Positive Behavior Intervention System and Latino/a High School Student Academic Achievement

Jasmin Ramos McEntire
California State University, Monterey Bay, jaramos@csumb.edu

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Positive Behavior Intervention System and Latino/a High School Student Academic Achievement

Jasmin Ramos McEntire

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Education

California State University, Monterey Bay

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PBIS AND LATINO/A HIGH SCHOOL STUDENT ACHIEVEMENT

Positive Behavior Intervention System and Latino/a High School Student

Academic Achievement

Jasmin Ramos McEntire

APPROVED BY THE GRADUATE ADVISORY COMMITTEE

Kerrie Chitwood, Ph.D.
Advisor and Program Coordinator, Master of Arts in Education

Casey McPherson, Ph.D.
Advisor, Master of Arts in Education

Erin Ramirez, Ph.D.
Advisor, Master of Arts in Education

Kris Roney
Digitally signed by Kris Roney
Date: 2017.05.25 16:02:17 -08'00'
Kris Roney, Ph.D. Associate Vice President
Academic Programs and Dean of Undergraduate & Graduate Studies
Abstract

The Latino student population faces lower high school graduation rates, college enrollment, and higher office discipline referrals (ODR). Interventions, such as Positive Behavior Intervention System of Supports (PBIS) are a popular intervention program that aim to increase schoolwide positive behavior via positive modeling. PBIS decreases ODR and expulsions when implemented with fidelity and can be followed by an increase in academic achievement. A quasi-experimental quantitative design was used to compare two 10th grade science classes academic achievement. The hypothesis was: PBIS tier one incentive cards increase Latino students’ academic achievement. The treatment group \( n = 24 \) received PBIS tier one incentive cards for on-task behavior, and the control group \( n = 18 \) did not receive incentive cards for on-task behavior for three weeks. Independent and paired sample t-tests were completed to determine the difference in student academic achievement between the groups. The results suggest that both groups increased in academic achievement, however there were no statistically significant differences in academic achievement between the control and treatment groups on the post test. The hypothesis was partially accepted, because there were greater gains by the intervention group (4.0 points) in comparison to the control group (3.33 points) in academic achievement. Further research should examine the effects of incentives for on-task behaviors, and PBIS implemented with fidelity in high schools.

*Keywords:* Positive Behavior Intervention System of Supports, Incentive cards, Academic Achievement
Acknowledgements

I would like to acknowledge my husband Frank, my son Jimmy, and my family. Your struggle and support has made this possible, and I am thankful you helped me reach my goals.
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Academic Achievement

Literature Review

A key ambition for educators is to guide their students in attaining their academic goals. It has long been an issue for educators to ensure all students achieve their fullest potential. However, this is challenging as there are a variety of factors that impact high school students’ academic performance and achievement (Gandara & Contreras, 2009; Garcia-Reid, Peterson, & Reid, 2013; Hill & Torres, 2010; Rodriguez, Rhodes & Aguirre, 2014; Stewart, 2007). The administrators and teachers can control some of these factors; however, there are other factors such as home or social influences that are out of the control of the school site (Stewart, 2007). Different ethnic groups of students, for example Latino/a students of different immigration and generational levels, often face additional factors that influence their academic achievement (Gandara & Contreras, 2009; Garcia-Reid et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014).

Historically, a higher standard of living is often associated with high school graduation, academic achievement, and college degree completion. Unfortunately, Latino students have struggled with low high school graduation rates, low college enrollment, and low academic achievement (Gandara & Contreras, 2009; Garcia-Reid et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). Academic achievement is defined as when a student meets long or short term goals in relation to their academic success including excellence in all academic disciplines in class and extracurricular activities (Stewart, 2007). Furthermore, academic achievement can be characterized by the degree
of competence in school tasks measured by standardized tests, knowledge obtained or
skills developed in school subjects as determined by test scores (Stewart, 2007).

Academic achievement in high school is important because without a high school
diploma, one cannot attend college. Furthermore, a college education, specifically
obtaining a bachelor’s degree, has become increasingly necessary to secure jobs that pay
a living wage and the differences in earning power between those with and without a
college degree are significant (Garcia-Reid, et al., 2013; Hill & Torres, 2010). Students
that do not perform well academically, like some Latino students, need additional
academic support to be successful and attain their goals (Garcia-Reid, et al., 2013; Hill &
Torres, 2010; Rodriguez et al., 2014).

Students that do not perform well academically often have lower salaries as
adults, work in middle or lower class jobs, and do not attend college (Rodriguez et al.,
2014). These students often do not achieve their academic goals and many of them
identify as ethnic minorities, such as Latino students (Hill & Torres, 2010; Rodriguez et
al., 2014). Latino students are a growing population in public schools. This reflects the
growing population changes in the United States. Despite the increase of Latino students
in public education, the Latino educational experience is affected by their culture and
varies depending on school interventions and other variables (Gandara & Contreras,
2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014).

Variables Affecting Academic Achievement

There are many in- and out-of-school variables that affect academic achievement.
Stewart (2007) stated that academic achievement is associated with the amount of effort
that students devote to education and extracurricular activities. Other variables include
school commitment, school involvement, and school climate. One way to address these variables is through evidence-based interventions (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). For example, evidence suggests that interventions which increase positive school climate can promote academic achievement; whereas negative school climates that are often marked by excessive discipline issues, and left unaddressed, depresses academic achievement (Gandara & Contreras, 2009; Sulak, 2014; Woolley, Kol, & Bowen, 2008). School climate is defined by the interactions of the community, school organizational structure, background characteristics of students, and school culture (Sulak, 2014). The aforementioned variables can impact academic achievement for all students, yet there are additional factors that must be considered when working with the Latino/a population.

**Variables Affecting Latino/a Academic Achievement**

Latino students are a vulnerable minority group, and without additional intervention and support, are at risk of low academic achievement and risk dropping out of high school (Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014; Woolley et al., 2008). The Latino student population has struggled with low college enrollment and completion, low high school graduation rates, and underrepresentation in Science, Technology, Engineering, and Mathematics (STEM; Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). This is an issue of concern, as the Latino public school population almost doubled from 1987 to 2007, and the United States (U.S.) census predicts that one in four U.S. students will be of Latino decent by 2050 (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). In addition to being one of the fastest growing
ethnic groups, Census data from 2007-2011 states that 23.2% of Latinos are living below the poverty line, which is double the number of white non-Hispanics who have a poverty level of 11.6% (U.S. Census Bureau, 2013).

Research has shown that one consequence of living below the poverty line is that there are limits to educational opportunities and a documented increase in school discipline issues (Garcia-Reid, et al., 2013; Hill & Torres, 2010). Freeman and colleagues (2015a), suggest that risk factors for dropping out of school include: behavior difficulties in school and community, frequent office discipline referrals, frequent suspensions or expulsions, and student misbehavior. Researchers should focus on school-wide interventions that increase Latino students’ academic achievement, address variables that affect achievement, and increase High School graduation rates (Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014; Woolley et al., 2008).

**Latino/a students and interventions.** Multiple studies suggest that Latino youth should be provided with early and consistent positive support by responsive individuals who care about their education. This type of support will help the students thrive academically and improve their future prospects (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Rodriguez et al., 2014). Responsive individuals include parents, family members, and school staff including: teachers, administrators, and counselors (Garcia-Reid, et al., 2013; Rodriguez et al., 2014). Furthermore, Woolley, Kol and Bowen (2008), state that academic support provided by teachers reduces the likelihood of school failure among Latinos. Multiple studies suggest that teacher support significantly decreases problem behavior and increases Latino students’ perception of school meaningfulness (Gandara & Contreras, 2009; Garcia-Reid, 2013; Woolley et al., 2008).
School-based interventions that contain all these factors may improve Latino high school enrollment and decrease drop-out rates because they address school climate (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013).

**School climate and effects on student achievement.** Since school climate is a variable that affects academic achievement, interventions that address changing school climate may lead to improved academic achievement and may address the education gap in the Latino student population (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Rodriguez et al., 2014; Woolley et al., 2008). Latino students not only face the same challenges that apply to all students, but additional factors that are influenced by their culture and systemic injustices (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). Latino students often attend low-income and urban schools which have high transfer and dropout rates, disciplinary issues (fights, defiance, office discipline referrals) and limited resources (Gandara & Contreras, 2009; Hill & Torres, 2010); all of which affects students’ perception of school climate.

In contrast, schools that have a safe and orderly climate have more equitable academic achievement between white students and students of color (Lee & Bryk, 1989). Additionally, school attachment is a factor to academic achievement, therefore students’ perception of climate may affect school attachment (Garcia-Reid, 2013; Lee & Bryk, 1989). In other words, the more students feel attached to their school, the better they perform academically and obtain their academic goals (Lee & Bryk, 1989). Intervention programs often make it a priority to encourage a safe and orderly climate (e.g., classroom management, effective discipline, improved school organization and consequences; Gandara & Contreras, 2009; Garcia-Reid, et al., 2013). These types of intervention
programs may be a way to cultivate a safe and orderly (e.g., on-task behaviors) school climate and therefore promote equitable academic achievement between white students and students of different ethnicities; however, there is a dearth of research literature that addresses school climate and Latino youth (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Rodriguez et al., 2014).

Another way for schools to influence school climate is through effective behavior management (Stewart, 2007). By focusing on addressing variables that increase academic achievement, schools can lend support to Latino students to increase academic performance (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013; Hill & Torres, 2010; Rodriguez et al., 2014). Variables that positively affect academic performance and success include peer groups and influence, meaningful and positive relationships with peers and staff, and parent involvement (Stewart, 2007); Latino students are less likely to participate in school activities that promote this (Gandara & Contreras, 2009; Garcia-Reid, et al., 2013). Many school interventions aim to increase academic success and include either some form of parental involvement, increase in positive relationships with peers and staff, or promote positive peer influence to help achieve this.

**Positive Behavior Intervention Systems and Supports**

The goal of the widely-used school intervention, Positive Behavior Intervention System of Support (PBIS), is to create positive interactions between peers and increase academic achievement by reducing problem behaviors (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). One way PBIS does this is by increasing on-task behavior and decreasing off-task behavior. On-task behavior is defined as when a student has their eye gaze set on teacher, activity, or instructional materials (Godwin et
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al., 2016; Ruff & Rothbart, 1996). On-task behavior is often associated with academic achievement (Otero & Haut, 2016). On the other hand, students who exhibit off-task behavior for a large portion of their time are at risk of lower academic achievement and a greater likelihood of negative behavioral outcomes and school dropout (Otero & Haut, 2016). Within the framework of PBIS, on-task and positive behavior is rewarded, therefore promoting a positive school climate (Freeman et al., 2015a).

These multi-tiered systems of support are implemented with the goal of reducing problematic behavior and reinforcing positive behavior among students (Freeman et al., 2015a, 2015b). PBIS has become popular and is widely used in elementary, middle and high schools throughout the U.S. (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). The popularity of PBIS stems from research demonstrating improvements in positive behavior within academic and social settings in schools with behavioral issues (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). Also, PBIS research suggests it is effective in reducing office discipline referral (ODR) rates because it prevents problematic behaviors, which lead to ODRs (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). In addition, a key facet of the PBIS framework is that academic improvements will follow behavioral improvements (Kennedy et al., 2009). Therefore, if on-task behavior (considered positive) is reinforced, academic achievement should increase.

Typically, PBIS programs have three tiers, with each tier having different levels of support depending on the needs of the student (Freeman et al., 2015a, 2015b). Interventions are school wide and applied to all students to reinforce positive behavior as the school culture. One tool used as a school wide tier one intervention is the use of
incentive cards (Kennedy et al., 2009). This current study followed suit and focused on the use of this tool to promote positive behavior (on-task behavior).

**PBIS tier one interventions and incentives.** PBIS program implementation suggests common school-wide rules, expectations and instructional procedures (Freeman et al., 2015a, 2015b). Screening tools are used to identify students who need additional support, and these students move on to more individualized attention with group intervention and placement in tier two, or individualized intervention with placement in tier three. PBIS tier one interventions are implemented school-wide and focused on establishing a positive school climate. One aspect of PBIS is positive attending, which is an evidence based practice that encourages and maintains positive classroom behavior. Some examples of positive attending are praise and rewards for on-task behavior. Using incentives is a cost-effective strategy to raise student achievement even in the poorest minority students in low performing schools (Allan & Fryer, 2011). Incentives for specific behaviors may lead to a student maintaining on-task and positive behaviors (Allan & Fryer, 2011).

**PBIS fidelity and success with Latino/a high school students.** Although PBIS is evidenced based, and the problem-solving methods are grounded in literature, PBIS is challenged by extrinsic influences such as social, economic and cultural factors, which influence student academics and behavior (Utley & Obiakor, 2012). Furthermore, Freeman et al. (2015a, 2015b) identified the potential challenges (e.g., external factors) associated with high schools implementing PBIS with fidelity. PBIS programs implemented with fidelity are successful at reducing ODR, improving school climate, and positively affecting student attendance at the high school level; however, research on
PBIS implementation at the high school level is scarce (Freeman et al., 2015a, 2015b). There is currently a lack of data of PBIS implementation in high schools; although the limited data available supports the connection between PBIS implementation with fidelity and student academic success.

Furthermore, there is little research available regarding PBIS, minority groups, and academic achievement despite the widespread use of PBIS. To date, research surrounding PBIS interventions has not focused on culturally diverse populations like Latino students (Freeman et al., 2015a, 2015b). The current data is from dissertations, and there are no peer-reviewed sources supporting the link between PBIS implementation with fidelity and improved academic achievement in Latino students. Multiple studies suggest there is a need for further research in PBIS effectiveness and implementation at the high school level (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). The literature supports that Latino students may benefit from guidance and support from teachers, parents, and the community. This support provides the tools needed to complete high school and attain their higher educational goals. Interventions, like PBIS, that take into account school climate and Latino culture may increase Latino academic success in high schools, and decrease dropout rates. In this study, the school intervention chosen for the target population will include efforts to promote positive relationship with others and improve school climate.

**Conclusions and Current Study**

In conclusion, review of the literature supports that Latino students are more likely than their peers of other ethnic groups to experience the risk factors for dropping out of high school and are underrepresented in college enrollment (Hill & Torres, 2010).
As the Latino population continues to grow, it is important that Latino students are represented in higher education and compete high school to contribute to society and the U.S. workforce. Latino students may benefit from positive relationships with school professionals (Rodriguez et al., 2014). PBIS tier one interventions aim to promote a positive school climate and relationships between staff and students. The literature supports further research in PBIS in high schools, and there is a gap in research on the topic of PBIS and its effect on Latino students (Freeman et al., 2015a, 2015b).

Methods

As mentioned previously, there exists a gap in research regarding PBIS and its effect on racial and ethnic subgroups, PBIS fidelity and effectiveness on increasing achievement, and PBIS implementation at the high school level (Freeman et al., 2015a, 2015b). The purpose of this study is to see if interventions like PBIS tier 1 incentive cards influence academic achievement in 10th grade Latino students. Earned incentive cards can be submitted for a weekly raffle prize, and are earned when a student is demonstrating a positive behavior in three aspects: being safe, respectful, or responsible.

Research Question

Do PBIS tier 1 incentive cards improve Latino student academic achievement in a 10th grade Biology class over the course of a three-week human body systems unit?

Hypothesis

Based on the research, if PBIS tier 1 incentive cards are given to Latino students for on-task behavior, then there will be an increase in academic achievement in Latino students (Kennedy et al., 2009).
Research Design

A quasi-experimental quantitative pre test/post test control-group research design was used. A pre test was administered to the students before the unit began, then a three week intervention was implemented, and a post quiz was administered to the students at the end of the unit.

**Independent variable.** The independent variable was PBIS incentive cards that provide praise and incentive for on-task behavior. Incentive cards are a form of school wide tier 1 intervention and are distributed when a staff member witnesses a student being safe, respectable, or responsible. Responsible can be further defined as academically responsible, for example, a student accepting responsibility for their own education. Taking responsibility for one’s own education can be described as being on-task. On-task behavior is operationally defined as eye gaze set on teacher, activity, or instructional materials (Godwin et al., 2016; Ruff & Rothbart, 1996). Off-task behavior is operationally defined as visual gaze elsewhere or out of their seat during an instructional activity (Godwin et al., 2016).

**Dependent variable.** The dependent variable was academic achievement and it is determined by comparing the pre test/post test results of the treatment group to the pre test/post tests results of the control group. The conceptual definition for academic achievement is defined as when a student meets long or short term goals in relation to their academic success (Stewart, 2007). The operationalized definition for academic achievement is the percentage correct on the pre/post test (Stewart, 2007). Academic performance on the pre/post test demonstrate the level of conceptual understanding in the human body system unit.
Setting & Participants

The setting was a large public high school located in the central coast region of California, where there is a dominating agricultural industry. There was a district student population of 25.7% English Language Learner (ELL) and there was a school site ELL student population of 21.8%. At the high school, 2,083 students out of the student population of 2,466 identified as Latino or Hispanic. Of that student population, there were 1,655 students who identified as socio-economically disadvantaged and many of the students were enrolled in the free or reduced lunch program; further, the school was designated a Title 1 school (Yu, 2010). The school schedule was a rotating block schedule, where all classes meet on Monday for 59 minutes, then 2-hour blocks for the rest of the week in rotating fashion. There were 51 participants from two randomly selected 10th grade biology classes. Each class was randomly assigned as either the treatment (experimental) or control (comparison) group. The students were all between the ages of 15-16 years old.

Treatment group. The treatment group was composed of 27 students, 12 males and 15 females. Within the treatment group, 25 students identified as Latino. Four of the students were considered Redesignated Fluent English Proficient (RFEP), these students were all male.

Control group. The control group was a total of 27 students, comprised of 16 males and 11 females. Within the control group, 24 identified as Latino. From the control group, four students were RFEP, and are were male.
Measures

The measure for this study was a nine-question multiple choice pre/post test (Appendix A). The pre test served as a diagnostic tool to evaluate student understanding of the content and assesses the student’s previous knowledge before the unit began. There were also short answer questions on the test, which were not being scored for this study. The pre test and post test were composed of the same questions. The test was timed to be 20 minutes long.

Validity. The unit was created by five biology teachers during weekly collaboration meetings. Standards, activities, and tests were collectively created. Professional Learning Community (PLC) members were all credentialed by the State of California to teach Biology, and have B.S degrees in Biology or Environmental Science. The quizzes were created at the school site before the unit began, therefore addressing threats of validity. Biology teachers at the site have experience in summative, formative, formal and informal assessment creation. The members of the PLC have a range from 1-20 years in teaching.

Reliability. Reliability stems from the pre and post test that was created by the PLC of Biology teachers at the school site. The test key was created collaboratively by the five Biology teachers who meet weekly.

Intervention

The intervention was the distribution of incentive cards to all students when they were exhibiting safe, responsible or respectable behavior and were being academically responsible by being on-task. On-task behavior is described as eye gaze set on teacher, activity, or instructional materials (Godwin et al., 2016). PBIS tier 1 incentive cards were
distributed with a positive note stating, “Thank you for being on-task.” Students received these cards when the researcher was circulating the room during instructional tasks. Cards were the size of business cards and have space for a note, and the words “safe, respectable and responsible” were printed on them.

Cards are a form of incentives used to promote positive and on-task student behavior. Incentives are used as a PBIS tier one intervention because they are a cost-effective strategy to raise student achievement (Allan & Fryer, 2011; Kennedy et al., 2009). Students were able to take the incentive cards they earned every week and submit for incentives at the student store, a school-based store with snacks and school supplies.

Procedures

Both the treatment group and the control group took a multiple-choice body system pre test prior to beginning the unit of study for this project. The pre test quantifies how much of the material the students in the treatment and control group already know about the topic. The classroom teacher administered the pre test during class time. The same questions were on pre test and the post test, however the order was changed from pre to post test. The unit consisted of one pre test and a post test.

After the pre test, the intervention commenced and treatment group students received an incentive card for all on-task behavior noted during instructional activities. Students in the control group did not receive incentive cards for on-task behavior. Both groups studied the identical unit and received the same curriculum and instructional activities for three weeks. Students were observed for on-task behavior during periodic checks for understanding as the teacher rotated around the room, specifically, the warm up activity where the students began the warm up and the teacher circulated and provided
credit for homework assignments. All instructional activities were graded the same way using the same rubric. All instructional activities were created by the PLC and were designed to reinforce learning.

The treatment and control group each had three classes per week to earn incentive cards for the length of the three week unit. This gave the treatment group a total of nine in class opportunities to earn incentive cards. At the end of each week, students submitted their cards for a prize. Prizes are incentives for positive behavior and include: school lunch credit, admission to school activities, school supplies, or purchases at the student store. Students from the treatment group that received incentive cards for on-task behavior wrote their names and submitted for prizes in a communal area on school grounds.

**Data collection.** The three week unit began with a pre test that is composed of nine multiple choice questions. The students were given 20 minutes to complete the quiz before the beginning of the unit. The post test was composed of the same questions but in a different order. Instructions for both groups were exactly the same.

**Fidelity.** In order to ensure intervention fidelity, visits by another teacher or staff were done for both classes for 50% of the study. This teacher ensured the presence of intervention by noting distributions of incentive cards with the treatment group when there was on-task behavior. The same teacher visited the control group and noted no distribution of incentive cards even with the presence of on-task behavior (see Appendix B).
Ethical Considerations

Both groups received verbal praise for on-task behavior throughout the instructions, however only the treatment group received the PBIS tier 1 incentive card treatment during the warm up and instructional activities. No names or school sites were mentioned. Students in both groups received incentive cards if positive behavior was witnessed outside of the instructional classroom setting. Students in both groups received incentive cards in their other subjects.

Validity threats. One threat to validity was that the same assessment was given to the students for the pre and post test. The validity threat was minimized due to the researcher alternating the order of the questions on the tests; therefore, the post test was a different order from the pre test. Another threat to validity was that students in the treatment group and control group were still eligible to receive incentive cards in their other subjects and by school staff when demonstrating safe, responsible, or respectable behavior. Students attended all subjects on Mondays and three subjects the rest of the week and had the opportunity to earn an incentive card in other subjects. This posed as a threat to validity because academic achievement in the control group may be influenced by obtaining an incentive card in another subject or by another school staff member.

Another threat to validity was that students could have communicated with each other and realized they are not receiving incentive cards even though they are exhibiting on-task or positive behavior. To offset this threat, the researcher informed students to not tell other classes of their incentive card rewards. Researcher bias did not impact the outcome as the researcher adhered to the operational definitions of on-task behavior and provided intervention to all students for exhibiting on-task behavior. The researcher did
not withhold or take away incentive cards even if the student stopped exhibiting on-task behavior after they received an incentive card.

**Quantitative Data Analyses**

All data were entered into the Statistical Package for the Social Sciences® (SPSS®) for Windows, version 24.0.0 (SPSS, 2016). No names or identifying information were included in the data analysis. Before data was conducted all data was cleaned to ensure no outliers were present (Dimitrov, 2012). Fourteen participants were removed from the data file due to missing or incorrectly completing the pre test or post test. After cleaning the data the final sample size was 42 participants; 24 for the treatment group and 18 for the control group. After cleaning the data, independent (control and treatment groups) and paired (pre test and post test) samples t-tests were conducted to determine the significant differences between the mean scores on the body systems tests in academic achievement. Further, before implementing the analytical output, Levene's Homogeneity of Variance was examined to see if the assumption of equivalence had been violated (Levene, 1960). If Levene’s Homogeneity of Variance was not validated (i.e., the variances were equal across groups), data were interpreted for the assumption of equivalence; however, if the variances was not equal across groups the correct output was used for interpretation.

**Results**

Two independent samples t-tests were conducted on the whole sample \( n = 42 \) for both the pre and post test scores. Results for the pre test were: Levene’s Homogeneity of Variance was not violated \( (p > .05) \), meaning the variance between groups was not statistically different and no correction was needed, and the t-test showed
significant differences between the mean scores on the pre tests between the two groups $t(40) = -2.26, p < .05$. Meaning that the means between the two groups was statistically different on the pre test with the control group scoring an average of 1.12 points higher than the treatment group (see Table 1). Although this was not ideal, the two groups were still considered comparable based upon demographics and previous assessment data.

Results for the post test were: Levene's Homogeneity of Variance was not violated ($p > .05$), meaning the variance between groups was not statistically different and no correction was needed, and the t-test showed non-significant differences between the mean scores on the post tests between the two groups $t(40) = -0.96, p > .05$. These results show that the two groups achieved similarly to each other on the post test, which does not confirm the hypothesis that the treatment group would score statistically higher than the control group (see Table 1).

Table 1

Results of Independent Samples T-Tests

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>2.38</td>
<td>1.21</td>
</tr>
<tr>
<td>Control</td>
<td>3.50</td>
<td>2.01</td>
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<tr>
<td>Post Test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>6.38</td>
<td>1.66</td>
</tr>
<tr>
<td>Control</td>
<td>6.83</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Note. SD = Standard Deviation.

After determining the differences between pre and post test scores between groups, two paired t-tests were run for both groups (i.e., treatment and control) to determine if participants mean scores from pre to post were significantly different within each group (see Table 2). Results for each group were as follows: treatment group, $t(23)$
Thus, both groups scored statistically significantly different from pre test to post test. Additionally, there was a slightly larger difference in scores by the treatment group (4.0 points) in comparison to the control group (3.33 points). The negative t-value for each group indicated an increase in scores from pre to post test for both groups; however the treatment group had a bigger increase than the control group. Additionally, although the control group scored higher on the post test, the treatment group made more gains as they improved from 2.38 to 6.38 on the post test. These findings partially support the original hypothesis since the treatment group made a greater increase in scores than the control group; however, the difference was not statistically significant.

### Table 2

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.38</td>
<td>1.21</td>
</tr>
<tr>
<td>Post</td>
<td>6.38</td>
<td>1.66</td>
</tr>
<tr>
<td>Control Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.50</td>
<td>2.01</td>
</tr>
<tr>
<td>Post</td>
<td>6.83</td>
<td>1.34</td>
</tr>
</tbody>
</table>

*Note. SD = Standard Deviation.*

### Discussion

The purpose of this study was to examine if giving PBIS tier 1 incentive cards to Latino students for on-task behavior would increase their academic achievement. There were 42 participants in two Biology classes in this study; 24 in the treatment group and 18 in the control group. Before the study, students took a pre test on the material that was to be presented. Over the course of a three week unit, students in the treatment group had
the opportunity to earn incentive cards for on-task behavior during instructional practice, while the control group had instruction as normal. During the unit, all instructional material was the same, the only difference being the distribution of incentive cards for on-task behavior. At the end of the unit, both treatment and control groups took a post test composed of the same questions from the pre test, but in a different order.

In this study, the hypothesis was partially accepted, because there was no statistically significant difference on the post test between the treatment and the control group. Although the results of the independent samples t-test do not support the hypothesis, the results of the paired t-test show that both groups made statistically meaningful growth from pre to post test. In addition, the treatment group was able to improve more (by 4.0 points compared to 3.33 points) than the control group, providing partial confirmation of the original hypothesis that using PBIS tier 1 cards would improve Latino student’s academic achievement.

Currently, there is little research available regarding PBIS, minority groups, and academic achievement (Freeman et al., 2015a, 2015b). Many current studies support further research into student subgroups (e.g., high school, ethnicities) and implementation at the high school level (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012). Since PBIS studies at the high school level are scarce (Freeman et al., 2015a, 2015b), it was difficult to compare the current study with past research. Within those few studies available, it has been suggested that PBIS implementation with fidelity leads to student academic success (Freeman et al., 2015a, 2015b). In this study, results demonstrated that students within the intervention group had greater gains than the
control group in regard to academic achievement; thus, further research in student subgroups is needed (e.g., high school, ethnic groups).

**Limitations & Future Studies**

There were a few notable limitations in the study. One limitation is that PBIS implementation is in its fourth year at this school site, and it may not be followed with fidelity by all staff members. During the course of the study, it was suspected by the researcher that many students did not know how to submit their incentive cards to the school. In addition, students mentioned they had not received an incentive card before at the school site. PBIS can be effective when followed with fidelity by trained staff members (Freeman et al., 2015b); however, the lack of fidelity by other faculty members may have contributed to the findings in this study.

An additional limitation was that the pre test mean scores for the control group were nearly a point higher than the treatment group (see Table 1). This is partly due to individual students being outliers in the control group and scoring extremely high on the pre test. Three students in the control group pre test scored a six, seven, and eight correct out of nine questions, respectively. These numbers skewed the mean of the pre test and left little room to increase scores, for example, the student who scored eight correct out of nine questions. These range of scores contributed to the high standard deviation for the control group pre test (see Table 1). Another limitation was the small sample size which could have affected the study. Sample size was an issue because the scores were influenced by score outliers, and student absences. When a student was absent for either the pre/post test, their scores could not be used and they had to be dropped from the
study. This led to having a smaller sample size than originally intended and may have led to not having enough statistical power to locate difference.

Moreover, the study was limited by the use of convenience sampling. Using a convenience sample limits the ability to generalize findings. Further, the length of the intervention was three weeks, and this short intervention period was a limitation to the study. Although it was enough time to see a change in the treatment group, it was a short intervention period. A longer intervention period may be better to see long term effects of PBIS on academic achievement. It is recommended for future studies that the intervention period be longer to see if the current hypothesis could be fully accepted.

One finding that can enhance future study is that there was a greater positive difference in pre/post test scores by the treatment group in comparison to the control group. This difference in positive gain means the hypothesis was partially accepted; suggesting that this type of intervention could prove beneficial if used over a longer period of time with a large random sample. In addition, future studies with a longer intervention period, larger treatment group, and implementation of PBIS with fidelity are also suggested. The current consensus that PBIS at the high school level has to be further explored is also recommended by the researchers of this study (Bohanon et al., 2006; Freeman et al., 2015a, 2015b; Utley & Obiakor, 2012).

**Conclusion**

As the Latino population continues to grow, it is important to find adequate intervention programs to support this high-risk population. In order to compete with future job markets and the chance for a brighter future, this underserved population should have access to academic equity. This academic equity can in the form of support
for graduating high school and support for increasing academic achievement—both are goals of PBIS. Intervention programs, like PBIS, need to be structured to address behavioral and academic issues and need to be implemented schoolwide with fidelity, not just by one researcher.
References


Appendix A

Unit Test

Name: ________________________

1. What enzyme found in saliva breaks chemical bonds between the sugar monomers in starches? 1 point
   A. hydrochloric acid
   B. amylase
   C. chyme
   D. pepsin

2. Which of the following is true of enzymes? 1 point
   A. are not very specific in their choice of substrates
   B. lower the activation energy of a reaction
   C. all enzymes have the same pH optimum
   D. the active sites of all enzymes have the same three-dimensional shape

3. What does the process of peristalsis do? 1 point
   A. creates smaller food particles to aid digestion
   B. smooth muscle contractions that move food through the esophagus
   C. increases surface area of the intestines
   D. pumps blood throughout arteries

4. What is one of the roles of the pancreas in nutrition? 1 point
   A. neutralizes acids
   B. churns food
   C. dissolves food
   D. absorbs nutrients

5. A substance with a pH of 6 is called? 1 point
   A. a base
   B. an acid
   C. both an acid and a base
   D. neither an acid nor a base

6. Which of the following makes up a molecule of water? 1 point
   A. one atom of sodium and one atom of chlorine
   B. one atom of hydrogen and two atoms of oxygen
   C. one atom of hydrogen and one atom of oxygen
   D. two atoms of hydrogen and one atom of oxygen

7. What passage carries food between the pharynx and the stomach? 1 point
   A. esophagus
   B. epiglottis
   C. small intestine
8. Where does the process of chemical digestion begin?
A. small intestine
B. mouth
C. esophagus
D. stomach

9. Select the definition that fits best. A calorie is the amount of energy needed to?
point
A. Raise the temperature of 1 g of water by 1 degree Celsius
B. Raise the temperature of 1 g of fat by 1 degree Celsius
C. Raise the temperature of the body by 1 degree Celsius
D. None of the above

10. Completion: If a part of the stomach digests itself, a(n) _____________ develops.

11. Paragraph response. What are the functions of the digestive system?

12. Completion. The pH scale is a measurement system that indicates the concentration of _________________ in the solution.
**Appendix B**

**Intervention Fidelity**

Observer: Angelica Pulido

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