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Future Discounting by Slum-Dwelling Youth Versus University Students in Rio de Janeiro

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We compared Future Discounting (FD, preference for smaller, sooner rewards over larger, later ones) by 160 Brazilian youth (16–30 years old; 71 women and 89 men). University students and slum-dwelling (favela) youth were compared. Participants completed a monetary FD task, a scale of youngsters' view of their neighborhood, and self-reported exposure to violence (EV). Favela youth discounted the future more than students; favela men more than women. However, university women discounted more than men, an unexpected result. Predicted differences in the participants' view of their neighborhood between the two groups were observed. The interaction context × EV scores was a significant predictor of FD. These youth have apparently adjusted trade-offs between the short and long term in a context-sensitive, adaptive manner.

Future discounting is the preference for smaller, sooner rewards over larger, later gains. Some degree of future discounting is characteristic of all living organisms, but its magnitude varies among species, between the genders, over the lifespan, and in response to contextual cues indicative of mortality risk and future prospects (Daly & Wilson, 2005). In human beings, men have been found to discount more than women (e.g. Kirby & Marakovič, 1996; Wilson & Daly, 2006), and younger people to discount more than older (e.g. Green, Myerson & Ostaszewski, 1999). There is also evidence that young people discount the future more where circumstances are conducive to a mental model of the future as uncertain (Hill, Jenkins, & Farmer, 2008). In this study, we focus on the relation between Future Discounting and the developmental context, in its objective characteristics, subjective perception, and personal experience, among young adults with different life prospects, in Rio de Janeiro, Brazil.

According to an evolutionary psychological perspective, the processes and mechanisms that comprise the human mind have been selected to respond in adaptive ways to cues indicative of future prospects and threats (Yamamoto, 2009). Thus, young people's development helps shape them to function appropriately in their different environments, with different developmental contexts eliciting different mental models of the future and different strategies of present-future trade-off (Ellis, Figueredo, Brumbach, & Schlomer, 2009).

Research and theories in developmental psychology still focus mainly on contexts that are characteristic of only a relatively secure minority (Seidl-de-Moura, 2005). Henrich, Heine and Norenzayan (2010) present a forceful argument that such a focus is unduly narrow, and we concur. Research on youths from affluent, developed nations may not shed light on the full range of adolescent behavior and adaptation. Brazilian literature on developmental processes in adolescence is growing, but we are not aware of any studies of how Brazilian youth in slums model the future. We

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believe that it is important to study this topic, oriented by an evolutionary perspective.

According to a report from the Network of Latin American Technological Information (RITLA) entitled "Map of Violence: The Youth of Latin America" (Waiselfisz, 2008), Brazil's overall rate of violent deaths (homicides, suicides and accidents) was 49.1 per 100,000 persons per annum in 2005, ranking it eighth of 83 countries considered. The rate for young people 15–24 years of age was 79.6 per 100,000, ranking Brazil fourth. Obviously, many Brazilian youth face a dangerous and potentially short future, but of course this varies as a function of one's ecological and sociodemographic context.

Even in the United States, young people in certain urban areas have reportedly been exposed to violence at surprisingly high rates (Bell & Jenkins, 1993; Martinez & Richters, 1993; Schwab–Stone et al., 1995; Tolan & Gorman-Smith, 1998). Usually the negative effects of violent contexts on development are highlighted in those studies, including increased risk of psychopathology (Bell & Jenkins, 1993; Lorion & Saltzman, 1993; Osofsky, Wewers, Hann, & Fick, 1993), but not everyone in a given neighborhood is uniformly exposed to violence, nor are they all similarly affected even if exposed. Most importantly, exposure to violence is not novel; indeed, the majority of youth may have witnessed violence in past societies (see, e.g. Pinker, 2011), and from an evolutionary perspective, we might therefore expect that responses to such negative experiences may be more often adaptive than pathological ones.

In Rio de Janeiro, young people can have very different experiences and perceptions of the places where they live because of dramatic differences among neighborhoods in such socio demographic attributes as mortality rates, life expectancy, income, and the Human Development Index (HDI) (IBGE, 2008). Contexts also differ in their proximity and hence exposure to people who are dramatically richer or poorer. Although some progress has been made due to government policies and social programs, Brazil still has some singular social characteristics, especially the degree of economic inequality between regions and states, and within some regions, states and cities. On a national level, Brazil's Gini index of income inequality is the third highest in the world at .56 (Brígido, 2010), but the heterogeneity described above may be even more salient than this high level of overall inequality.

In theory, higher mortality rates justify greater future discounting (Williams, 1957), and comparisons across species indicate that life histories have evolved accordingly. Within species, individuals also modulate such life history attributes as age at first reproduction in apparent response to mortality rates (Nettle, 2010; Wilson & Daly, 1997). In adaptively modulating one's future discounting, however, one can only respond to the information provided by experience, such as personal exposure to violence and other factors that affect one's evaluation of one's milieu and one's expectations about the future. Accordingly, we aim to take a different perspective from studies of youngsters in situations of deprivation, violence and risk that see them as aggressors or victims, vulnerable to psychopathological symptoms (Abramovay et al., 2001; Abramovay, Waiselfisz, Andrade, & Rua, 1999; Castro, Abramovay, Rua, & Andrade, 2001; Garbarino, Dubroe, Kostelny, & Pardo, 1992; Peralva, 2000; Singer, Anglin, Song, & Lunghofer, 1995; Zaluar, 2000). In general, those studies have considered the context where their subjects live, but not how they perceive or construct this reality. Based on the evolutionary theory of future discounting, we believe that both objective living conditions and subjective perceptions and experiences of context should be considered to illuminate the future- or present-orientedness of youngsters in situations of risk and violence. We chose two contrasting contexts: those of slum dwellers and of university students from very different neighborhoods in Rio de Janeiro, Brazil.

Rio de Janeiro is one of the 27 federative units in Brazil. Located in the southeast zone, is it composed of very different cities and neighborhoods, which are demographically and socio-economically diverse. Considered as a big urban metropolis, it comprises a population of 15,989,929 citizens (IBGE, 2008) and two of its biggest problems are violence and drug trafficking.

According to the Map of Violence, published by the Latin American Network of Technology (Waiselfisz, 2008), Rio de Janeiro ranks fifth among 26 Brazilian states in the rate of homicide victimization among youngsters (15–24 years). This reality is slowly changing. Recent data (Trindade, 2011) indicate that since 2010 Rio de Janeiro's index of violence has been declining for homicides and armed robberies. However, Rio de Janeiro's levels of violence are still high in the world ranking. In recent decades, low-SES slums have spread across the whole metropolitan region of Rio de Janeiro (Salata, 2007), but citizens of Rio de Janeiro have more basic services available, even in the slums (favelas), than do citizens of other Brazilian cities.

The favela context has been analyzed and discussed by many Brazilian scholars (Araújo & Salles, 2008; Homero, 2008; Maricato, 2003). In general, what defines a favela is the lack of legal ownership of property by the residents: favela-dwellers are "squatters". Areas of Rio de Janeiro with the best infrastructure and lowest rates of violence, such as the middle-class neighborhoods in the south zone, include almost no favelas by this definition. In contrast, among the most violent regions with few public services, 82% are favelas (Homero, 2008).

Youth from two favelas, Rocinha and Vigário Geral, participated in this study. Rocinha is the largest favela in Rio de Janeiro, with over 100,000 inhabitants. It is located in the South Zone of the city, built on a steep hillside overlooking the city, just one kilometer from the beach, between neighborhoods that have some of the highest property taxes in the city. These adjacent upper class neighborhoods contrast sharply with the poor houses in Rocinha, which has developed from a shanty town into an urbanized slum. Almost all of Rocinha's houses are made of concrete and brick. Some are three and four stories tall, and almost all have basic sanitation, plumbing, and electricity. Compared to simple shanty towns or slums, Rocinha has a better infrastructure (schools, community projects) and hundreds of businesses. There are also a good number of community organizations at work in Rocinha, including three neighborhood associations and numerous NGOs and nonprofit educational institutions. Despite all these positive aspects, the HDI of Rocinha is one of the lowest in the state of Rio de Janeiro (.073), due to high levels of homicide, drug trafficking, and school dropouts. Vigário Geral is located in the northern part of the city, surrounded by neighborhoods with HDI as low as its own (.076). Established in the 1930s, Vigário Geral has high levels of violence and homicides involving drug trafficking, and fewer social projects than Rocinha (Araújo & Salles, 2008).

Based on the above considerations and prior literature, we set out to test three hypotheses. The first was that youth living in the favelas of Rocinha and Vigário Geral would discount the future to a greater degree than university students in the same city who do not live in favelas. We also anticipated that residents of the two favelas might differ from one another, because of their distinct attributes as described above, but we did not predict how they would differ. One possibility is that because of recent investment in social programs, Rocinha residents may be more optimistic about their futures and therefore discount less than Vigário Geral residents; alternatively, because of the greater proximity and salience of affluent neighbors, Rocinha residents may experience greater relative deprivation and therefore discount more.

Our second hypothesis, based on prior research and theoretical considerations reviewed by Daly and Wilson (2005), was that men would exhibit higher rates of future discounting than women. Moreover, because low status often has a greater impact on marriageability and life prospects for men than for women, we anticipated that this gender difference would be greater in favela residents than in university students.

Our third hypothesis was that the participants' positive/negative view of their neighborhood and actual exposure to violence would differ between the favela and university groups and would predict group differences in discounting.

METHOD

Participants

The participants were 160 young people, aged 16–30 years, of both genders: 40 residents (19 men, 21 women) of Rocinha (HDI = .073); 40 residents (20 men, 20 women) of Vigário Geral (HDI = .076; and 80 university undergraduates (32 men, 48 women) all of whom resided in middle-class neighborhoods of Rio de Janeiro county, with higher HDI than in the favelas (mean = .082; *SD* = .05). Although the difference between the HDI of the favelas and the university students' contexts may appear small, it is not. The average HDI of the group of university students' living contexts corresponds to the 18th highest HDI in a list of 126 neighborhoods, of which Vigário Geral ranks 107th and Rocinha 120th (IBGE, 2008). The students were from eight different universities (three public and five private) and were all in their first semesters. Twenty-seven were psychology majors and 17 were mathematics majors, with the remaining 36 students scattered among 14 other programs.

Participants were recruited opportunistically during visits to the two favelas and the eight universities, where they were invited to answer our questionnaire after signing an informed consent form. There were almost no refusals in either favela, due to the fact that the researchers were familiar with the context. At the universities, data collection was helped by the teachers and carried out in classrooms. Approximately 80% of the students invited in each class agreed to participate.

Table 1 presents additional socio-demographic attributes of the participants. As expected, there

was a large difference in family income between favela residents and university students, with 76% of the latter reporting monthly incomes above R $2000 (approximately US$ 1111) compared to just 29% of the favela residents. Also, more people dwelt in the homes of the favela respondents ($M = 4.06$, $SD = 1.84$) than in those of the university students ($M = 3.14$, $SD = 1.13$); F (1,158) = 14.61; $p < .05$, $\eta^2 = .08$. More of the favela residents (63.8%) were currently or previously employed than was the case among the university students (41.3%), and more of the former reported making a current contribution to the family income (50% vs. 32.5%). One university student and seven favela residents already had children of their own.

Instruments

A composite questionnaire containing open, closed, and multiple-choice questions was used. It combined measures used in prior research with items developed specifically for this study. For the purposes of the present report, the following components are relevant:

Socio-demographic data: questions about place and duration of residence, number of people living in the house of the respondent, income, and family composition.

Information about the family: items on family circumstances in the participant's childhood, family size, siblings, and current family setting.

Positive/negative view of one's neighborhood: 14 five-point items (rated from "not at all" to "totally"), concerning participants' perceptions of where they live (e.g., "I would like my child [children] to be raised in the neighborhood where I live now"; "The neighborhood where I live is a source of doubts about my survival"; "Living where I live guarantee me a secure future"). Items were summed (some reverse-coded), with a higher score representing a more positive view of one's context. This scale was developed by the three first authors (Cronbach's alpha = .83).

Exposure to violence: questions based on the Exposure to Violence Interview, a subscale within the CYDS Stress and Coping Interview (Tolan & Gorman-Smith, 1991, in Tolan & Gorman-Smith, 1998) that lists eight specific items related to victimization and witnessing violence. For example, subjects were asked if they had been—or had seen someone else being—robbed, beaten or kidnapped in the last twelve months. The score is calculated as the sum of affirmative answers; higher scores indicate greater violence exposure.

Future discounting: a series of nine paired hypothetical choices, based on a larger set by Kirby and Marakovič (1996), between a smaller sum of money today and a larger sum to be delivered at some future time. Future discounting evaluated in this way has been validated in various ways, and is correlated with standard measures of self-reported impulsivity (e.g., Kirby, Petry, & Bickel, 1999). For present purposes, the score was calculated as the sum of present-oriented choices out of a possible nine, with higher scores indicating higher discounting.

Procedures

The study followed Brazilian and APA guidelines for research with human subjects, and was

TABLE 1
Socio-demographic Characteristics of Participants ($N = 160$)

Variable		*Frequency*			
		University Students		*Slum Residents*	
		$n = 80$	%	$n = 80$	%
Age					
16–20		42	52.4	43	53.8
21–25		29	36.3	23	28.8
26–30		9	11.3	14	17.4
Monthly family income (*in Reais/US Dollars*)					
<R$500	<US$277	0	0	1	1.3
R$500–1000	US$277–555	3	4.0	22	27.8
R$1001–2000	US$556–1111	15	20.0	33	41.8
R$2001–3000	US$1112–1666	24	32.0	17	21.5
R$3001–4000	US$1667–2222	26	34.7	6	7.6
>R$4000	>US$2222	7	9.3	0	0

approved by the Ethics Committee of the State University of Rio de Janeiro. All participants were given an Informed Consent (IC) form with explanations of the nature of the research and its procedures. Data collection in Vigário Geral was conducted by the first author (DR), a former resident of the community. The second author (TV) is a resident of Rocinha and collected the data there. Data from the university students were collected by both DR and TV.

RESULTS

The mean Future Discounting scores of the various participant groups are presented in Table 2. To test the first and second hypotheses, we conducted a univariate GLM, with Future Discounting score as the dependent variable and group (university students × youngsters from slums) and gender as factors. An alpha level of .05 was used for all statistical tests. As predicted, the slum dwellers indeed had higher Future Discounting scores ($M = 5.73$, $SD = 2.09$) than the university students ($M = 4.15$, $SD = 1.94$), $F\ (1,\ 156) = 26.58$, $p < .05$, $\eta^2 = .15$. The genders did not differ significantly, but there was a significant group by gender interaction $F\ (1,\ 156) = 4.15$, $p < .05$, $\eta^2 = .03$. Thus, although the expected gender difference in future discounting was not found overall, the hypothesis that the differences between settings would affect men more than women was supported between the two favela residents. As shown in Table 2, men discounted more than women in both favelas, but among university students the women discounted more than the men, an unexpected result.

A similar analysis distinguished the three groups: Rocinha, Vigário Geral, and university students. The between-group difference remained significant $F\ (2,\ 154) = 20.10$, $p < .05$, $\eta^2 = .21$, but the gender by group interaction no longer was. Rocinha residents had lower mean Future Discounting scores ($M = 4.98$, $SD = 2.81$) than the Vigário Geral group ($M = 6.47$, $SD = 1.57$), which suggests that the higher investment in social programs in Rocinha may be succeeding in eliciting a more future-oriented mentality among its young residents than is the case in Vigário Geral. The highest mean Future Discounting score was that of males from Vigário Geral, and the lowest was that of university men.

We next tested the hypothesis that there would be differences between the groups in their view of

TABLE 2
Means, Standard Deviations, Maximum and Minimum Values on Future Discounting, View of One's Neighborhood Scores, and Self-Reported Exposure to Violence Scores for Young Men and Women From the Different Contexts

Group	*Gender*		*N*	*Min.*	*Max.*	*Mean*	*SD*
Rocinha	Male	View of One's Neighborhood Score	18	23	52	37.94	6.08
		Self-Reported Exposure to Violence Score	19	7	27	19.16	4.62
		Future Discounting Score	19	0	9	5.53	2.12
		Valid *N*	18				
	Female	View of One's Neighborhood Score	21	19	58	36.81	8.64
		Self-Reported Exposure to Violence Score	21	11	28	19.14	4.45
		Future Discounting Score	21	1	9	4.48	2.36
		Valid *N*	21				
Vigário Geral	Male	View of One's Neighborhood Score	20	22	63	36.35	10.48
		Self-Reported Exposure to Violence Score	20	6	27	17.35	5.94
		Future Discounting Score	20	3	9	6.55	1.54
		Valid *N*	20				
	Female	View of One's Neighborhood Score	20	23	48	33.40	6.91
		Self-Reported Exposure to Violence Score	20	9	28	17.30	6.17
		Future Discounting Score	20	4	9	6.40	1.63
		Valid *N*	20				
Univ. Students	Male	View of One's Neighborhood Score	31	29	62	43.55	8.86
		Self-Reported Exposure to Violence Score	31	14	30	25.03	4.28
		Future Discounting Score	32	1	6	3.75	1.39
		Valid *N*	31				
	Female	View of One's Neighborhood Score	48	35	63	48.65	8.13
		Self-Reported Exposure to Violence Score	48	16	30	25.88	3.61
		Future Discounting Score	48	0	9	4.42	2.21
		Valid *N*	48				

their neighborhood, using a GLM with group as factor (university students × slum residents). An expected effect was found: F (1, 156) = 60.83, $p < .05$, $\eta^2 = .28$. As predicted, the youngsters who live in the two slums have worse perception (lower scores) of the context where they live ($M = 36.09$, $SD = 8.27$) than the university students ($M = 46.65$, $SD = 8.74$). A comparison between the two slum groups was also made. There were no differences between the groups of Rocinha ($M = 37.33$, $SD = 7.49$) and Vigário Geral ($M = 34.88$, $SD = 8.89$). When introducing the variable gender, no general effect of gender was observed, but the interaction gender × group (Rocinha, Vigário Geral, and university students) was significant: F (2, 152) = 3.65, $p < .05$, $\eta^2 = .05$. The lowest mean scores are from the Vigário Geral women ($M = 33.40$, $SD = 6.90$) and the highest from the university women ($M = 48.65$, $SD = 8.13$). By this measure, in contrast to what was observed with Future Discounting, it would appear that women are more sensitive to their contexts than men. As we also anticipated, slum dwellers exhibited considerable diversity in scores related to positive/negative view of one's neighborhood: in Vigário Geral, there were two very high scores ($\geq$63), and in Rocinha, there were three extremely low scores ($\leq$23) and two high scores ($\geq$52).

Finally, we used linear regression to assess the predictors of Future Discounting. To make the data suitable for such analyses, we excluded extreme outliers (points lying more than 2.5 standard deviations from the mean), leaving a sample of 137 subjects. We used SPSS 19.0's stepwise procedure, excluding variables based on $p < .05$. The first regression model used positive/negative view of one's neighborhood scores and Exposure to Violence as predictors of Future Discounting; this model was not efficient with adj $R^2 = .07$. Our second model used the same predictors with gender and group (university vs. slum) as dummy variables in the equation; this model was somewhat more efficient (adj $R^2 = .27$), but only the product of Exposure to Violence scores and group was a statistically significant predictor of Future Discounting ($p < .05$), suggesting that slum dwellers may come to discount the future specifically in response to their experiences of violent events.

DISCUSSION AND FINAL CONSIDERATIONS

Our findings support our primary hypothesis that Rio de Janeiro's young slum dwellers discount the future more than university students: the context in which they live apparently influences the ways in which youth make trade-offs between immediate and more distant future goals. There is also some evidence that Future Discounting responds to specific characteristics such as investment in social programs, even when more difficult conditions are present. Differences in exposure to violent events in favelas predict more or less optimistic mental models of the future, and therefore more or less investment in the future. However, contrary to our expectations, perceiving one's context in a relatively positive or negative light did not predict Future Discounting, even though these perceptions differed among groups as expected.

The gender differences that we observed among the slum dwellers replicated findings elsewhere (Kirby & Marakovič, 1996; Wilson & Daly, 2006), but the university students' data did not. This result is both unexpected and unprecedented, and although there may be theoretical reasons why gender differences in Future Discounting should be expected to vary in magnitude (see Hill et al., 2008; Rogers, 1994), we feel that any attempt to interpret the finding would be unduly speculative at this point, especially since we did not evaluate potentially relevant variables such as local levels of fertility, gender-specific mortality, and gender-specific investment in kin. To the best of our knowledge, this is the first group within which women have been found to discount more than men, and future research is needed to determine whether or not this difference is reliable and what might explain it.

From an evolutionary psychological perspective, we interpret the observed variations in Future Discounting as a reflection of evolved mechanisms of behavioral and psychological development that help young people adjust to the prospects and predictability of their social and material environments.

Our study focused on specific groups, including participants from two favelas in Rio de Janeiro. A limitation is that the opportunistic sample of university students, to whom we compared the favela groups, may be heterogeneous in their backgrounds, which were not assessed, other than family income. Another possible limitation may be the scale of positive/negative view of one's neighborhood. Although consistent, and able to discriminate between groups, it has not been shown to be a valid predictor of Future Discounting, contrary to our hypothesis. New studies are necessary to further analyze the influence of this variable on youngsters' behaviors. Despite those limitations we believe that our results can contribute to an understanding of the behavior and attitudes of young people in

challenging contexts, and perhaps eventually to the development of effective interventions. We believe that to study development we have to consider ultimate and proximal causes, the evolutionary basis of behaviors, and the contextual factors that young people confront. By doing so, we feel that the evolutionary perspective we have adopted can contribute to an understanding of youths' future orientation and help to formalize the proposition that young people's psychology and behavior are adapted to their life circumstances.

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