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Gambling Behavior and Temporal Discounting Among Military-Affiliated and Civilian Students

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The present study explored whether the contingencies maintaining gambling behavior differed for military-affiliated and non-military-affiliated students. It also tested for differences in how these groups discounted delayed outcomes. Three groups of students participated: Reserve Officer Training Corps (ROTC) students (n = 36), students with a relative in the military (n = 62), and students with no relative in the military (n = 58). Participants completed the Gambling Functional Assessment-Revised and a delay-discounting task. Results indicated that all participants' gambling behavior was maintained primarily by positive reinforcement. Moreover, ROTC students scored significantly higher on gambling for positive reinforcement, and significantly lower on gambling for negative reinforcement, than non-ROTC students. No differences were found across groups in terms of delay discounting. The results suggest that there are differences in the contingencies maintaining the gambling behavior of military-affiliated and non-affiliated students. Implications of the results are discussed.

Keywords: Gambling, GFA-R, Discounting, Military

There are approximately 1-3 million United States citizens currently serving in the military, the vast majority of whom are male (Bray et al., 1999). Kindt (2007) reported that 5% of personnel serving in the military were problem gamblers and 2% were pathological gamblers. In the general population, the prevalence rate of problem and pathological gambling is 2-4% and 1-2%, respectively (Petry, 2005). Although these prevalence rates appear similar, the contingencies maintaining military and non-military personnel's gambling behavior may be different. For example, Bray, Marsden, and Peterson (1991) compared rates of alcohol, drugs, and cigarette use between military and civilians. Their results indicated that military personnel were less likely to use drugs, and more likely to use alcohol and cigarettes, compared to civilians. They attributed these results to military policies, programs, and the military environment.

Extending Bray et al.'s (1991) argument to gambling behavior, the contingencies in the environment that maintain gambling behavior for military personnel may be different than the contingencies that maintain civilians' gambling behavior. Understanding the factors that maintain military and civilians' gambling behavior and whether one group is more impulsive than the other will aid our understanding of factors that affect military personnel and civilians' gambling behavior. The present study was a step in that direction.

Gambling Behavior

In order to identify whether individuals have problems related to gambling, clinical screening measures such as the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), have been created and administered to determine the prevalence of problem gambling in the general population. In addition, two indirect measures of assessing behavioral function, the 20-item Gambling Functional Assessment (GFA; Dixon & Johnson, 2007) and 16-item Gambling Functional Assess-

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ment-Revised (GFA-R; Weatherly, Miller, & Terrell, 2011), have been used to determine the controlling variables and contingencies that maintain respondents' gambling behavior. For example, the 16-item GFA-R is composed of eight questions that measure gambling for positive reinforcement and eight questions that measure gambling for negative reinforcement. Past research indicates that gambling behavior maintained by negative reinforcement, as opposed to positive reinforcement, has been associated with a higher frequency of gambling behavior (Miller, Dixon, Parker, Kulland, & Weatherly, 2010). With a well-represented collection of studies that have used the SOGS to determine the prevalence rates of problem and pathological gambling in different populations in the research literature (e.g., Neighbors, Lostutter, Cronce, & Larimer, 2002; Winters, Benston, Dorr, & Stinchfield, 1998), a need has been voiced to extend the investigation beyond prevalence rates of problem gambling to factors that control or sustain gambling behavior (Dixon & Johnson, 2007).

A number of explanations can be forwarded to expect that the gambling behavior of military personnel would be maintained by different contingencies than those that maintain the gambling behavior of civilians. Firstly, it could be that military personnel are limited in their recreational options and in an attempt to escape from an aversive situation, they choose to gamble. Secondly, military personnel may view gambling as a social event that gives personnel an opportunity to get together with others when off duty. Thirdly, it could also be that individuals in the military who experience greater exposure to violent combat may seek out activities (e.g., gambling) where risk taking is involved (Killgore et al., 2008). Theoretically, these possibilities would be reflected in scores on the GFA-R.

Discounting

One form of temporal discounting occurs when an individual is forced to make a choice between a small, immediate reinforcer and a large, delayed reinforcer. Although the relationship between rates of temporal discounting and impulsivity has been tenuously established (Mobini, Grant, Kass, & Yeomans, 2007), rates of discounting have been used to infer comparative value between outcomes (e.g., Smith & Hantula, 2008). For example, if two people were asked to discount cigarettes, the differences in their rates of discounting would provide a measure of which individual valued the cigarettes more/less (Baker, Johnson, & Bickel, 2003), with steeper rates of discounting indicating less value for the commodity. Past discounting research has also examined the relevancy of rates of discounting in determining the efficacy of treatment methods for pathological gamblers (Petry, 2011), the discounting of money in relation to how one discounts environmental outcomes (Hardisty & Weber, 2009), and how commodities within certain domains are discounted (Weatherly, Terrell, & Derenne, 2010). However, no discounting research to date has been conducted on military personnel.

Military personnel may discount commodities to a greater extent than civilians as military personnel have been known to behave more impulsively in terms of alcohol consumption and cigarette use (Bray et al., 1991). For example, if military personnel discount certain outcomes differently than civilians, then one could infer that they place different values on those outcomes than civilians. If those outcomes are gambling related, then the results would be informative as to how gambling-related decision making might differ between military personnel and civilians.

Present Study

The present study was conducted to determine (A) if the contingencies maintaining gambling behavior differed between military-affiliated (i.e., Reserve Officer Training Corps [ROTC] students[1]) and non-affiliated students' (i.e., non-ROTC students) gambling behavior and (B) if rates of delay discounting would differ between military-affiliated and non-military-affiliated students. Not only is this study the first to compare the contingencies maintaining the gambling behavior of these populations, it is the first study to examine potential differences in temporal discounting between these populations. The GFA-R (Weatherly et al., 2011) and a discounting questionnaire were given to three groups of university students with varying degrees of military affiliation.

METHOD

Participants

In total, 156 (150 male, 6 female) participants were recruited to participate: 36 ROTC students, 62 students with at least one relative (e.g., father, sister, uncle, grandparents) in the military and 58 students with no relative (past or present) in the military. The non-military-affiliated students were dichotomized into two groups based on a self-report measure of military affiliation. The 36 Army ROTC students were recruited directly from the Army ROTC facility on the University of North Dakota campus. In terms of sex, six females were in the ROTC group whereas all non-ROTC participants were male. Non-ROTC participants received one hour's worth of extra credit, whereas ROTC participants received $5.00 cash in return for their participation. Demographic information related to participants' age, grade point average, and income can be found in Table 1.

Materials and Procedure

Before participants completed the measures, informed consent was obtained from every participant as approved by the Institutional Review Board at the University of North Dakota. To complete the study measures, non-ROTC students were directed to the SONA system, which allowed participants to complete the study online. For the ROTC students, the researcher had students complete a hard-copy form of all measures in a classroom housed in the ROTC department.

The demographic questionnaire consisted of questions related to participants' age, sex, gender, military affiliation, and relative(s) military affiliation. Next, the participants were directed to complete two measures: the GFA-R (Weatherly et al., 2011) and a delay-discounting task. On the GFA-R (Weatherly et al., 2011) participants were asked 16 questions related to experiences they may or may not have had as a result of gambling and responded to these question using a 7-point scale (0=Never; 6=Always). Of the 16 items on the GFA-R, eight questions measure gambling for positive reinforcement and eight questions measure gambling for negative reinforcement. The questions on the GFA-R that pertain to positive reinforcement included: gambling that is maintained by sensory stimulation associated with gambling, social reasons, and financial reasons. For example, one questions on the GFA-R related to gambling maintained by positive reinforcement reads,

[1] For 39% of active-duty military personnel, the transition between non-military to military personnel was preceded by enrollment into a ROTC program (ROTC Colleges, 2011). Enrollment into an ROTC program entails additional course work for college students, as students are expected to meet the same graduation requirements as non-ROTC students. The ROTC course work consists of classes, courses (e.g., Leader's Training Course), and trips that expose cadets to different aspects of a military environment. For example, in the Leader's Training Course, Army ROTC cadets are expected to successfully complete four phases of leadership training (e.g., solider, warrior leader, bold leader, and future leader phase). Throughout each phase, cadets are exposed to weapons and field training which allow the cadet to experience a military environment (US Army, 2001).

Table 1. Demographic information for the no relative, relative, and ROTC group. Mean scores and standard deviations are presented for age, grade point average, and annual income.

		Age	GPA	Income
Groups	n	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
No Relative	58	19.25 (3.02)	3.63 (.52)	$12,100 ($4,530)
Relative	62	19.10 (3.06)	3.53 (.59)	$13,400 ($9,450)
ROTC	36	19.45 (1.91)	3.83 (.38)	$13,700 ($9,380)

"After I gamble, I like to go out and celebrate my winnings with others." Questions on the GFA-R that pertain to negative reinforcement included gambling that is maintained by escape from interpersonal and intrapersonal problems (e.g., family problems or stress). For example, one question on the GFA-R related to gambling maintained by negative reinforcement reads, "I gamble after fighting with friends, spouse, or significant other." Scores from the eight positive and eight negative reinforcement columns were summed to provide a subscale score for each reinforcement category.

On the discounting measure, participants were asked to discount four outcomes at different delay intervals and amounts (See Appendix). The four outcomes consisted of: lottery tickets ($1,000 & $100,000 worth) and money owed ($1,000 & $100,000). Each outcome was tested at five delays: one week, one month, six months, two years, and 10 years. Gambling and non-gambling related outcomes were included to determine if military-affiliated participants would discount all outcomes more steeply than non-affiliated participants, or if military-affiliated participants would only discount outcomes related to gambling at a greater rate compared to non-affiliated students. Past research suggests that outcomes in different domains (e.g., gambling and non-gambling) are discounted by individuals at different rates, thus lending support to the claim that certain outcomes serve functionally different roles (Weatherly et al., 2010).

The present study employed the fill-in-the-blank (FITB; Chapman, 1996) and area-under-the-curve (AUC; Myerson, Green, & Warusawitharana, 2001) method for collecting and analyzing discounting data. The FITB method was used because it requires fewer questions than other methods (e.g., the binary-choice method). The FITB method is also a reliable and efficient way to collect discounting data as past researchers have utilized this method on a variety of outcomes (Chapman, 1996; Smith & Hantula, 2008). The AUC method was used to analyze the discounting data because AUC values are generally found to be normally distributed, and because a model fit does not have to be obtained (Smith & Hantula, 2008).

The equation for calculating the AUC for a particular outcome is found below, where X_1 and Y_1 represent one indifference point (i.e., point at which a smaller-sooner portion of an outcome is of equal subjective value to that of larger-delayed portion of the same outcome) and X_2 and Y_2 represent another indifference point at a different delay period:

$$(X_2 - X_1)[(Y_1 + Y_2)/2] \quad \text{(Equation 1)}$$

Thus, the x-values represent the predetermined range of delays until receipt of the full amount of an outcome (e.g., one week, one month, six months, two years, and 10 years), and the y-values represent the percentage of an outcome that a participant would accept immediately rather than having to wait a predetermined amount of time to receive the full amount of the outcome. The area between each indifference point (e.g., the area between X_1 and Y_1 and X_2 and Y_2) were computed and summed to derive participants' AUC value for each outcome. Smaller AUC values reflect steeper discounting and, theoretically, more behavioral impulsivity than larger AUC values.

RESULTS

Gambling Behavior

The results in Figure 1 indicate that participants' mean positive reinforcement scores on the GFA-R were greater than their negative reinforcement scores. Between groups, ROTC participants' scores on the positive and negative reinforcement subscales relative to the non-ROTC participants' scores suggests that the effect found for all participants (i.e., higher positive and lower negative reinforce

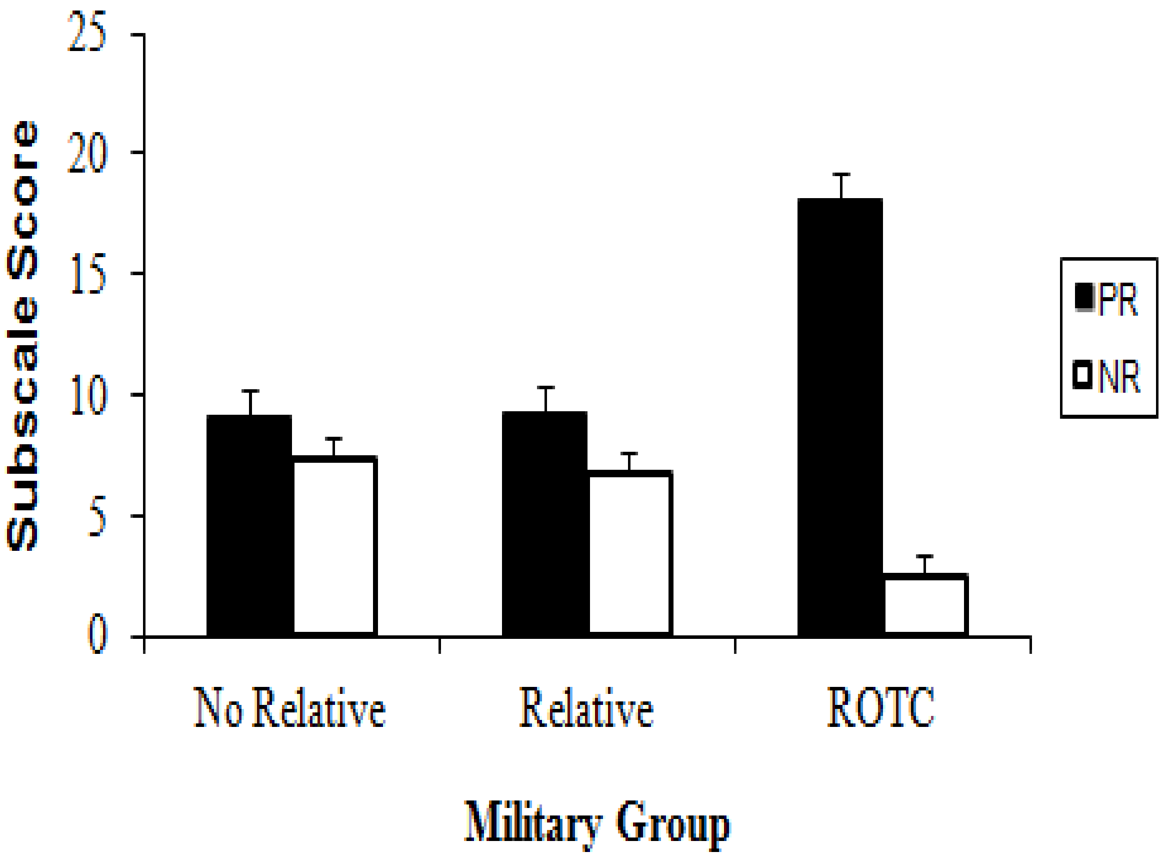

Figure 1. Presented are the mean GFA-R subscale scores for each group. The error bars represent one standard error of the mean.

ment scores) was especially pronounced for ROTC students.

A two-way mixed-model analysis of variance (ANOVA) was conducted on the GFA-R data (group x contingency), with group affiliation (no relative, relative, & ROTC) serving as the grouping factor, and contingency (positive or negative reinforcement) serving as the within-subjects factor. The main effect of group was not significant, $F(2, 152) = < 1$, $p = .49$, $\eta^2 = .01$, but the main effect of contingency was significant, $F(1, 151) = 101.09$, $p = .001$, $\eta^2 = .40$. The interaction effect for group by contingency type was also significant, $F(2, 151) = 61.96$, $p = .001$, $\eta^2 = .45$. Results for this analysis, and all that follow, were considered significant at $p \leq .05$.

When examining the within-subjects factor of contingency type for all participants using a Tukey HSD *post-hoc* test, results showed that participants scored significantly higher on gambling for positive reinforcement ($M = 11.31$, $SD = 10.85$) than on gambling for negative reinforcement ($M = 7.10$, $SD = 8.07$). In terms of interpreting the significant interaction effect, Tukey HSD *post-hoc* tests showed that the ROTC group had a significantly higher positive reinforcement mean subscale score ($M = 18.45$, $SD = 14.74$) compared to the relative-in-the-military ($M = 9.26$, $SD = 8.25$) and no-relative-in-the-military ($M = 9.14$, $SD = 8.61$) groups. Conversely, the ROTC group had a significantly lower negative reinforcement mean subscale score ($M = 2.88$, $SD = 6.02$) when compared to both the relative ($M = 8.02$, $SD = 7.88$) and no relative ($M = 8.69$, $SD = 8.56$) group.

Discounting

A three-way mixed-model ANOVA was conducted on the discounting data (group x outcome x monetary amount). Group affiliation served as the grouping factor. Outcome and monetary amount served as the within-subject factor. The main effect of group was not significant, $F(2, 153) = 2.43$ $p = .09$, $\eta^2 = .02$. Additionally, the main effects of outcome, $F(1,153) = 2.67$, $p = .10$, $\eta^2 = .17$, and monetary amount, $F(1, 153) = 1.00$, $p = .32$, $\eta^2 = .01$, were not significant. Likewise, none of the potential interactions reached statistical significance (all Fs < 2.57, ns, $\eta^2 < .02$).

DISCUSSION

The results indicate that all participants' gambling behavior was maintained predominantly by positive, rather than negative, reinforcement. Moreover, military-affiliated participants had a significantly higher positive reinforcement subscale score and significantly lower negative reinforcement subscale score than the other participants. This outcome is potentially good news for both military-affiliated and non-affiliated individuals because gambling maintained by negative reinforcement, but not positive reinforcement, appears to be strongly linked to problem or pathological gambling (Miller et al., 2010). Moreover, rates of discounting for lottery tickets and money were not significantly different across groups. This outcome is also good news for military-affiliated personnel because rates of discounting have been used as a behavioral measures of impulsivity, and with the rates of discounting for both affiliated and non-affiliated participants being relatively similar, one could state that military-affiliated students are no more impulsive than non-affiliated students.

It could be posited that what maintains students' gambling behavior is the sensory stimulation that results from gambling or the tangible benefits that infrequently occur when a student gambles. That is, students gamble because they enjoy engaging in certain gambling activities or because they enjoy winning money. These types of reinforcers seem to play a more significant role in the gambling behavior of military-affiliated, rather than non-affiliated, students. Past research using self-report measures of gambling behavior have also found that college students' gambling is predominantly maintained by positive of comprehensive reports and studies comparing rates of problem and pathological gambling between active-duty military personnel and civilians have been written elsewhere (see Bray et al., 1999). Absent from such reports and studies were a clear rationale for why one would expect military personnel and civilians to engage in certain behaviors, most notably behaviors that are typically associated with negative consequences (e.g., gambling). Thus, the focus of the current study is consistent with Dixon and Johnson's (2007) comments concerning the need to examine the "function that gambling serves" (p. 48) rather than merely focusing on the differences in rates of problem and pathological gambling between military and civilian populations.

Third, an administration of behavioral and self-report measures is warranted to determine if the dominant reinforcement contingency actually maintains gambling behavior. That is, along with GFA-R, it would be of interest to determine whether an actual increase in positive reinforcement (e.g., money or sensory stimulation) would in fact maintain participants' gambling behavior. Triangulation of behavioral and self-report measures of gambling behavior will improve the construct validity of the GFA-R.

The results indicate that the dominant contingency maintaining all students' gambling behavior is positive reinforcement, which has not been found to be as strongly associated with problem gambling (Miller et al., 2010). The present discounting results lend support to the claim that ROTC and non-ROTC students are equally impulsive. Taken together, students in the ROTC program who traditionally enlist in the military are no different going into the military (in terms of contingencies maintaining gambling behavior and impulsivity) than students who may never enlist in the military. The present study is just one step in the direction of elucidating the differences between military and civilian populations. A better understanding of the differences between military and civilians will benefit researchers, clinicians, and most importantly, the individuals who have served, and who are currently serving in the military.

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