

# The effect of military service on soldiers' time preferences — Evidence from Israel

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## Abstract

The current field study compares the time preferences of young adults of similar ages but in two very different environments, one more dangerous and uncertain than the other. Soldiers, college students and a control group of teenagers answered questionnaires about their time preferences. During mandatory service, soldiers live in a violent atmosphere where they face great uncertainty about the near future and high risk of mortality (measured by probability of survival). University students and teenagers live in much calmer environment and are tested for performance only periodically. The soldier-subjects show relatively high subjective discount rates when compared to the other two groups. We suggest that the higher subjective discount rate among soldiers can be the result of high perceived risk in the army as an institution, or higher mortality risk.

Keywords: time preference; discount rates; soldiers; perceived risk; military.

## 1 Introduction

The subjective discount rate is the rate at which individuals trade current value for future outcome. This rate varies from person to person, depending on each one's willingness to wait. In general, an individual who values the present more than the future will have a higher subjective discount rate than a person who places more value on the future.

In the current paper, we examine how military service influences the time preference of soldiers. We compare the time discount of soldiers in the Israel Defense Forces (IDF) to the time discount of university and high school students. Since its establishment in 1948, the State of Israel has had universal conscription for all youths (male and female) upon completing high school at the age of 18. By law, soldiers serve full-time for two (females) or three (males) years, and then continue serving in the reserves.<sup>1</sup> The IDF plays an important part in Israeli society, and is supported by a national consensus of the Israel population (Gal, 1986).

The soldiers are a unique group because they are drafted at young age, prior to beginning their tertiary education, and earn similar, very low salaries. Their "employer" is a harsh and total institution—where all

parts of life of the individuals under its authority are subordinate to and dependent upon the hierarchy of the organization—with very clear values. The soldiers are intensively trained and tested from the first day of basic training. Conversely, university students in Israel usually work and have higher earnings. They live in much calmer environment and are tested for performance only periodically.

A few studies have tested soldiers' decision making and compare them to civilians. Warner and Pleeter (2001) studied the choices regarding early retirement plans of older soldiers in the US army. These soldiers were heterogeneous in age, education, and earnings, and choose to join the Army as a profession. In a recent article, Haerem et al. (2010), compared educated, military decision makers to business students, and found that the soldiers exhibited high levels of self-efficacy that correlated with risk-seeking behavior. Unlike other studies, our study is the first to test time preferences of young soldiers who did not join the army as a career choice but rather were drafted for mandatory service.

In order to ensure similar test conditions for the soldiers and other young adults, we distributed the questionnaires to both groups when they were travelling on the train. We found that the soldiers have a higher subjective discount rate when compared to similar age groups.

The rest of the paper is organized as follows: In section 2, we discuss risk, morbidity, and mortality and their relation to our research. Section 3 presents the hypothesis. Section 4 describes the experimental design. Section 5 presents the results regarding the time preferences of soldiers and students. Finally, Section 6 summarizes the paper and presents its conclusions.

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<sup>1</sup>Those who continue in the career military earn a full salary, according to their rank and position.

## 2 Risk, morbidity, mortality and time preferences

Initial research in the field of time preferences focused primarily on monetary questions, and found that subjective discount rates vary with age<sup>2</sup>, time delay, amount of money and direction of trade (see Benzion, et al, 1989; Thaler, 1981; Chapman & Elstein, 1995; Laibson, 1997; Frederick et al., 2002; Myerson, et al., 2003; Prelec, 2004).<sup>3</sup>

An important individual characteristic that may influence time preference is risk preference, the tendency of an individual to refrain from taking risks or to take them (Brockhaus, 1980; Rabin, 2000; Riley & Chow, 1992; Tochkov, 2009). A more risk-averse person can tolerate less uncertainty about future income, which may lead to a higher elicited subjective discount rate and a demand for higher compensation for delaying consumption or a payment (Stevenson, 1986). In an experiment that combined lotteries with delayed payments Anderhub et al. (2001) found a positive correlation between the degree of risk aversion and the subjective discount rate. In a more recent study that included both lottery questions and time preference questions, Andersen et al. (2008) found a low positive correlation between risk aversion and subjective discount rate. Ida and Goto (2009), used lottery questions that included a time delay for one of the alternatives in their research regarding smoking behaviors. They found that smokers in Japan are more impatient and risk-prone than nonsmokers, pointing to a negative correlation between risk aversion and subjective discount rate.

Other important effects that may influence subjective time discounts and related risks are morbidity and mortality. Chao et al. (2009) found that both physical health and subjective expectation of survival are related to subjective time discount. Their research was done in South Africa where, due to HIV/AIDS, the middle-age mortality rate is much higher than in developed countries. The subjects were asked about their mental and physical health, and about their subjective probabilities of survival in the next years. Mortality risk (measured by probabilities of survival) is important because it reduces the time available for reproduction and enjoyment. Similarly, morbidity risk (measured by health questions) reduces the ability to reproduce, consume and enjoy. In addition to the mortality and morbidity questions, the researchers

<sup>2</sup>The research on the effect of age on subjective discount is not consistent. Some find decreases with age and some curvilinear relationships (Thaler & Shefrin, 1981; Green et al., 1994; Green et al., 1997; Green et al., 1999; Harrison et al., 2002; Sozou and Seymour, 2003; Read and Read, 2004).

<sup>3</sup>There are also many articles regarding non-monetary questions, such as choices for various durable items (Gately, 1980; Ruderman et al., 1987), and even for beers and bags of chips (Tsukayama & Duckworth, 2010).

elicited the subjective discount rate, using a time preference questioners regarding monetary questions. After controlling for mortality and morbidity, they found that age is not a significant predictor of time preference. (The researchers note, however, that their data may not have contained enough older people to show the age effect that others found.) They also found a U-shaped relationship between physical health and the subjective discount rate (very healthy or very sick people have higher discount rates than people with average health). A similar relationship was found between survival probabilities and subjective discount rate (people with a low or high probability of survival have a higher discount rate than people with an average probability of survival). The researchers conclude that “because causes of morbidity and mortality in South Africa are not necessarily related to aging, age is no longer a strong predictor of health and expected survival and, hence, of subjective discount rates” (Chao et al., p. 14).

Carstensen et al. (1999, 2003) also separated age from mortality in their research and development of the socioemotional selectivity theory. According to this theory when time is perceived as open-ended, people are future-oriented and concentrate on knowledge-related goals. However, when time is perceived as limited, people become present-oriented, and start concentrating on emotional goals. The researchers found that young people with symptomatic HIV concentrated on emotional goals.

## 3 The hypothesis

During mandatory service, soldiers leave in a violent atmosphere, and face great uncertainty about the near future and greater mortality and morbidity risk. Even on their way home and back to base, terrorist organizations consider them preferred targets. Beside the mortality and morbidity risk, soldiers face uncertainty about daily activities: their commanders control their schedule, and can change it instantly if the soldier, or even other soldiers, misbehaves in any way. For example, it is quite common for soldiers to have weekend leave canceled for misbehavior or for not achieving a training goal. In some cases, they can be grounded on base for weeks as a punishment.<sup>4</sup> The military is regarded as a total institution (Wintre and Ben-Knaz, 2000), unlike a high school or university environment.

We suggest that such uncertainty about daily activities and violent atmosphere of military service can lead to higher perceived risk<sup>5</sup> in the future (Slovic et al., 1982;

<sup>4</sup>In Israel most forces are posted within a few hours drive of their homes and soldiers usually receive a few days leave at least once every three weeks.

<sup>5</sup>Perceived risk is the subjective judgment of risk that people attribute to a situation. According to the sociological approach, percep-

Weber & Milliman, 1997), and therefore produces a high preference to the present. This is also consistent with Carstensen et al. (1999, 2003) whose socioemotional selectivity theory suggests that, when time is perceived as limited, people become present-oriented. Note that our explanation and hypothesis are speculative since we do not measure directly the degree of totality of the army institution or uncertainty inherent in military service. In order to control for income and age more thoroughly when testing the hypotheses, we also use earlier data on high school students. This data were collected and used in Lahav et al. (2010). Soldiers are older than the high school students, but younger than the university students.<sup>6</sup> Note however, that all of our ages are very close, and age effects on discounting are relatively small within the range included in this study.

As a result of the uncertainty inherent in military service we expect to find that the subjective discount rate of the soldiers will be higher than that of students and teenagers, due to higher perceived risk during mandatory army service.

## 4 Experimental design

### 4.1 Subjects

The subjects in the group of soldiers consisted of 90 Israeli soldiers during their mandatory service period (average age 19.93, age range: 18–23, 60 males and 30 females).<sup>7</sup> The young adult subjects were 69 students (average age 23.57, ranging in age from 19 to 25 years, 34 males and 35 females).<sup>8</sup> The questionnaires were distributed on trains traveling between three large cities in Israel (Haifa, Tel-Aviv and Beer-Sheva) where there are major universities. Furthermore, these train lines are also used extensively by soldiers, who are exempt from paying fares on public transportation. The subjects were given approximately 40 minutes to fill the questionnaire, and were paid 20 New Israeli Shekels (NIS, about \$5 U.S.) for their time. They were asked not to speak with each other while completing the questionnaires.

We chose to distribute the questionnaires on trains to facilitate access to soldiers, since the IDF usually does

tions are socially constructed by institutions, cultural values, and ways of life (Wildavsky & Dake, 1990).

<sup>6</sup>Because of the mandatory service, young adults in Israel usually start university only at age 21 or older, and most work while studying.

<sup>7</sup>In exceptional circumstances, such as being a new immigrant, a person can start his mandatory service a few years after the age of 18. This is the case for the oldest soldiers in our sample.

<sup>8</sup>Since the mandatory draft applies to all 18 year-old Israeli, the few that are not drafted are usually considered problematic. Other small groups that are not drafted are ultra-orthodox Jews and Arabs. These young adults are not representative of the general population in Israel and using them as a comparison group would cause a selection bias. Therefore, the soldiers and comparison group are not identical in age.

not allow civilian researchers an access to soldiers on bases. Furthermore, even if we had been able to enter one or two military bases to conduct the current survey, it would create selection bias, since soldiers in each service (Air Force, Navy, or ground forces) have certain shared traits. However, the train is a comfortable means of transportation used by young soldiers from all services, as well as many students. This helped us to avoid selection bias, and created the same testing environment for both soldiers and students.

The control group included 58 teenagers (average age 16.6, age range: 15–18 years, 36 males and 22 females), who we studied in an earlier paper (Lahav et al., 2010). The questionnaires for this group did not include all of the questions that were presented to the young adults (see section 5.1.2).

## 4.2 Procedure

### 4.2.1 Time preferences

The questionnaires began by informing the subjects that they about to complete questionnaires in the field of behavioral economics. They were further instructed that the questions did not have “correct” answers, so each answer should reflect their personal preferences.

In the main scenario (postponing receipt of income), subjects were informed they had earned  $x$  for working in a large fashion chain store, and they could receive that amount today. The chain’s management offered them the option of postponing receipt of  $x$  to a later time ( $t$ ). The subjects were instructed to write down the amount they would ask to receive at time  $t$  rather than receiving  $x$  today. The time periods ( $t$ ) were: one week, two months and one year. They were also asked to assume that the chain is reliable, and there is no doubt they would be paid on their chosen future date if the management accepted their offer. (See the Appendix for the translated instructions.) The idea of the scenario was based on a paper by Benzion et al. (1989) that asked about a financial firm. The statement about the chain store’s behavior was made to clarify the scenario.

A sample of the postponed receipt question:

The sum of NIS 600 is going to be deposited in your bank account today. However, we are offering you the option of postponing this deposit and receiving another amount in one year. What is the minimum amount you are willing to accept one year from now in order to postpone receipt of the sum?

Instead of NIS **600** today, I am willing to accept NIS \_\_\_\_\_ in **one year**.

The questions referred to two different amounts: NIS 600 and NIS 3,000, so the scenarios had six different

questions: three different time periods and two different amounts. All subjects answered all six scenarios.

Using the same amounts for both groups made the results comparable. However, since students have a higher income than soldiers, there might have been an income-effect problem, meaning that students might consider NIS 600 a relatively low amount, while it is a relatively large amount for soldiers. For many soldiers, this amount is more than their monthly salary.<sup>9</sup> In order to avoid this effect, we also compared the high amount in the students group (NIS 3,000) to the low amount in the soldiers group (NIS 600).

#### 4.2.2 Risk preferences

In order to control for differences in risk preferences between the two groups the questionnaire included risk preference questions. The first question was a lottery question similar to a question used by Booij & van Praag (2009):

Suppose you were offered a lottery ticket in a lottery with ten participants (so you have a 1:10 chance of winning). The prize is NIS 1,000 in cash. What is the maximum amount you are willing to pay for the ticket?

I am willing to pay no more than NIS \_\_\_\_\_ in order to purchase the lottery ticket.

In addition, we included 6 questions regarding risk aversion, similar to the ones used in Singer et al. (2005). The subjects were asked to circle their answer on a scale from 1 (Strongly disagree) to 6 (Strongly agree) for the following statements:

- I enjoy taking risks.
- I avoid situations of uncertainty.
- I am not troubled by taking risks if my actions might yield substantial gains.
- I consider the possibility of not taking risks as a main factor in my life.
- People say that I enjoy taking risks.
- I will take risks only very occasionally, if at all, if there is another alternative.

<sup>9</sup>Israeli soldiers earn between NIS 350 to NIS 700 per month during the mandatory service period.

## 5 Results

### 5.1 Time discount

#### 5.1.1 Comparing time discount of soldiers and students

Table 1 shows the annual (yearly) subjective discount rate for each period and amount<sup>10</sup>. The annual discount rate for delaying payment was calculated as follows:

$$r = \left( \frac{P}{X} - 1 \right) \cdot \frac{12}{t}, \quad (1)$$

where  $P$  is the amount the subject is willing to accept in  $t$  months for delaying the receiving of the amount of  $X$  today.

We used a one-tailed t-test to examine the null hypothesis that the subjective discounting is equal for soldiers and students, and Cohen's  $d$  to measure the strength of the difference. We compared not only the subjective discount rate for the same amounts (NIS 3,000 and NIS 600) but also students' responses for the higher amount to soldiers' responses for the lower amount, as a way of neutralizing the income effect.

The subjective discount rates are very high for both soldiers and students, with high variance, suggesting wide variations between the subjects. This finding is consistent with earlier studies about the subjective discount rate, especially for short periods (e.g., Thaler, 1981; Frederick et al., 2002). In all cases, we found that the average subjective discount rate was substantially and significantly higher for soldiers than for students, which is consistent with our hypothesis. This was also true when we avoided an income or size effect by comparing the discount rates for a relatively low amount for soldiers (NIS 600) and a relatively high amount for students (NIS 3,000).

In addition, we found that the discount rate was significantly lower for the higher amount (NIS 3,000) than for the lower amount (NIS 600), both for soldiers ( $p < 0.001$ ), and students ( $p < 0.001$ ) consistent with the results of Thaler (1981), which pointed to lower subjective discount rates for higher amounts.

Our sample included an equal number of males and females in the students' group, but an unequal number in the soldiers' group. To test for the possibility of a gender effect, we ran multivariate regression analysis of subjective discount rate on amount variable (NIS 600 or NIS 3000), time variable (1 week, 2 months or 1 year), dummy variables for group (Soldier = 1; Students = 0) and for gender (male = 0, female = 1). The results are presented in Table 2.

We found no significant effect for gender, while soldiers show higher subjective discount rate consistent with

<sup>10</sup>The discounting behavior was better captured by the hyperbolic model

Table 1: Average (STDV) annual subjective discount rates (comparing soldiers to students). Standard deviations are in parentheses.

| Group  | Amount    | 1 week                 | 2 months              | 12 months             |
|--|-----------|------------------------|-----------------------|-----------------------|
| Students<br>( <i>n</i> = 69)                 | NIS 600   | 667.78%<br>(617.20%)   | 259.01%<br>(201.55%)  | 117.04%<br>(89.33%)   |
|  | NIS 3,000 | 393.20%<br>(397.35%)   | 140.35%<br>(114.14%)  | 78.23%<br>(49.86%)    |
| Soldiers<br>( <i>n</i> = 90)                 | NIS 600   | 1390.31%<br>(2097.67%) | 472.82%<br>(679.96%)  | 183.00%<br>(189.35%)  |
|  | NIS 3,000 | 637.92%<br>(805.10%)   | 237.44%<br>(208.74%)  | 102.73%<br>(67.79%)   |
| T-test                                       |           | t(157) = 2.77          | t(157) = 2.53         | t(157) = 2.67         |
| Soldiers NIS 600 vs.<br>Students NIS 600     |           | p = .003<br>d = 0.467  | p = .006<br>d = 0.426 | p = .004<br>d = 0.446 |
| T-test                                       |           | t(157) = 2.32          | t(157) = 3.48         | t(157) = 2.52         |
| Soldiers NIS 3,000 vs.<br>Students NIS 3,000 |           | p = .011<br>d = 0.385  | p = .000<br>d = 0.577 | p = .006<br>d = 0.412 |
| T-test                                       |           | t(157) = 3.89          | t(157) = 4.02         | t(157) = 4.48         |
| Soldiers NIS 600 vs.<br>Students NIS 3,000   |           | p = .000<br>d = 0.660  | p = .000<br>d = 0.682 | p = .000<br>d = 0.757 |

Table 2: Regression analysis with gender. The dependent variable is subjective discount rate. Significance levels are in parentheses.

| Independent Variable | Coefficient | (significance) |
|----------------------|-------------|----------------|
| (Constant)           | 6.54        | (0.00)         |
| Amount               | -0.001      | (0.00)         |
| Time                 | -5.25       | (0.00)         |
| Gender               | 0.55        | (0.30)         |
| Soldier              | 2.38        | (0.00)         |
| R- Square            | 0.117       | (0.00)         |

the results in Table 1. The amount and time have negative effect on the annual subjective discount rates consistent with Thaler (1981) and Benzion et al (1989). We also compare female soldiers to female students, and male soldiers to male soldiers. Using an ANOVA with repeated-measure, we find significant positive difference in the levels of annual subjective discount rate between soldiers and students for females ( $F(1,29) = 6.37, p = .02$ ) and males ( $F(1,33) = 9.53, p = <0.01$ ) separately.

We found no difference between combat soldiers (28

subjects) and non-combat soldiers (62 subjects), based on a repeated-measures ANOVA ( $F(1,27) = 1.89, p = .18$ ). Combat soldiers are soldiers which train for battle, and engage in combat when necessary. Non-combat soldiers engage in assisting the combat soldiers during the fight. These soldiers are involved with tasks involving ammunition, information gathering, arms repairs, etc. All newly-drafted soldiers are trained for combat fighting in the first few months of their army service, and combat soldiers have longer combat training depending on the corps where they will serve. Because non-combat soldiers assist the combatants, they frequently meet each other. On weekend soldiers usually meet with their old friends from high school, again giving combat and non-combat soldiers an opportunity to socialize with each other and possibly communicate attitudes. Although this might be a possible explanation for the lack of difference in the time preferences of the two groups, another potential explanation relates to the uncertainty about a soldier's daily activities in the army. Combat and non-combat soldiers have the same uncertainty about where they will be in the near future (even the next weekend, as we mentioned earlier). This uncertainty may be the main influence on the subjective discount rate, while the effect of uncertain mortality is marginal.

Table 3: Subjective discount rates—postponing receipt of income (comparing soldiers to teenagers). Standard deviations are in parentheses.

| Group                                     | Amount  | 1 week                              | 2 months                            | 12 months                           |
|---|---------|-------------------------------------|-------------------------------------|-------------------------------------|
| Teenagers<br>( <i>n</i> = 58)             | NIS 600 | 774.77%<br>(724.25%)                | 219.74%<br>(204.70%)                | 171.81%<br>(186.59%)                |
| Soldiers<br>( <i>n</i> = 90)              | NIS 600 | 1390.31%<br>(2097.67%)              | 472.82%<br>(679.96%)                | 183.00%<br>(189.35%)                |
| T-test                                    |         | <i>t</i> (146) = 2.15               | <i>t</i> (146) = 2.75               | <i>t</i> (146) = 0.35               |
| Soldiers NIS 600 vs.<br>Teenagers NIS 600 |         | <i>p</i> = .017<br><i>d</i> = 0.392 | <i>p</i> = .003<br><i>d</i> = 0.504 | <i>p</i> = .362<br><i>d</i> = 0.060 |

### 5.1.2 Control for age and earnings

This paper focuses on the time preferences of young adults in two very different institutional frameworks (military and university). The average ages of these two groups are close but not identical (Soldiers: 19.93 years; Students: 23.57 years). We used a control group of 58 teenagers (average age 16.6) from our earlier paper (Lahav et al., 2010). If there is an age effect even for a difference of three years, we expect the subjective discount rates of the teenage subjects to be higher than that of the soldiers.

Many teenagers do not work, while teenagers who do work mostly do so on weekends or vacations, and so their own earnings often do not exceed those of mandatory service soldiers. Earnings were previously found to be negatively correlated with subjective discount rates (Warner & Pleeter, 2001).<sup>11</sup> Therefore, the control group of teenagers can be used as a control for age and earnings.<sup>12</sup> The teenagers were not asked about NIS 3,000, and so we compared the questions regarding delaying an income of NIS 600.<sup>13</sup> Table 3 presents the annual subjective discount rate of the income postponement scenario for each group. We use a one-tailed t-test to examine the null hypothesis that the subjective discount rate is equal for soldiers and teenagers.

Table 3 shows that the subjective discount rates are also

<sup>11</sup>A survey of the Ministry of Industry, Trade and Labor in Israel found that 5% of 15 to 17 years old teenagers worked while in high school, and about 1.3% worked and did not attend school, in 2004. In a survey from 2007, the ministry found that about 75% of 14 to 15 year olds only work during vacations. The surveys (in Hebrew) can be found at <http://www.moital.gov.il/NR/exeres/1C46576A-890C-4096-BE6F-7563F6FB0577.htm>

<sup>12</sup>We do not have an estimator for the soldier or teenager parent's earnings. This could cause an estimation bias because parents finance most of a teenager's expenses, and in many cases, a part of a soldier's expenses as well. For students, this is not always the case, because most students in Israel work.

<sup>13</sup>It is not realistic for a teenager to receive salary of NIS 3,000.

very high for the teenage subjects, with a high variance, suggesting wide variations between the subjects. The teenagers' average subjective discount rate was significantly lower for both one week delay and two month delays. These results contradict the predictions of an age effect or income effect. For a one year delay, there was no difference.

The results suggest that the differences we found in the current questionnaire regarding the time preferences of soldiers and students were, for the most part, not due to an age or income effect, but rather the result of other characteristics, such as institutional differences.

### 5.2 Control for risk preference

In order to compare the risk aversion of the two groups, we first created a risk aversion index variable for the six non-numeric questions. The Cronbach's  $\alpha$  of the six questions was 0.734. The index was calculated as an average of the answers to the six risk aversion questions, calculated separately for each subject. The index values ranged from 1 (low risk aversion) to 6 (high risk aversion).

The second risk aversion measure is the willingness to pay (WTP) for a lottery similar to a question used by Booij & van Praag (2009). For this question, willingness to pay a lower amount to participate in the lottery indicates a higher risk aversion.

We used a two-tailed t-test to examine the null hypothesis that the index variable and the WTP are equal for soldiers and students. The average index value is significantly lower ( $t(155) = 2.451, p = 0.015$ ) for the soldiers (mean = 3.6, STDV = 0.70), than for the students (mean = 3.93, STDV = 0.93). The average WTP is significantly higher ( $t(157) = 1.978, p = 0.05$ ) for soldiers (Mean = NIS 83.79, STDV = 144.4) than for students (Mean = NIS 48.76, STDV = 30.87). Both measures indicate that the soldiers are less risk averse than the students subjects.

Table 4: Regression analysis with lottery for risk-aversion measure. The dependent variable is subjective discount rate. Significance levels are in parentheses.

| Independent variable            | All subjects  | Students only | Soldiers only |
|---------------------------------|---------------|---------------|---------------|
| Constant                        | 6.32 (0.00)   | 5.42 (0.19)   | 9.47 (0.00)   |
| Amount                          | -0.001 (0.00) | -0.001 (0.00) | -0.001 (0.00) |
| Time                            | -5.25 (0.00)  | -3.33 (0.00)  | -6.73 (0.00)  |
| WTP for lottery (Risk aversion) | 0.01 (0.00)   | -0.006 (0.31) | 0.01 (0.00)   |
| Soldier                         | 1.93 (0.00)   |               |               |
| R- Square                       | 0.134 (0.00)  | 0.186 (0.00)  | 0.125 (0.00)  |

The finding of lower risk aversion for soldiers is consistent with Haeren et al. (2010). They explain that the soldiers' lower risk aversion is due to the military setting, with its specific type of organizational culture. They suggest that "operating in such culture can create different behaviors than those found in civil organizations." Our findings indicate that the risky and uncertain environment of the army and the institutional nature in the army are a source for soldiers' lower risk aversion and higher time discount.

In order to test whether differences in risk aversion could mediate the differences we found in discount rates, we used simple regression of risk aversion measures (index and lottery) on dummy variable for soldiers (soldier = 1; student = 0). We found a significant negative effect of the dummy variable for the index ( $p = 0.015$ , R-square = 0.037) and significant positive effect of the dummy variable for the lottery's WTP ( $p = 0.050$ , R-square = 0.024). Next we conducted a multiple regression analysis of subjective discount rate on risk measure (the index or the lottery), amount variable (NIS 600 or NIS 3000), time variable (1 week, 2 months or 1 year = 0) and a dummy variable for group (Soldier = 1; Students = 0). We conducted a different analysis for each of the two estimations of risk aversion (the lottery question and the risk aversion index). When using the index as measure of risk aversion, we found that the risk aversion coefficient is not significant ( $p = 0.88$ ), meaning that differences in risk aversion based on the index could not mediate the differences we find in discount rates.

When using the lottery for risk aversion measure, we find that the risk aversion coefficient is significant. Table 4 presents the regression analysis when lottery is used for risk aversion measure for all the subjects and for students and soldiers separately. We thus used two methods for eliciting risk aversion and found conflicting results. A possible explanation is that the lottery question was more suitable than the non-monetary questions for eliciting risk aversion, when considering time preferences for monetary issues.

Table 4 shows that subjective discount rate increases with the increase in WTP for the lottery, meaning that a decrease in risk aversion (increase in the willingness to pay) results in an increased subjective time discount. This means that risk preference based on the lottery could mediate the differences we found in discount rates. When we separate the groups, we found that risk aversion based on the lottery correlated with time discount rate only for soldiers. It is possible that soldiers who are more strongly influenced by the risky and uncertain environment of the army show lower risk aversion and higher time discount rate than soldiers who are less influenced by the risky and uncertain environment of the army. Our results are also in line with Ida and Goto (2009) who found that one high risk group (heavy smokers) had the highest time discount (most impatient) and the lowest risk aversion, while on the other hand a lower-risk group (ex-smokers) had the lowest time discount (least impatient) and the highest risk aversion.

## 6 Conclusion

In the current study we compare the time preferences of soldiers and students in Israel, in order to estimate the effect of the uncertainty and mortality risk due to military service and the military environment. The subjective discount rates were significantly higher for the soldiers' group.

A possible explanation for the high discount rates of soldiers is a higher perceived risk (Slovic et al., 1982; Weber & Milliman, 1997), during mandatory service. Soldiers live in a violent atmosphere, face as risk of mortality and great uncertainty about the near future. Their commanders control their schedule, and can instantly change it if the soldier or, even other soldiers, misbehave in any way. We suggest that such uncertainty regarding even the near future produces high present preference, and as a result they present higher subjective discount rate. As Dar and Kimhi (2001, p. 3) explain: "Israeli

youth must direct most of their personal resources toward adjusting to a rigid and demanding service and must comply with commands and assume roles that they are not involved in shaping. They must live for an extended period in a total institution, which ostensibly provides for all their needs but limits their privacy and freedom of choice and threatens their individuality.”

The results are even more interesting when taking into account that the risk aversion of the soldiers group was significantly lower than that of the students group consistent with Haerem et al. (2010). We suggest that the risky and uncertain environment of the army and the institutional differences are sources of a different risk attitude.

In the current study, we claim that institutional risks and uncertainty may change the way people discount the future. This claim reinforces the findings of Chao et al. (2009) who found that the uncertainty about the future caused by the HIV/AIDS epidemic in South Africa effects people’s time preferences. Therefore, future researchers who examine decision-maker uncertainty might also take into account the perceived risk or mortality risk for various situations in life, such as the differences between institutional contexts or work places. Collecting data in different situations or for situations where the subjects are face a mortality risk is not easy and almost impossible in the lab. Only field studies, like the ones conducted by Chao et al. (2009) or the present authors can give us insight regarding the effect of mortality risk or real future uncertainty on judgment and decision making. More field studies are needed to strengthen the relationship between real uncertainty regarding the future or mortality risk and decision makers’ judgment and behavior.

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## Appendix — Questionnaire instructions

Dear Subject,

The following experiment is part of a research discipline called Behavioral Economics that tries to understand people's behavior and their decision-making process on economic and financial issues.

The goal of the experiment is to gather data on the subjects' preferences for receiving an amount of money at the present time, as opposed to receiving a different amount of money at a later time.

In order to receive a cash prize of NIS 20 you should complete the questionnaire. The data gathered will only be used for research purposes.

The questions in the questionnaire do not have a correct or an incorrect answer, therefore we ask that the answers represent your personal preference, for each and every question. Please do not use a calculator, as this will cause a deviation in the research results.

The questionnaire is divided into 3 parts. Please take your time to answer each part.

### Instructions for the income postponement scenario:

Assume that you have worked on weekends in a large fashion chain store, and you have earned a sum of money for your work, which you are to receive today. The chain's management offers all the employees who are supposed to receive wages today, an opportunity to postpone receiving their wages until a later point in time. In return, they will receive a larger amount of money (like interest on savings). Assume that the chain is reliable and there is no doubt you will be paid on their chosen future date, if the management accepts your offer.