Piquero (2009) found a significant positive effect of engagement in risky behavior on fraud victimization. In addition to predicting general victimization, risk-taking positively and significantly predicted likelihood of victimization by specific types of scams such as free prize fraud and 800/900 number fraud. A study on the risk of cyber-crime victimization of users of Social Network Systems (SNS), found that risk propensity, measured by willingness to take and assume risks, positively affects SNS’s user’s risk of cyber-crime victimization (Saridakis et al., 2016). Titus and Gover (2001) also list tendency towards risk-taking behavior as a character trait that can increase one’s vulnerability not only to fraud victimization, but also to revictimization.

In some studies of fraud victimization, risk-taking has also been used as a proxy for impulsivity or low self-control, which have been found to positively affect fraud victimization. For instance, when analyzing the effect of “remote purchasing” and self-control on risk of being

targeted and victimized, Holtfreter et al. (2008) measured self-control by willingness to take financial risks. Contrarily to Wyk and Benson (1997), they found that low self-control, or greater willingness to take financial risks, does not affect whether consumers are targeted, but does significantly increase consumer's likelihood of falling victim to fraud. Another study with victims and age-matched non-victims of investment fraud, however, found that both group's risk preferences did not significantly differ (Knutson and Samanez-Larkin, 2014). This study did find differences in impulsiveness, with victims reporting higher impulsiveness, particularly regarding not planning. More direct measures of impulsivity have also been studied with respect to fraud victimization following Gottfredson and Hirschi (1990)'s self-control theory (in Wilsem, 2013). In an assessment of the characteristics of victims of online consumer fraud, using survey data among the Dutch general population, Wilsem (2013) found both direct and indirect effects of low self-control on internet consumer fraud. The study's results suggest that apart from the independent relationship between victimization and low self-control, consumers who are more impulsive are more susceptible to such crimes due to their higher engagement in "risk-enhancing internet activities." Pratt et al.'s (2014) more recent meta-analysis supports the existence of a positive relationship between low self-control and victimization.

- **Mate-acquisition motive, Risk-seeking/Loss aversion and Impulsivity**

A functional hypothesis of past conditions poses that due to frequently living on survival mode, putting more effort to avoid losses than to acquire gains lent ancestral humans a better chance of enduring. Put simply, overabundance was nice, but insufficiency could be deadly (Kenrick et al., 2012). The modern evolutionary approach extends this hypothesis as a function of fundamental motives. The fundamental motives framework suggests rather than a cognitive bias, loss aversion allowed humans to solve ancestral challenges crucial for survival. It is argued that loss aversion is present when people are motivated to protect themselves whereas it is gone when people are motivated to acquire a mate (Kenrick et al, 2012; Li et al. (2012) in

Griskevicius and Kenrick, 2013). Furthermore, the mate acquisition motive affects women and men differently. While under the influence of this motive both want to draw attention and stand out, they do so in different manners. In men, it leads to more risk-seeking (Kenrick et al., 2012; Baker and Maner (2008), Knutson et al. (2008) in Griskevicius, Kenrick, 2013), more impulsiveness (Wilson & Daly (2004) in Griskevicius and Kenrick, 2013), and not only reduces, but might reverse loss aversion (gains loom larger than losses) (Kenrick et al., 2012; Li et al. (2012) in Griskevicius, Kenrick, 2013). One explanation for this is that due to females' higher selectivity in choosing mates (Li and Kenrick (2006) in Kenrick et al., 2012), males ought to indirectly (e.g. conspicuous buying) or directly outcompete other males in an attempt to be selected as mates. Therefore, when primed to think about mating, taking risks helps males since a high level of loss aversion would defy the purpose when competing with other males for a mate (Kenrick et al., 2012). Women, on the other hand, do not become openly risky like men when primed by the mate acquisition motives, except when taking risk enhances their appearance. For instance, women with a mating motive are more willing to risk getting cancer from tanning their bodies (Hill & Durante (2011) in Griskevicius, Kenrick, 2013). Hence, I also explored whether gender moderated the mating motive effect on impulsivity and risk attitudes.

Methodology

- **Hypothesis Development**

As Griskevicius and Kenrick (2013) suggested, different motivational systems may influence individuals differently throughout their life stages. The mate acquisition system, they suggest, has more influence on teenagers and young adults because it coincides with the mate-acquisition stage. Based on the literature discussed thus far, there is a link between the mating motives and risk-seeking and impulsivity, which increase the likelihood of successful victimization. Therefore, in order to explain individual differences in vulnerability to fraud victimization from this standpoint, this study was carried out under the following hypotheses:

H1: The mate-acquisition motive has more influence on young adults than in old adults.

Therefore, when primed by mate-acquisition motive, risk-seeking and impulsiveness are higher, and loss aversion is lower for young adults than for old adults.

H2: As they are more risk-seeking, less loss averse and more impulsive than old adults, young adults have a higher likelihood of being victimized when primed by mate-acquisition motive.

Griskevicius and Kenrick (2013) argue that “due to inherent sex differences in parental investment, the motivation to acquire mates could diminish the bias for losses to outweigh gains in men, but not women.” Since loss-aversion hinders willingness to take risks, this goes in line with Kenrick et al.’s (2012) accounts that when primed by this motive, females do not become as risky as males, which led to the following hypothesis of this study:

H3: As they are more risk-seeking, less loss averse and more impulsive, males have higher likelihood of being victimized than females when primed by mate-acquisition motive.

- **Data Collection and Measures**

The data for this study was collected through a survey administered on Qualtrics platform. I ran two experiments: the first experiment investigated the victim’s side (two between-subject conditions: mate acquisition motive and control groups) and the second experiment investigated the perpetrator’s side (two between-subject conditions: targeting a young adult or targeting an old adult). Participants were directed randomly to one of the experiments, and within the experiment they were allocated randomly to conditions. The questionnaires encompassed fraud scenarios, demographic, and financial decision-making questions.

Experiment 1

119 participants completed this study on a voluntary basis (Mage = 28.21; SD = 8.61; % male: 38.66). To measure fraud victimization, participants were first primed with one of the conditions. Participants in the mate acquisition group (N=61, Mage=27, SD=7.15; % male:

37.70) watched a clip from the movie “Things to Do in Denver When You’re Dead”, which prior research has shown to elicit the desired effect (Cantin et al. (1995) in Maner et al., 2005). Participants in the control group (N=58, Mage=29, SD=9.86; % male: 39.66), watched a neutral clip of similar length from the same movie. Immediately after the manipulation, participants answered an hypothetical telemarketing/prize fraud scenario adapted from Holtfreter et al. (2010). Participants rated the likelihood that they would pay a \$25 advance fee to claim a voucher for an all inclusive trip to Hawaii in the US with a friend scale (1=Extremely unlikely, 7=Extremely likely). As noted by Holtfreter et al. (2010), although the answers to this scenario do not equate actual fraud victimization, they represent participants’ willingness to engage with strangers and provide them personal information over the phone, thus, cooperating with a potential scammer, which is a necessary condition for actual victimization. Unlike Holtfreter et al. (2010), a follow-up question to this scenario asked respondents who were slightly to extremely unlikely to pay the advance fee the amount that would make them at least slightly likely to pay it. This was to observe whether respondents that rejected paying the fee did so because they suspected or recognized a fraud attempt or simply thought the advance fee was too high. Therefore, unless participants answered that they would be slightly to extremely unlikely and would not pay any amount (inserted \$0) as advance fee, the fraud attempt scenario was considered successful. Risk-seeking and loss-aversion were measured by two methods adapted from Kahneman and Tversky (1997) (in Kahneman, 2011). Participants were presented the choice of a sure payment or a non-mixed gamble with the same positive expected value. Participants who chose the gamble were considered risk-seekers (risks=1). For loss aversion, participants were asked whether they would accept a mixed gamble (where a loss and a gain are possible) with a positive outcome. If participants rejected the gamble, they were considered loss averse (lossav=1). Then, loss aversion ratio was measured as a continuous value. The average value estimated from many experiments ranges from 1.5 to

2.5, meaning that people weight losses more than gains. Then, a loss aversion ratio of 1 means that an individual is risk-neutral or indifferent, and any value below 1 means that the individual is risk-seeking (Kahneman, 2011). Impulsivity was measured by asking respondents to rate their level of agreement with the five statements, presented in Table 1, adapted from Gammicks et al. (1993)'s self-control scale on a five-point Likert scale (1=Totally disagree to 5=Totally agree) as in Kimpe et al. (2018). Age was measured as a continuous variable and gender as a categorical variable (male=1). Because of concerns that the Italian movie clip would produce a different reaction for Italian individuals because their culture was, perhaps, stereotypically portrayed, participant's nationalities were collected in order to detect it if such was the case. Furthermore, participants were asked whether they were parents to control for parenthood because age is not an exact indication of life-stage (1=Yes, 2=Adopting or expecting, 3=No). There might be overlap between young adults who are already in the parenting stage and may be out of the mate-acquisition stage and old adults not yet in the parenting stage, but still in the mate-acquisition stage.

Result Analysis and Discussion

Because risk-seeking measured by the non-mixed gambling task did not provide enough variability in the results in both groups, the analysis was carried out only with the loss aversion ratio measure. Also, no Italians participated in Experiment 1, thus, nationality was not used in the analysis. To conduct the analysis, correlations between the independent variables and dependent variables were computed first. Since age, children and loss aversion ratio do not follow a normal distribution and all other variables are non-parametric, Spearman rank correlations were computed. Then, the mediator and moderator analysis were performed, followed by multivariate analysis.

○ Mediator and Moderator Analysis

Impulsivity. The impulsivity scale used in this study was reliable ($\alpha=0.73$). First, a two-sample t-test was conducted to determine if mean impulsivity differed between conditions. The test showed that there was not a statistically significant difference in impulsivity between these two groups ($t=-0.056$, $df=117$, $p=0.52$). In fact, the values (2.82) for both groups were essentially the same. Then, an OLS regression was performed on condition (group) including age as a moderator ($\beta_{\text{group}}=0$, $\beta_{\text{age}}=0$, $\beta_{\text{group}\times\text{age}}=0$). It was expected that the effect of a mating motive would be higher for young adults than for old adults. However, condition remained statistically non-significant as was its interaction with age ($F=0.21$; $df=115$, $p>0.05$). Therefore, these results do not support this study's hypothesis (H1). Furthermore, it was expected that a mating prime would have a lower effect on impulsivity for females. Therefore, another regression was performed on condition with gender as a moderator variable ($\beta_{\text{group}}=-0.04$, $\beta_{\text{gender}}=0.26$, $\beta_{\text{group}\times\text{gender}}=0.10$). Again, the interaction between condition and gender was statistically non-significant as were the individual variables ($F=0.17$, $df=115$, $p>0.05$). Hence, these results do not provide enough evidence for this study's hypothesis (H3).

Loss Aversion. The results from a two-way table, show no statistical difference between loss aversion prevalence in these two groups (mating group $N=53$, control group $N=44$; $F=0.095$, $df=1$, $p>0.05$). Likewise, a logistic regression showed that condition ($\beta=0.75$) was not statistically significant in predicting loss aversion likelihood ($\chi^2=2.42$, $df=1$, $p>0.05$). Another logistic regression was performed to include the interaction between condition (group) and age. The results suggest that as age increases, likelihood of being loss averse when primed by a mating motive also increases, which is in line with the hypothesis that younger individuals would become less loss averse when primed by a mating motive. None of the variables ($\beta_{\text{age}}=-0.03$, $\beta_{\text{group}}=-0.06$, $\beta_{\text{group}\times\text{age}}=0.03$) reached statistical significance, however ($\chi^2=3.39$, $df=3$, $p>0.05$). Therefore, H1 cannot be supported statistically. The results for the loss aversion measure also show that while they comprise 39.66 % of the sample, 56.52 % of males in the

control group were loss averse whereas 88.57% of females were. In the manipulated group, where males comprise 37.70%, loss aversion prevalence increased to 78.26 % for males and 92.11% for females. When interacting condition with gender in the logistic regression, the results also show that females primed by a mating condition have a higher likelihood of being loss averse and for males, that likelihood is even higher ($\beta_{\text{group}}=0.41$, $\beta_{\text{gender}}=-1.79$, $\beta_{\text{group}\times\text{gender}}=0.61$). Thus, while these results are aligned with the expectation that a mating prime would have higher influence on males, the direction of the effect is opposite to that expected: reduced, or even inverted in males, loss aversion. However, while gender was statistically significant, condition and the interaction term were not ($\chi^2=12.49$, $df=3$, $p<0.05$). Hence, there is not enough evidence neither against nor supporting H3.

Loss Aversion Ratio. As loss aversion ratio was positively skewed, a logarithmic transformation was applied. Then, loss aversion ratio was regressed on condition. The results show that, as expected, a mating motive decreases loss aversion ratio by 43%. However, these results were non-significant ($F=2.45$, $df=117$, $p>0.05$). Age differences were then tested. Although non-significant ($F=0.97$, $df=115$, $p>0.05$), the results from this regression were surprising as they suggest that loss aversion ratio increases with age but decreases with age when a mating motive is active ($\beta_{\text{group}}=0.52$, $\beta_{\text{age}}=0.02$, $\beta_{\text{group}\times\text{age}}=-0.03$). Nevertheless, there is not enough evidence to support nor reject H1.

As I expected risk-seeking to increase in males but not as much, if at all, in females, gender was then tested as a moderator. All variables in this regression were significant in explaining loss aversion ratio ($\beta_{\text{group}}=-0.88$, $\beta_{\text{gender}}=-1.68$, $\beta_{\text{group}\times\text{gender}}=1.11$). Surprisingly, the effect of a mating prime was not only higher for females, but also in a direction opposite to that expected in males. For males, a mating motive caused loss aversion ratio to increase by 22.8%, suggesting less willingness to take risks while it reduced by 88% in females, suggesting higher

willingness to take risks ($F=9.01$, $df=115$, $p<0.05$). For males, these results suggest that loss aversion may be a domain-general bias.

Victimization. First, I analyzed whether mating motive affected victimization. A Chi-square statistic test showed no statistical difference in victimization between both conditions ($\chi^2=0.44$, $df=1$, $p>0.05$). When analyzing the possible mediating effect of impulsivity (imp), victimization was first regressed on impulsivity ($\beta=0.22$) to check if there was a zero-order relationship, which was not found to be statistically significant ($\chi^2=0.80$, $df=1$, $p>0.05$). Then, a logistic regression of victimization on condition ($\beta=-0.12$) and impulsivity ($\beta=0.22$) was also not statistically significant ($\chi^2=0.91$, $df=2$, $p>0.05$). When age was tested as a moderator on the previous regression ($\beta_{\text{group}}=-1.97$, $\beta_{\text{age}}=-0.07$, $\beta_{\text{group}\times\text{age}}=0.06$, $\beta_{\text{imp}}=0.20$), it became the only significant predictor, suggesting victimization likelihood decreases with age. However, the interaction factor and the full model were non-significant ($\chi^2=5.95$, $df=4$, $p>0.05$). Including gender as a moderator ($\beta_{\text{group}}=-0.43$, $\beta_{\text{gender}}=-0.63$, $\beta_{\text{group}\times\text{gender}}=0.78$, $\beta_{\text{imp}}=0.25$) also did not produce significant results ($\chi^2=2.30$, $df=4$, $p>0.05$).

The same procedure was followed to analyze possible mediating effects of loss aversion (lossav) and loss aversion ratio (lossavr). There was no significant zero-order relationship between loss aversion ($\beta=0.67$) and victimization ($\chi^2=1.96$, $df=1$, $p>0.05$). Adding loss aversion to the hierarchical equation ($\beta_{\text{group}}=-0.21$, $\beta_{\text{lossav}}=0.71$) produced no significant associations ($\chi^2=2.25$, $df=2$, $p>0.05$) as neither did adding gender ($\beta_{\text{group}}=-0.47$, $\beta_{\text{gender}}=-0.36$, $\beta_{\text{group}\times\text{gender}}=0.68$, $\beta_{\text{lossav}}=0.66$) as moderator ($\chi^2=3.03$, $df=4$, $p>0.05$). When interaction of condition with age was included, age became negatively associated with victimization and marginally significant ($p<0.10$), but the model ($\beta_{\text{group}}=-1.94$, $\beta_{\text{age}}=-0.07$, $\beta_{\text{group}\times\text{age}}=0.06$, $\beta_{\text{lossav}}=0.62$) was non-significant ($\chi^2=6.91$, $df=4$, $p>0.05$). Loss aversion ratio ($\beta=0$) was also not significantly associated with victimization, but the model ($\beta_{\text{constant}}=0.47$) was significant ($\chi^2=4.21$, $df=1$, $p<0.05$). Regression of on loss aversion ratio ($\beta=0$) and condition ($\beta=-0.23$)

resulted in a non-significant model ($\chi^2=0.59$, $df=2$, $p>0.05$) as did subsequent addition of gender as moderator ($\beta_{\text{group}}=-0.71$, $\beta_{\text{gender}}=-0.92$, $\beta_{\text{group}\times\text{gender}}=1.08$, $\beta_{\text{lossavr}}=-0.01$) ($\chi^2=7.12$, $df=4$, $p>0.05$). Only age became marginally significant ($p<0.1$) when included as a moderator ($\beta_{\text{group}}=-1.92$, $\beta_{\text{age}}=-0.07$, $\beta_{\text{group}\times\text{age}}=0.06$, $\beta_{\text{lossavr}}=0$), with likelihood of victimization decreasing with age. The model was also marginally significant ($\chi^2=9.27$, $df=4$, $p>0.05$). Overall, there is no statistical support for an effect of mating motives on victimization and neither for mediating effects of the theoretical variables nor for moderator effects of age and gender (H2, H3) although the effect of age on victimization was as expected in these regression models.

○ *Multivariate Analysis*

Finally, four multivariate analysis were performed to investigate the issues above: Effect of mating motive on 1) impulsivity, 2) loss aversion, 3) loss aversion ratio, all with age and gender as moderators, and 4) Effect of impulsivity, loss aversion and loss aversion ratio on victimization. Logistic regressions were performed for 2 and 4 and OLS regressions for 1 and 3 (Table 2). The variable Children was included as a control in the multivariate analysis because it captures whether one is in the parenting stage, which is expected to weaken the influence of the mate acquisition motive. From the Spearman correlations, Parenthood is significantly and highly correlated with Children (-0.94). Hence, only number of children was included in the regression to avoid collinearity. Although Parenthood and number of children is also significantly correlated with age (-0.39 and 0.44, respectively) as assumed (older people in parenting stage, younger people still in mating stage), these relationships are weaker. Therefore, both variables are included in the regressions. The same regressions were also performed excluding participants who answered the question about the movie clip incorrectly (Table 3).

Impulsivity. As observed in Tables 2 and 3, there is a relationship between loss aversion and impulsivity. Loss aversion ($\beta=-0.44$) significantly reduces impulsivity, which is consistent with the fact that impulsive people tend to engage more in risky behavior. While gender

($\beta=0.26$) was marginally significant in predicting impulsivity in Table 2, suggesting that males are slightly more impulsive than females, this relationship was non-significant in Table 3. The opposite occurred for age ($\beta=-0.02$), which was only marginally significant in Table 3, suggesting that older people are less impulsive. As age and gender were not significant as moderators, the interaction factors were removed from this regression.

Loss Aversion. As seen in the regressions for impulsivity, less impulsive people ($\beta=-0.89$) have higher likelihood of being loss averse (Table 2). However, when people who answered the question about the movie clip incorrectly were excluded, this relationship ($\beta=-0.75$) became non-significant. The results from both Tables 2 and 3 show a significant relationship between likelihood of being loss averse and loss aversion ratio ($\beta=0.35$ and $\beta=0.81$, respectively) in the expected direction. Since higher loss aversion ratios correspond to higher loss aversion, the higher the loss aversion ratio, the higher the odds of being loss averse. For risk-seeking and risk-neutral individuals, this means shifting from a loss aversion ratio of less than or equal to 1, respectively, to a loss aversion ratio greater than 1. Mating motive ($\beta=1.29$) was only partially significant in Table 3, suggesting that a mating prime increases the likelihood of being loss averse. Age, gender, and corresponding interactions (removed), and number of children were not significantly associated with loss aversion.

Loss Aversion Ratio. There is a significant association between loss aversion and loss aversion ratio, where in Tables 2 and 3, loss averse people have loss aversion ratios 111% and 128% higher than those who are not, respectively. The full sample regression suggests that a mating motive reduces loss aversion ratio by 90% in females and, unlike in the mediator analysis, it also reduces males' loss aversion ratio, although only by 4% in males, suggesting that a mating motive encourages risk-seeking. Additionally, males with a mating motive have loss aversion ratios 56% lower than females while in the control group males have 142% lower loss aversion ratios than females. The interaction factor between condition and gender was,

however, only marginally significant. Hence, these results are not fully supported statistically. In the reduced sample, mating motive (56% reduction) becomes only marginally significant with no gender effects, and males have loss aversion ratios 79% lower than females in general. Age differences were not significant in any of the regressions and were, therefore, removed.

Table 2: Multivariate Regression Models of Full sample(N=119)					Table 3: Multivariate Regression Models of Reduced sample (N=87)				
	(1) Impulsivity	(2) Loss Aversion	(3) Loss Aversion Ratio ¥	(4) Victimization		(1) Impulsivity	(2) Loss Aversion	(3) Loss Aversion Ratio ¥	(4) Victimization
Variables	b	b	b \div	b	Variables	b	b	b \div	b
Impulsivity	-	-0.89 ** (0.4) [0.41]	0.04 (0.15)	0.36 (0.28) [1.44]	Impulsivity	-	-0.75 (0.48) [0.47]	-0.05 (0.16)	0.22 (0.34) [1.25]
Loss aversion	-0.44 ** (0.18)	-	1.11 *** (0.35)	0.95 * (0.55) [2.58]	Loss aversion	-0.43 ** (0.21)	-	1.28 *** (0.26)	1.61 ** (0.67) [5.00]
Loss aversion ratio	0 (0.00)	0.35 ** (0.16) [1.43]	-	-0.01 (0.08) [0.99]	Loss aversion ratio	0 (0.00)	0.81 ** (0.41) [2.25]	-	-0.011 (0.01) [0.99]
Condition	0.04 (0.14) [2.15]	0.77 (0.56)	-0.90 ** (0.35)	-0.5 (0.42) [0.61]	Condition	0.1 (0.16)	1.29 * (0.72) [3.65]	-0.56 * (0.30)	-0.82 (0.54) [0.44]
ConditionxGender	-	-	0.86 * (0.49)	-	ConditionxGender	-	-	-	-
Age	-0.015 (0.01) [0.97]	-0.03 (0.04) [0.97]	0.03 * (0.02)	-0.01 (0.03) [0.99]	Age	-0.02 * (0.01)	-0.02 (0.05) [0.98]	0.03 (0.02)	-0.02 (0.03) [0.98]
Gender	0.26 * (0.15)	-0.76 (0.52) [0.47]	-1.42 *** (0.36)	-0.26 (0.45) [0.77]	Gender	0.26 (0.18)	-0.95 (0.74) [0.39]	-0.79 *** (0.26)	-0.37 (0.55) [0.69]
Children	0.13 (0.15) [1.12]	0.12 (0.53)	-0.38 * (0.22)	-0.73 (0.48) [0.48]	Children	0.18 (0.17) [1.08]	0.08 (0.59)	0.38 (0.25)	-1.03 (0.62) [0.36]
Constant	3.46 *** (0.46)	4.09 ** (1.73)	0.32 (0.78)	-0.42 (1.36)	Constant	3.58 (0.34)	2.5 (2.05)	0.35 (0.83)	-0.05 (1.64)
Model F/ Chi2	2.29 **	30.76 ***	7.12 ***	14.64 **	Model F/Chi2	1.86 *	35.51 ***	9.71 ***	20.09 ***
Adj/Peseudo R2	0.06	0.27	0.25	0.09	Adj/Pseudo R2	0.05	0.39	0.26	0.17

Note: b are coefficients, values in parentheses are standard errors and values in brackets are odds ratios

*p<0.10; **p<0.05; ***p<0.01

±Robust standard errors

¥Log transformation

Victimization. Differently from the mediation analysis, where no association was found between victimization and the theoretical variables, the results from Tables 2 and 3 agree that whether individuals are loss averse is the only significant (marginally in Table 2) predictor of victimization. A striking surprise is that these results suggest that if one is loss averse, one has a higher likelihood of being a victim. It is possible that in this study's fraud scenario, people identified passing on an opportunity to save for a trip as a loss, which loss averse people seek to minimize. Neither age nor gender effects were found.

Experiment 2

As being targeted is indispensable for being victimized even though it does not necessarily lead to successful victimization, the likelihood that young and old adults would be targeted was analyzed. It was an exploratory analysis to observe whether young adults are more likely to be targeted. 116 participants (Mage=27.4, SD=9.6, % male: 38.8) were in this experiment. A perpetrator version of the victimization scenario presented earlier was allocated to two different groups. In this version, participants were the ones making the call and were told that that was their job as part of a fraudulent organization and that they operated on an individual daily quota of successful victimization. Furthermore, they were told that they had missed their daily quota for the previous seven days and risked being fired if they did not meet their quota that day. One group (N=58, Mage=28.3, SD=10.4, % male: 44.8) was presented the choice to call a young adult as opposed to a random number and asked the likelihood that they would prefer to target the young adult while the other group (N=58, Mage=26.5, SD=8.7, % male: 32.8) had the same choice and answered the scenario with respect to targeting an old adult. They were finally asked how old they imagined their allocated demographic to be.

Result Analysis and Discussion

Mean likelihood of targeting young and old adults were 2.1 and 2.2, respectively. These low scores reflect a floor effect, which may be due to social desirability bias. Those targeting young adults imagined them to be 21.1 years old (SD=3.3) while those targeting old adults imagined them to be 65.2 years old on average (SD=14.7). The result from an ordered logistic regression on the age the participants imagined their allocated group to be showed that age ($\beta=-0.01$) affected the likelihood of being targeted negatively and only marginally significantly ($\chi^2=2.92$, $df=1$, $p>0.05$). Another regression on the condition (young=1) participants were in showed no significant effect on likelihood of being targeted ($\beta=0.40$). Both regressions suggest

that young adults are more likely to be targeted, however, the non-significant results suggest that, especially for types of fraud such as telemarketing, targeting is usually random.

General Discussion

The results above, from the mediating and moderator analysis and the multivariate analysis, showed that loss aversion ratio was the only potential mediator affected by condition. Furthermore, there were gender effects in that relationship. While in the mediator analysis males' loss aversion ratio increased, males' loss aversion ratio reduced in the multivariate analysis. Differently from the multivariate analysis, the result from the moderator analysis was statistically supported, suggesting that when primed to acquire a mate, males value financial losses even more than gains. In the broader Fundamental Motives context, this may suggest that for males, loss aversion is not only a self-protection domain bias, but also a mating and, perhaps, domain-general bias. Alternatively, level of loss aversion may depend more on the context it is applied than in the motive. More studies could investigate the effect of other motives on males' financial decision-making risk attitude to see whether loss aversion ratio also increases, thus highlighting the role of context. Also, unlike Kenrick et al. (2012), it was found that a mating motive had a higher impact on females, which was surprising since the risk-taking measure does not affect their appearance. Nevertheless, loss aversion ratio did not show a mediation effect because not only did it not affect victimization, but also no relationship was found between condition and victimization. Since no association between condition was found with impulsivity and loss aversion and, as mentioned, condition did not affect victimization, the results failed to show any mediation effects. It was found, however, that loss aversion increases likelihood of being a fraud victim. This differs from the literature discussed in this paper as being loss averse gives place to risk-averse choices (Kahneman, 2011), and this study found a negative relationship between loss aversion and impulsivity. It is risk-seeking and impulsivity that have been linked to higher victimization likelihood. Nevertheless, these results do not

invalidate previous studies (e.g. Wyk and Mason, 2001; Knutson and Samanez-Larkin, 2014) on the link of risky behavior and/or impulsivity with fraud victimization as the impact of these factors may vary with specific types of fraud as Schoepfer and Piquero (2009) found. This study's victimization measure is not global, only suggesting that risk-seeking and impulsivity may not explain victimization by telemarketing/free prize fraud. A purely speculative explanation for this loss aversion effect on victimization is that, perhaps in the fraud scenario, participants identified foregone savings in the event they did not pay the fee as a loss compared to keeping their money as a gain. Since loss averse people seek to minimize losses and weight them more heavily than gains, they could pay the fee in order to avoid missing on that much savings for a potential trip. It would be interesting to ask participants whether they intended to go on a trip in the near future to see if that was a contributing factor. This result has implications for detecting nature of the messages in fraudulent schemes and techniques that fraudsters may use to take advantage of loss aversion in people.

From the perpetrator measure, no age demographic was found more likely to be targeted. Some participants, however, may have not been able to put themselves in the fraud scenario. Individuals' levels of Machiavellianism may affect the ability and ease with which they do so and, therefore, affect their responses. Moreover, in addition to possible desirability bias, there may still be place for morality in situations such as that described in the scenario, which may also be reflected in the floor effect. Finally, consistent with general definition of old adulthood, participants attributed old adults an average of 65 years old. As this study did not have many participants around and above that age, it cannot provide conclusions for comparisons between young and old adults, but more appropriately for young adults and adults.

Conclusion

Building from the Fundamental Motive Framework and fraud victimization studies, the present study aimed to analyze the mediating effects of impulsivity and risky behavior on fraud

victimization resulting from motivation to solve an evolutionary challenge: mate acquisition. It sought to investigate how these effects differed in young and old adulthood in order to identify high risk individuals and inform optimal targeting of information dissemination and protective measures. It was expected that a mating motive would increase males' impulsiveness and willingness to take risks and, therefore, their likelihood of falling victim to fraud, and would have little to no effect on females. Furthermore, the effect of the mating motive was expected to be larger for young adults than for old adults given that young adults are in the mating stage of life. The results did not provide enough statistical evidence for those hypotheses. Except for loss aversion ratio, which acted in an opposite direction than that expected, a mating prime did not significantly alter any of the theoretical variables, and loss aversion was the only significant predictor of victimization. Along with the perpetrator's perspective, this study suggests that a mating motive does not render any age demographic more vulnerable to fraud neither directly nor through mediation of impulsive and risky behavior. Contrary to studies that found a correlation between age and victimization (e.g. Wyk and Benson, 1997; Schoepfer and Piquero, 2009), this study reinforces that the effect of age on victimization may vary by fraud type and is still inconclusive. This study is also, to my best knowledge, the first to contribute to this literature by combining the Fundamental Motives Framework with self-control theory to study fraud victimization, thus providing new avenues for research.

Limitations and Future Research

The present study has some limitations. Firstly, although the priming mechanism used has been proven to be effective in previous studies, in this study it was used remotely and there was no means of ensuring that participants paid attention to the entirety of the movie clip. This was partly accounted for by including a question about the clip and a time requirement before respondents could advance to the next question. However, for participants that did not answer it correctly, it is not possible to know whether they did not pay attention and, consequently,

were not primed or they simply did not remember. If the second is the case, then memory could be included in the regressions instead of being used as a filter. Another noteworthy component of this study is that the risk-seeking measure was framed as gains. That may be one reason that I did not find variability as Tversky and Kahneman (1979) have shown that people tend to be loss averse in the gains domain while they tend to be risk-seeking in the losses domain (in Kahneman, 2011). This suggests that prevention and promotion frames may have different effects on people. For types of fraud where safety or prevention of losses is promoted (e.g. confirm personal and credit card via email or phone), risk attitude could differ from that when the fraud tactic promotes a gain (e.g. fee prize, high financial returns on investment). Therefore, future research could investigate if young adults become more risk-seeking in the losses domain than old adults when primed by a mating motive. In addition, future studies may investigate whether mating motives affect risk-taking and impulsivity differently in different contexts. For instance, a mating frame of mind may affect people's physical risky behavior, but not their financial risk attitude. Certain risky behaviors may be more closely related to victimization by certain types of fraud. I would not expect physical risk attitude to affect investment fraud victimization. Finally, since the Fundamental Motives Framework poses that individuals' choices may differ as a function of the active fundamental motive, future research could investigate the effect of other fundamental motive domains (e.g. self-protection) on risk attitudes and impulsivity as mediators of victimization, and provide longitudinal studies to understand whether the effect of fundamental motives changes with age or is constant until and after an individual goes to another life stage.

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