

## **Observed Altruism in Dental Students**

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**PURPOSE:** The conventional wisdom in dental and medical education is that dental and medical students experience "ethical erosion" over the duration of dental and medical school. There is some evidence for this claim, but in the case of dental education this evidence consists entirely of survey research, which doesn't measure behavior. The purpose of this study was to measure the altruistic behavior of dental students, in order to fill the significant gap in knowledge of how students are disposed to behave, rather than how they are disposed to think.

**METHODS:** To test the altruistic behavior of dental students, we conducted a field experiment using the Ultimatum Game, which is a game commonly used in economics to observe social behavior. Students from each of the four years of dental school played the game in standardized conditions with real money.

**RESULTS:** Students exhibited greater levels of altruism than the general population typically does. Students' altruism peaked in year four. Students' altruism was associated with the socioeconomic status of responder.

**CONCLUSION:** The results suggest that that dental students are more altruistic than the population average and that altruism increases during their education. Thus, if a decreasing ability to behave altruistically is observed during dental school, it is not likely due to a general disposition of students, but rather some factor specific to the educational environment in which the decrease is observed.

**KEYWORDS:** Altruism; Dentist-Patient Relations; Behavioral Economics; Moral Development

## INTRODUCTION

The conventional wisdom in dental education is that dental students exhibit ethical erosion over the course of dental school.<sup>1</sup> Along with anecdotal experience of educators, supporting this conventional wisdom is a body of literature that suggests that medical and dental students become less empathic over the four years of school.<sup>2-6</sup> Though research has been conducted on the moral development of dental students,<sup>7-9</sup> and on the altruistic motivations of entering dental students,<sup>10, 11</sup> the research doesn't lend support to any conclusion regarding the ethical behavior of dental students.

It is not possible to draw inferences about the ethical behavior of dental students from this research. The value of health care is achieved by what doctors actually *do*, as opposed to what they *think*. This body of research uses surveys to measure students' mental states.<sup>12</sup> Even if the surveys achieve psychometric validation, as long as they survey mental states, they will never measure actual behavior. This is because being in a given mental state, or being disposed to be in a given mental state, implies nothing about how one behaves. It is possible that even though dental students' moral psychology becomes less disposed to induce ethical behavior, they nevertheless continue to behave in ways that serve, first and foremost, the interests of their patients. In other words, what really matters is not the stated level of empathy or the development of their moral psychology, but the revealed level of ethical behavior, which includes their ability to behave in ways that put patients' interests above their own—their ability to be altruistic.

Galizzi et al.<sup>13</sup> examined empirical research on the ethics and behavior of medical and dental students. They divided the papers into five main types: 1) survey and interview data; 2) discrete choice experiments; 3) prescription records; 4) field experiments; and 5) laboratory

experiments. Physicians/medical students and nurses/nursing students have been extensively studied using methods from types 1, 2, and 4 above, and to a lesser, but growing, extent using methods from categories 3 and 5. However, beyond research that uses survey and interview data, dentists/dental students have been studied very little. The purpose of this study was to evaluate dental students' altruistic behavior by observing their behavior in an experimental setting using the Ultimatum Game.<sup>14</sup>

The Ultimatum Game is played with two participants: a proposer and a responder. The proposer is given a pot of resources, typically money, to split with the responder. The proposer proposes a split of the pot. If the responder accepts the proposed split, then both participants keep the amounts according to the offer. If the proposal is rejected, then neither participant receives anything.

Standard economic theory predicts that the proposer would offer the smallest possible positive value and the responder would accept, making both better off.<sup>14, 15</sup> Suppose that the players are dividing \$20. In theory, the proposer should offer a split of \$19 - \$1. The responder should accept, since getting \$1 is better than getting nothing. However, experimentation has shown that highly unequal splits are seldom proposed. Instead, offers typically average about 30-40 percent of the total; a 50-50 split is often the mode. This is evidence that proposers often behave altruistically, choosing not to exploit the opportunity to push for an uneven split. Offers of less than 20 percent are frequently rejected.<sup>16</sup> Importantly, real money is at stake. This gives subjects an incentive to behave in the same way they would in the real world, where altruistic decisions come at a cost to oneself. Surveys cannot observe this behavior.

Bertolami and Berne<sup>17</sup> are the first authors to discuss experimental games designed to elicit prosocial attitudes from dental students. However, they merely speculate on how dental

students might play the Ultimatum Game, but don't themselves investigate this behavior. To the best of our knowledge, no researchers have used experimental games to study dental students.

It is conceivable that behavior in an artificial laboratory environment might not match behavior in real life<sup>18</sup>. However, there is a large body of research demonstrating that actions in economic games are correlated with actual behavior. The Dictator Game, for example, is a close relative of the Ultimatum Game.<sup>19</sup> Subjects who make generous offers in the Dictator Game tended to donate more to charity,<sup>20</sup> volunteered to fight fires,<sup>21</sup> and returned letters filled with money that were intended for someone else.<sup>22</sup> Ugandan teachers who made generous offers were less likely to skip class.<sup>23</sup> Serra, Serneels, and Barr studied health care providers in Ethiopia using a three player game similar to the Ultimatum Game.<sup>24</sup> They found that players who make generous offers as proposers are more likely to work for NGOs.

In Henrich et al., a number of farming, foraging, and herding societies played the Ultimatum Game.<sup>25</sup> The authors showed a strong link between the society's norms – including norms regarding altruism – and behavior in the games. For instance, the Aché are a hunting society that shares meat with the whole community. This altruism is reflected in the Ultimatum Game. On average, an Aché Proposer offered 51% of the pot to the Responder. On the other end of the spectrum, the Machiguenga seldom engage in economic transactions outside of their family. Generous offers to strangers were much rarer; the mean offer was just 26% of the stakes. Camerer compiled about 30 studies on the external validity of economic experiments. In all but two of them, subjects' behavior in economic games was correlated with their behavior in the real world.<sup>26</sup> This is our justification for using the Ultimatum Game to measure altruism.

Altruism is an important factor in career choice for dental students. In fact, altruism was listed as the primary motivation of dental students in Australia,<sup>27</sup> Sweden,<sup>28</sup> Jordan,<sup>29</sup> Iran,<sup>30</sup> and

India.<sup>31</sup> The survey literature on altruism among health care professions has found there to be significant heterogeneity in levels of altruism among such individuals. Carreon et al.,<sup>32</sup> using the 2007 American Dental Education Association Survey of Dental School Seniors,<sup>33</sup> found that the personal characteristics of senior dental students were the most important determinants of altruism, with the highest reported altruism among women, African Americans, Asian/Pacific Islanders, and students with low socioeconomic status.

To observe the altruism of dental students and study the change over the course of dental education, we chose to have four cohorts of dental students at two private dental schools within the same university play the Ultimatum Game under controlled conditions.

Specifically, we hypothesized that students would exhibit more generous offers than the literature average, which is around 30-40%. We also hypothesized that, contrary to conventional wisdom, there would be no evidence of a decrease in altruistic behavior over the course of dental school. Finally, we hypothesized that offers to more vulnerable responders would be higher than offers to other responders.

## **METHODS AND MATERIALS**

This study used the Ultimatum Game in an experimental setting as a behavior elicitation mechanism to test altruism. Student dentists were assigned the proposer role, and the responder role was played by a programmed computer. However, the students believed that they were playing against real people. The students played the game against six computerized “responders,” who were constructed so as to represent various demographic groups. See Appendix A. Four of the profiles represented a person from a population that is often

underserved by health care delivery systems. The profiles were fixed across all participants, though the order in which they occurred for each participant was randomized.

Participants in the study were recruited from each of the four years at two dental schools affiliated with the same university. A total of 136 students participated; 160 were recruited by verbal script (40 each cohort) and participation was voluntary. Two schools were visited because one of the schools is new and lacked fourth year students at the time of the experiment. All of the participants from the affiliated school were fourth year students. The two schools share faculty, applicants, curricula, and administrative support. For each cohort, all students participated simultaneously during a break from regularly scheduled curriculum in a classroom designed to limit communication between students. They were not permitted to talk during the session, and were unable to view each others' screens. Participants were additionally instructed to not discuss their participation with other cohorts, until they were debriefed. The four sessions occurred on four different days during the fall of 2015. The experiment was approved by two local IRBs.

The experiment was conducted by way of a website designed by the investigators. Although participants were instructed that the responders in the experimental games were real people, they were in fact fictional, and their responses were programmed to accept any offer greater than or equal to \$6 (30 percent of the \$20 endowment) and reject any offer less than that.<sup>13</sup> Each responder differed with respect to age, gender, race, and profession (Appendix A).

On the first page of the website encountered, participants viewed a photo of the responder and were offered the opportunity to engage in a brief typed communication. They then entered the dollars and cents they wished to offer to the fictional responder. Once the offer was submitted, a screen indicating that the offer was being considered appeared for less than thirty

seconds. After each move by the participant, a wait dialogue appeared for a brief period of time, simulating the amount of time it would take a human responder to answer.

Once the responder's preprogrammed response was displayed, the participant moved on to the next scenario. At the beginning of each round, the participant was able to see the offer history, and the result (accepted or rejected).

The total time to complete all rounds was as little as ten minutes, and as much as thirty minutes, depending on how long a participant took to consider and propose an offer. After the participants played all six experimental rounds, their offers were automatically entered into a text file accessible via the internet. The recorded information included participant age and gender, all six offers, and user ID. An investigator in another room reviewed this data, and for each participant counted out in cash the compensation for the first listed round (which was different for each participant, since each went through the responders in random order) and placed this cash into an envelope marked with the user's ID and distributed to participants. Since offers of less than or equal to \$6 were rejected, the most compensation a participant could receive was \$14. After all data were collected, participants were debriefed as to the fictional nature of the respondents.

A linear regression was used for data analysis; the proposers' offers were the dependent variable. The independent variables were the proposer's age, gender, and two dummy variables. One dummy variable for each cohort (first year students, second year students, etc.) and one dummy variable for each of the responder profiles was included. This allowed a calculation of the mean offer conditional upon age and gender.

## **RESULTS**

Summary statistics are displayed in Table 1. One hundred thirty-six students participated; the average age was 26.9 years old; and 57 percent of the participants were female.

Table 2 shows the descriptive statistics of the offers across year of dental school. The participants on average shared 48 percent of their \$20 endowment with the responder. In accordance with our hypothesis, the participants in this study offered more than the literature average. However, the modal offer was a 50-50 split, which is something that occurs frequently.

Figure 1 shows what the average offer would be from a typical participant in each cohort – i.e., it displays the mean offer by cohort, conditional on the participant being a 26.9 year-old female. The graph also displays the standard error of the coefficients. The offers decrease over the first three years then increase in the fourth year, with conditional offers of 48.7, 48.6, 47.2, 51 percent, respectively ( $P=.06$ ).

These proportions are conditional on age and gender. Age is significant, and for every one year that the student ages, the proportion offered increases by 0.3 percentage points. Gender is also significant: being a female is associated with an increase of 2.6 percentage points.

To explore the results further, we also tested each pairwise combination of cohorts. The only significant difference was between third years and fourth years ( $P = 0.04$ ).

The two patient profiles that garnered the highest average conditional offers from all years were Jim (offer proportion of 0.506) and Maxwell (offer proportion of 0.504), the former described as having some college and being disabled and the latter described as having only secondary education and being unemployed. Third was was Ethel (offer proportion of 0.495), a responder described as an elderly, retired female.

First year students offered the most to Maxwell (offer proportion of 0.532), second year students offered the most to Ethel and Jim (0.495 and 0.493, respectively),

third year students offered the most to Ethel (0.5), and fourth year students offered the most to Maxwell and Jim (0.526 to each). By contrast, the two profiles that on average received the lowest offers were Richard (0.468), a marketing manager, and Deandre (0.47), a business executive. Richard received the lowest offer from the 1st, 2nd, and 3rd year students. From those classes, Deandre received the second lowest offers. For the 4th year students, Deandre received the lowest offers.

The null hypothesis that the subjects treated all the profiles equally was rejected ( $P=.01$ ).

## **DISCUSSION**

To date, there has been no experiment investigating the ethical behavior of student dentists. The present study aimed to fill this gap in knowledge by testing a significant component of ethical behavior: altruism. The experiment was novel, in that it evaluated dental students' altruistic behavior in an experimental setting, but used a method common to investigations of such behavior.

Our hypothesis was that dental students would behave more altruistically than the literature average, which describes offers in the range of 30-40%. The results provide evidence for our hypothesis, and indicate that dental students are disposed to act more altruistically toward their patients than the literature average.

One potential explanation for this observed phenomenon is that dental students, overall, are more disposed to act altruistically than the average person. This is consistent with survey evidence suggesting that dentists choose the profession based on a desire to behave altruistically.<sup>27-31</sup> It may be that dental students behaved more altruistically than the literature average because pursuit of the profession selects for altruistic individuals. Further research could

test this by conducting the same experiment, holding fixed age and gender of participants, but with a population of graduate students who are not training to be health professionals.

Another potential explanation is that dental students take on the behavioral dispositions of affluent individuals, as affluent individuals also act more altruistically than the literature average.<sup>34</sup> This explanation could seem less likely, since if it were true one would expect stable patterns of behavior over the course of dental school, along with a gradual increase in altruism as the proximity and likelihood of affluence increases. But instead, students' altruistic behavior dipped after the first year, only surpassing the altruism exhibited by first year students in the fourth year.

The results also indicate that altruistic behavior dips from year one to year three, and then spikes during year four. This is consistent with the conventional wisdom that dental students' ability to behave ethically decreases throughout dental school, but not with the conventional wisdom that students leave school ethically worse off than they began. On the contrary, fourth year students exhibited the highest levels of altruism. Not only were students more altruistic toward patients than the literature average, but they also got more altruistic over time. It is therefore important to reconsider the conventional wisdom that students' ability to behave ethically decreases over time. .

Another explanation of this observed behavior is that the students' reluctance to act altruistically increases as the student continues in school and picks up more of a debt burden. However, when the students reach the fourth year, they start thinking like the high-income dentists that they may become they begin to exhibit levels of altruism that mirror those of other high-income individuals.

Fourth-year students have also had at least one full year of treating patients, developing competence and confidence in their clinical skills. It is possible that with this comfort and confidence, students have honed skills in patient management, or are more prepared to enact the fiduciary relationship to which they are committed.

Finally, the results provide some evidence that dental students' altruistic behavior is associated with perceived financial status rather than race, as Maxwell and Deandre are black, and Richard, Ethel, and Jim are white.

There appears to be a pattern of more generous offers to the profiles from vulnerable groups. Maxwell, Jim, and Ethel elicited the highest offers (Panels b, c, and f in Figure 1, versus a and d). Together, these responders could be considered the most vulnerable of all the responders in the experiment. Once the Bonferroni correction for multiple testing was applied, however, no individual pair of profiles received significantly different offers. But it may be that the Bonferroni correction to the p-values is too conservative, since the tests are not actually uncorrelated. If no correction is made, then Deandre and Richard received significantly lower offers than Maxwell and Jim.

The results are consistent with the hypothesis that dental students show a large degree of altruism that is based on the characteristics of the responder. Such wholesale agreement on the part of the participants that those profiles who are more likely to be vulnerable deserve more of the endowment is strong evidence for a form of altruism that is conditional on the responder's characteristics, a finding consistent with other research.<sup>35, 36</sup>

There are several limitations of the present study. One limitation of the present study is that it did not investigate the source of the students' altruism. Further research should explore this, taking care to control for potential sources while observing behavior.

A second limitation is that, though the experiment was controlled and the profiles resembled likely patients as much as logistically possible, the experiment was not in a true clinical setting. Ideally, the experiment would have been conducted with actual patients in the course of normal treatments so that actual clinical behavior could be observed. Aside from the impossibility of standardizing such an experiment across participants, the fact that it was not conducted in clinical setting does not rebut the observation that dental students are more altruistic than the literature average or the observation that dental students become more altruistic over the course of dental school. However, the present study clearly justifies the pursuit of such a logistically and scientifically difficult study.

Further, the study was conducted at only one private institution. To provide more evidence that the results are generalizable, future experiments should recruit students from a larger number of dental schools in different regions of the United States or in other nations. The results from the present experiment warrant, and provide the methods for, the observation of altruistic behavior of dental students in these different settings and the comparison of this behavior with that of other populations and professions.

A common misconception is that longitudinal studies are the only valid method for showing changes in altruism over time. This study is cross-sectional, not longitudinal. Nevertheless, it still yields unbiased estimates of each cohort's conditional offers. The cohorts differ on age and gender; however, the regression controls for these difference. This fact is implied by the Gauss-Markov theorem.<sup>37</sup> It is possible that other demographic characteristics of the individual cohorts account for the differences in altruism. But this is unlikely, as the class profiles upon admission to the program are similar. An advantage of the current methodology is

that, unlike a longitudinal study, it does not take four years to conduct. Thus, the fact that the study is cross-sectional is not a limitation.

## **CONCLUSION**

The conclusion that dental students' altruism increases over time is important for dental educators, because it suggests that in cases where there is a genuine decrease in ethical behavior, it is likely due to factors relating to the educational environment, such as its curriculum, culture, or admissions criteria. It is not likely due to a general tendency for students' altruism to decrease. Educators and administrators should consider this fact when implementing dental curriculum, especially curriculum in ethics, professionalism, patient communication, and behavioral science.

The evidence also suggests that students exhibit a remarkable degree of conditional altruistic behavior—increasingly altruistic behavior to those who are judged to be from a lower socioeconomic status. This should be of prime interest to dental schools, since those populations who are most at risk for disease are typically those groups with a lower socioeconomic status. Dental educators should therefore not only nurture this altruism toward vulnerable populations, but also use it to enhance the ethical outcomes when treating patients of all socioeconomic statuses.

## Appendix A

Name: Maxwell Covington

Age: 24

Gender: M

Race: Black

Education: High School

Occupation: Unemployed



Name: Ethel Wiesel

Age: 85

Gender: F

Race: White/non-Hispanic

Education: Some college

Occupation: Retired



Name: Richard Helms

Age: 43

Gender: M

Race: White/non-Hispanic

Education: College

Occupation: Marketing manager



Name: Veronica Sanchez  
Age: 37  
Gender: F  
Race: White/Hispanic  
Education: High school  
Occupation: Food Service



Name: Deandre Baker  
Age: 42  
Gender: F  
Race: Black  
Education: College  
Occupation: Business executive



Jim Corn  
Age: 58  
Gender: M  
Race: White/non-Hispanic  
Education: Some college  
Occupation: Disabled



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**Table 1.** *Summary statistics*

	<b>1st years</b>	<b>2nd years</b>	<b>3rd years</b>	<b>4th years</b>	<b>All years</b>
N	42	35	33	26	136
Age	26.2	25.0	26.6	30.6	26.9
Proportion Female	0.67	0.60	0.61	0.33	0.57
Cumulative GPA	3.43	3.46	3.46	3.22	3.4
DAT	18.3	18.4	18.17	18.53	18.34

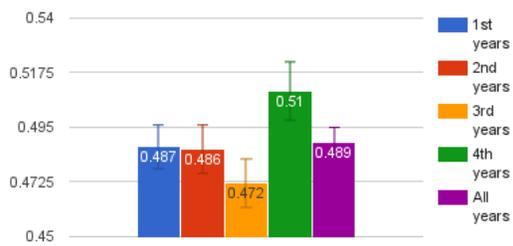
**Table 2.** *Descriptive statistics*

<b>Cohort</b>	<b>Mean</b>	<b>Mode</b>	<b>Standard Dev</b>	<b>Rejected</b>
1st years	0.48	0.5	0.15	0.1
2nd years	0.47	0.5	0.09	0.1
3rd years	0.46	0.5	0.13	0.14
4th years	0.5	0.5	0.11	0.05
All years	0.48	0.5	0.12	0.1

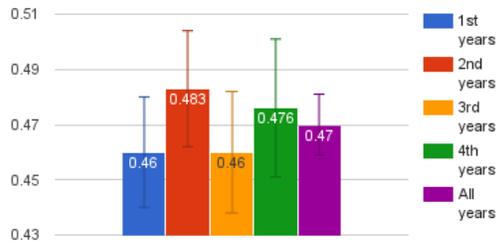
**Table 3:** *Offers conditional on age and gender*

<b>Cohort</b>	<b>Offer Proportion</b>	<b>Standard deviation</b>
1st years	48.7%	0.9%
2nd years	48.6%	1.0%
3rd years	47.2%	1.0%
4th years	51.0%*	1.2%
All	48.9%	0.6%

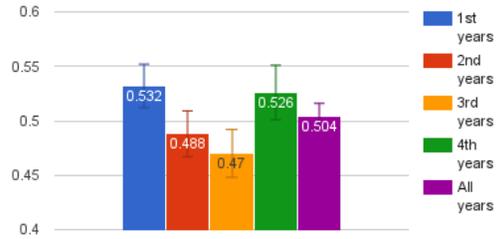
**Figure 1:** *Average for all offers*



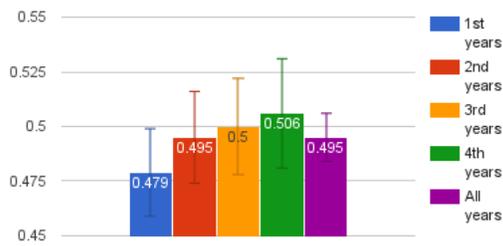
**Figure 2.** Average offers by responder profile



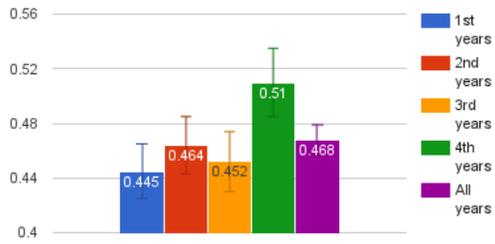
*(a) Offers to Deandre*



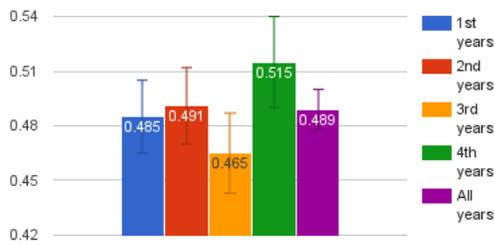
*(b) Offers to Maxwell*



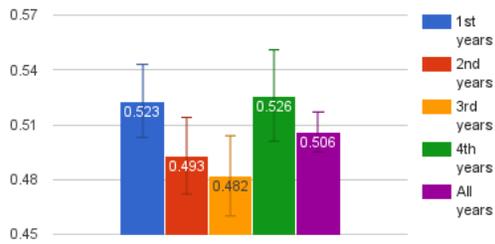
*(c) Offers to Ethel*



(d) Offers to Richard



(e) Offers to Veronica



(f) Offers to Jim