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# Deportes para la Vida:
# An Evaluation of an HIV/AIDS Prevention And Life Skills Intervention in the Dominican Republic

By
Daud Lodin
Master in Public Health

Global Epidemiology

_____

Travis Sanchez, DVM MPH
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2008

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An abstract of
A thesis submitted to the Faculty of the
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ABSTRACT

Deportes para la Vida: An Evaluation of an HIV/AIDS Prevention
And Life Skills Intervention in the Dominican Republic
By Daud Lodin

*Background*

The NGO Dominican Republic Education and Mentoring (DREAM) Project runs Deportes Para La Vita (DPV), a program that uses sports activities to teach sexual health to its students. An evaluation study was conducted of this program between May and August of 2013.

*Methods*

Our study design was intervention-control, surveying students (10-26 years of age) that had (intervention) and had not (control) participated in DPV in the last year. Thirteen survey events were conducted along the north coast using United Nations General Assembly Special Session (UNGASS) HIV knowledge and Centers for Disease Control And Prevention (CDC) sexual health practices questions. Correct responses to all five UNGASS knowledge questions and sexual health practices were compared between intervention and control groups. Multivariate logistic regression analyses controlled for sex, religion, age, language spoken, ethnicity, and region.

*Results*

A total of 132 survey were completed - 70 intervention and 62 control. Sixty-one percent of the intervention group and 80% of the control group were less than 19 years of age. Thirty-nine percent of the intervention group correctly answered all knowledge questions, compared to only 10% of the control group ($p<0.001$). No control participant under the age of 19 answered all questions correctly. No significant findings were made in the practices analyses. The adjusted odds ratio for HIV knowledge by intervention participants was 3.3 (95% CI = 1.1, 9.8; $p=0.036$).

*Conclusion*

This evaluation shows that participants of DPV demonstrate a higher level of HIV knowledge and shows some evidence of positive sexual behavioral changes. DPV serves as a strong tool for sexual health education within the country and succeeds as a worthy method of health risk communication.

# Deportes para la Vida:
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Sir Isaac Newton once said, “If I have seen further, it is by standing on the shoulders of giants.” This thesis is dedicated to those that have helped me see further.

Dr. Thomas Harries, Dr. Vin Tangpricha, Dr. Travis Sanchez, Ray Serrano, Molly Hamm, Yanlico Munesi, the amazing people at DREAM Project, my wonderful extended family, my sister, and my dear mother. Thank you for bringing happiness and success to my life.

## Table of Contents

# Chapter I – Background and Literature Review

## COUNTRY BACKGROUND/DESCRIPTIVE EPI

In 2009, it was reported that 1.0% of those aged fifteen to forty-nine years of age (44,000 individuals) lived with HIV in the Dominican Republic [1]. Over 1,700 deaths from HIV were reported in that year alone. Those with the highest risk are Dominican youth between the ages of fifteen and twenty-four years of age (0.7% HIV positive) [1]. Their prevalence is much higher than other countries such as the United States (0.3%) and the United Kingdom (0.1%) [2]. Several aspects have factored into this great disparity. Only 37% of the youth in the country have correct knowledge of the risk factors of the disease [1]. 19% have participated in sex before the age of fifteen and 17% has had more than one partner during the last year [1]. More than half all Dominican youth participate in unprotected sex, a disparaging sign that shows a risk for all sexually transmitted disease (STD) [1].

At the turn of the century, in reaction to the growing spread of HIV within the Dominican Republic, the government responded by developing El Consejo Presidencial del SIDA (COPRESIDA), a program designated to treat and prevent the spread of HIV [3]. Their focus was on legal and financial promotions to further these causes [3]. The areas that required the most attention were those in which there was a lower economic status and fewer educational opportunities. ‘Bateyes,’ communities that housed sugar cane factors, were areas known for high poverty and where Haitian-Dominicans migrated for work [4]. Their populations consist mostly of younger individuals (43% under the age of fifteen, 68% under the age of thirty) [4]. The HIV prevalence in these areas was higher than in any other areas of the country (5.0% prevalence) [4]. Poor availability of medical

services compounded with a lack of education and few resources all contributed to the development of this disparity [4].

## NGO/PROGRAM BACKGROUND

In the north coast of the country, a non-governmental organization (NGO) called the Dominican Republic Education and Mentoring (DREAM) Project provides educational opportunities to at-risk youth. DREAM's programs extend from early childhood through young adulthood, empowering at-risk children and youth to create a better future for themselves and their families through high quality education, youth development, and community enrichment [5]. Based in Cabarete, the DREAM Project reaches more than 4,000 children each year through fourteen programs in fifteen different communities [5].

As part of its youth development strategy, the DREAM Project implements an HIV/AIDS prevention and life skills course called Deportes para la Vida (DPV) [6]. The program emphasizes on changing the knowledge, attitudes, and practices of youth in order to minimize the spread of HIV and encourage healthy decision-making. The program utilizes the fun of sports and games to teach students about HIV transmission, risk factors, and prevention. Its focuses on how to avoid risky partners, manage risky situations, reduce stigma and discrimination, and eliminate gender-based violence [6]. The 15-hour program uses a peer-to-peer education model, where local youth trained as DPV coaches deliver the curriculum, serve as mentors, and develop their own leadership abilities [6].

DPV was first developed in 2005 as a pilot project between Grassroot Soccer (GRS), the University of Vermont, and the Dominican community of Batey Libertad

[5,6]. In 2010, program oversight was officially transferred to DREAM Project [6]. The organization began collaborating with Peace Corps, whose access to PEPFAR (President's Emergency Plan for AIDS Relief) funding and Peace Corps Volunteers led to rapid growth across the country. The combined efforts of DREAM and Peace Corps have resulted in the certification of more than 200 DPV coaches since 2010 and more than 2,500 students per year [5,6]. Since the years following its inception, there has not been an evaluation measuring the program's effects on both knowledge and behavior. In the spring of 2013, an evaluation plan was developed and subsequently implemented during the summer. This evaluation was created with the collaboration of two former Peace Corp. volunteers, who developed the outline to a monitoring and evaluation plan in the spring of 2012 [7]. The purpose of this thesis is to detail the interpreted results of this study in a manner that would prepare the results for publication. The purpose of this chapter is to create a basis for this interpretation and to offer a series of unanswered questions based on current literature with regards to the effectiveness of sports-based HIV education, such as DPV, in underprivileged regions.

## CURRICULUM

DPV's curriculum was developed in cooperation with GRS. Originally entitled "Football For Life", the program was translated into its Spanish name "Futbol Para la Vida" and further adapted into "Deportes Para la Vida" or "Sports For Life" when the program changed its focus from soccer to baseball [6]. The curriculum is divided into ten sections that each teaches a set of principles with regards to HIV and sexual health. The first day of the course involves the student signing a contract, committing themselves to the program and its principles and learning the basic risks with regards to contracting

HIV [6]. Each subsequent day of teaching covers a different aspect of disease prevention and participant empowerment, which includes how the disease is transmitted and how this transmission can be reduced [6]. Certain days of the curriculum focus more so on individual preventative measures, such as having a single partner or using condoms. Other days the focus is centered on more community-based lessons. The final day of instruction is a community-lead graduation ceremony, where each student demonstrates their knowledge and commitment to what they have learned before being given a certificate of graduation from their coaches [6]. The program combines knowledge and empowerment to motivate students in making the right decisions with regards to their sexual health and to spread knowledge about HIV and AIDS to their family and other members of their community [8].

Other than DPV and GRS, many other sports-based programs have been established worldwide to educate underserved or underprivileged youth all over the world. Mercy Corps in Africa, Kick4Life, Whizzkids United, and F4 are just a few of the organizations that support sports-based health education with their main focus being reproductive health and HIV prevention [9-11]. These organizations all rely on assistance from the same funding bodies (UNAIDS, PEPFAR, etc.), yet their curricula vary with regards to implementation and primary focus [9-11].

## BASIS FOR PREVENTION THROUGH THESE INTERVENTIONS

The fundamental principle of sports-based interventions is that health education leads to prevention. More specifically, HIV knowledge leads to a change in behavior and a change in sexual practice, ultimately leading to a decreased incidence in risky behavior. There are several studies that have shown how education can cause behavioral changes to

take place and cause the prevention of various STDs [12-16]. The general consensus from researchers and from studies is that health education leads to safer sexual practices and, as a secondary result, a decreased rate of transmission [13,15].

DPV is different from other health education interventions in that it combines games and sports into their curriculum. These activities serve two purposes in enhancing each student's experience. The first involves the role of entertainment and education. Behavioral theorists believe that educating through fun activities helps to involve the participant with their education and help with memory retention, which ultimately lead to behavioral changes [17-19]. The use of popular radio soap operas in Tanzania have proven effective in enhancing the popularity of family planning within the country [20]. This leads us to the second purpose of using sports to convey health education. Whether it is a local community's coach or David Beckham, role models are considered effective representatives for behavioral changes in health. Many studies have shown the socio-behavioral changes that celebrities have caused by endorsing or advocating for certain health issues [21-24]. In the realm of HIV advocacy, the media exposure of Magic Johnson and the admission of his HIV status impacted the perception of HIV across the world [24]. Through the use of celebrity endorsements and local trainers, sports-based health interventions use role models to advocate their programs and to appeal to those of all ages.

## PAST EVALUATIONS/LITERATURE

The focus of this section will be to look at study results that examined either changes in knowledge or behavior. From the literature search, the majority of evaluations conducted for sports-based health education programs contained a knowledge

component, yet very few focused on examining behavioral changes or differences in behavior between intervention and control groups. In 2013, Kaufman et al. conducted a systematic review and meta-analysis of published, unpublished, and conference presented evaluations of sports-based HIV education in Africa, the Caribbean, and the United States [25]. Of the 952 publications found, twenty-one were narrowed down to fit the authors' exclusion and inclusion criteria [9-10, 26-41]. These evaluation studies varied with regards to the country of program implementation (sixteen in Africa, two in the Caribbean, and three in the US), quality and choice of evaluation study design, use of a control group (only eight studies), and the particular program being evaluated (only five GRS evaluations and one DPV evaluation) [25]. Eighteen of these studies examined the change in knowledge for participants and showed a relatively positive change in HIV and reproductive health knowledge (RR: 1.25, 95% CI: 1.16, 1.34) [25]. Many of these studies used a quasi-experimental or pre-post evaluation study designs (sixteen out of eighteen), which may not indicate the true effect on knowledge of these educational programs [25]. Six studies examined behavioral changes after program implementation (five showing positive behavioral changes, one showing no change) [25]. Kaufman et al. used two common metrics (recent condom usage and HIV counseling and testing) to measure the collective behavioral results of these studies. Greater condom usage was statistically associated with intervention completion (RR: 1.29, 95% CI: 1.00, 1.59), yet greater HIV counseling and testing uptake was not statistically significant (RR: 1.81, 95% CI: 0.20, 3.42) [25]. As reported by Kaufman et al., no evaluation studies using biological endpoints have been reported [25], apart from a single study that discussed the practicality of such an endeavor [42]. A feasibility study conducted in 2001 by Cowan et

al. detailed the use of STD testing for the purpose of examining the efficacy of school-based reproductive health interventions in secondary school aged children in Zimbabwe. They found high acceptability and participation with students, parents, and teachers, and the presence of HIV, chlamydia, and gonorrhea prevalence within their cohorts (3.6%, 0.4%, 1.9%) [42].

Of the evaluations found in this systematic review, two were of note with regards to DPV. Kaufman et al. also conducted DPV's first evaluation in 2011 using a quasi-experimental study design, focusing on knowledge and communication [31]. They found a strong positive association with the improvement of knowledge (AOR: 13.02, 95% CI: 8.26, 20.52). The other study, an unpublished thesis by Wardell in 2009, was also a quasi-experimental evaluation developed for a DPV-clone in St. Lucia [36]. They reported only a non-significant positive association for knowledge improvement (RR: 1.14, 95% CI: 0.81,1.60). Four studies examining GRS interventions used cross-sectional, quasi-experimental, and pre-post study designs [9,26,30,37]. Three of these studies measured change in knowledge and showed varied positive associations (RR: 1.00 to 1.50) [9,26,37]. The only study to measure behavioral changes was conducted again by Kaufman et al. in 2010 [30]. Using a cross-sectional study design, they examined sexual debut and activity, comparing GRS graduates with non-graduates. The prevalence of sexual activity was even in both cohorts (AOR: 0.8, 95% CI: 0.5, 1.3) [30], while graduates of GRS were more likely to start their sexual debut much later than non-graduates. Graduates were also more likely to have fewer sexual partners both in their lifetime (1.8 versus 2.8 partners, p=0.015) and in the last two months (0.9 versus 1.4

partners, p=0.046) [30]. No significant association was found for condom usage during the last sexual episode between graduates and non-graduates (67% versus 58%, p=0.510).

A comparative literature search found that the Kaufman et al. article's [25] covered the majority of knowledge and behavior evaluations conducted for sports based HIV education since the inception of GRS in 2002. Only three other evaluation studies were found outside of this systematic review. Of those studies, GRS conducted two self-evaluations in 2004 [43] and 2006 [8]. The first study investigated knowledge change by administering pre-post surveys before and after implementation of the program, as well as examining the attitudes, perceptions, beliefs, and stigmas associated with their program [43]. HIV knowledge appeared to improve variably across all knowledge questions (condom use in the prevention of contracting HIV, pre: 51%, post: 77%; AIDS transmission knowledge and myths, pre: 38%, post: 49%) [43].

The purpose of their second study was to examine the spread of knowledge, as a result of program implementation [8]. This study showed that for every student educated through GRS, a median amount of three to five fellow community members discussed the program or were educated by the student [8]. This ranged from immediate family members to classmates and other members of the local community. These baseline evaluations showed a demonstrated improvement of knowledge both on a participant and community level.

More recently, a 2013 evaluation conducted by Balfour et al., surveying participants of the Whizzkids United Program in South Africa, examined knowledge and behavioral changes in HIV prevention [44]. A significant association was found in HIV knowledge for participants over non-participants (48% versus 37% correct, $p<0.0001$).

Drug and alcohol use was also less likely to occur in participants compared to non-participants (Drug Use OR: 0.463, 95% CI: 0.31, 0.70; Alcohol Use OR: 0.486, 95% CI: 0.31, 0.76) [44]. No associations were found for any other behavioral differences between participants and non-participants.

Many of the evaluation studies noted in this literature review utilized paper-based survey instruments or recorded interviews in order to collect data from participants. However, the study detailed in this thesis was completed using tablets programmed with Open Data Kit (ODK) and FormHub surveys. These electronic data collection methods are considered easier to control, do not require internet, and protect participant privacy by eliminating a potential paper trail and by immediately putting password protection on each captured survey. In another GRS study, Kaufman et al. compared the use of electronic and paper-based survey collection methods, examining comfort, ease, and attitudes between the two data collection tools [45]. Using GRS students in South Africa and Zimbabwe, participants preferred electronic collection methods to paper methods at a rate of five to one (78.1% versus 13.9%). On a one to five point scale, one being worst and five being exceptional, understandability (mean = 3.4 points), comfort (mean = 3.6 points), and honesty (mean = 3.6 points) of the questions were also all positively rated [45].

## UNANSWERED QUESTIONS

DPV's curriculum has adapted and changed several times over the previous years. A change in sport, a larger curriculum, improved translations in Spanish and Haitian Creole, and accommodative changes for each local community have created a program unique to the Dominican Republic. Apart from a single study conducted using DREAM

communities [31], a proper evaluation of the program's effect on knowledge and behavior has not been conducted. Furthermore, very few evaluation studies have been conducted on GRS-based programs in general [9,26,30,37], leading to a lack of evidence to support the implementation of this program in all settings. Inconsistent study designs, absence of control groups, and a lack of uniformity for questionnaires and data collection methods has caused excessive variability to the results of these evaluations [25], creating difficulty in ensuring that all of these programs are comparatively monitoring their progress in improving knowledge and decreasing the incidence of risky behavior.

Of the articles cited in our literature review, knowledge was the primary metric of interest (88% of studies), however, behavior was less so a priority (25% of studies) [25]. Instead, they focused on attitudes, communication, stigma, and perceptions of sports-based health education programs [25]. This would indicate that the overall goal of these studies was to ensure compatibility of the curriculum to each community, rather than the actual effectiveness of these programs. The results of these evaluation were aimed more so at examining program acceptance rather than effectiveness. Focusing more on the needs of the NGO, DPV's only evaluation [31] lacked a behavioral component, meaning that in the nine year span since the program's inception, no survey or evaluation has been conducted to examine whether or not they were running an effective program.

SOLUTION THROUGH THIS THESIS

In order to correctly understand the effectiveness of their sport-based HIV education program, DREAM Project would need to conduct a standardized evaluation study that focuses particularly on knowledge and behavioral changes. This thesis aims to explain the results of an evaluation that met these criteria. Completed in the summer of

2013, it utilized United Nations General Assembly Special Session (UNGASS) and Centers For Disease Control and Prevention (CDC) standardized surveys for HIV knowledge and sexual practices. The results of these surveys would allow DREAM to compare the effectiveness of the program with national and international data. In addition, the results of this study will allow DREAM to compare the usefulness of DPV with other sports-based HIV education programs. Since this study utilized electronic survey instruments, the participants of the study were able to answer questions more confidentially and privately, ensuring a greater amount of truthful response. Finally, the interpretation of this evaluation will give DREAM tangible results that may explain whether or not exposure to DPV is responsible for improved behavior within the Dominican youth that have completed or participated in this program.

## Chapter II – Manuscript

TITLE - Deportes para la Vida: An evaluation of an HIV/AIDS prevention and life skills intervention in the Dominican Republic

AUTHORS – Lodin D, Hamm M, Sanchez TH

TARGET JOURNAL: Journal of Acquired Immune Deficiency Syndrome (JAIDS)

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ABSTRACT

*Background*

The NGO Dominican Republic Education and Mentoring (DREAM) Project runs Deportes Para La Vita (DPV), a program that uses sports activities to teach sexual health to its students. An evaluation study was conducted of this program between May and August of 2013.

*Methods*

Our study design was intervention-control, surveying students (10-26 years of age) that had (intervention) and had not (control) participated in DPV in the last year. Thirteen survey events were conducted along the north coast using United Nations General Assembly Special Session (UNGASS) HIV knowledge and Centers for Disease Control And Prevention (CDC) sexual health practices questions. Correct responses to all five UNGASS knowledge questions and sexual health practices were compared between intervention and control groups. Multivariate logistic regression analysis controlled for sex, religion, age, language spoken, ethnicity, and region.

*Results*

A total of 132 survey were completed - 70 intervention and 62 control. Sixty-one percent of the intervention group and 80% of the control group were less than 19 years of age. Thirty-nine percent of the intervention group correctly answered all knowledge questions, compared to only 10% of the control group ($p<0.001$). No control participant under the age of 19 answered all questions correctly. No significant findings were made in the practices analyses. The adjusted odds ratio for condom usage by intervention participants was 3.3 (95% CI = 1.1, 9.8; $p=0.036$).

*Conclusion*

This evaluation shows that participants of DPV demonstrate a higher level of HIV knowledge and shows some evidence of positive sexual behavioral changes. DPV serves as a strong tool for sexual health education within the country and succeeds as a worthy method of health risk communication.

INTRODUCTION

In 2009, it was estimated that 1.0% (44,000 individuals) of 15 to 49 year olds living in the Dominican Republic had HIV [1]. The age group with the highest rate (0.7% HIV positive) was 15 to 24 year olds. Only 37 percent of Dominican youth have correct knowledge of the risk factors of the disease and in areas with low income and resources, the level of knowledge is significantly lower [1]. Nineteen percent have participated in sex before the age of 15 and 17% had more than one partner during the last year [1]. More than half of all Dominican youth ages 15 to 24 years of age participate in unprotected sex [1].

In the north coast of the country, a non-governmental organization (NGO) called the Dominican Republic Education and Mentoring (DREAM) Project provides educational opportunities to at-risk youth. DREAM's programs extend from early childhood through young adulthood, empowering youth to create a better future for themselves and their families through high quality education, youth development, and community enrichment [5]. Based in Cabarete, DREAM Project reaches more than 4,000 children each year through fourteen programs in fifteen different communities [5].

As part of its youth development strategy, the DREAM Project implements an HIV/AIDS prevention and life skills course called Deportes Para La Vida (DPV) [6]. DPV was first developed in 2005 as a pilot project between Grassroot Soccer (GRS), the University of Vermont, and the community of Batey Libertad in the Dominican Republic [5,6]. In 2010, program oversight was officially transferred to DREAM Project [6]. DPV emphasizes changing the knowledge, attitudes, and practices of youth in order to minimize the spread of HIV/AIDS and encourage healthy decision-making. The program

utilizes the fun of sports and games to teach about HIV transmission, risk factors, and prevention. It focuses on how to avoid risky partners, manage unsafe situations, reduce stigma and discrimination, and eliminate gender-based violence [6]. The 15-hour program uses a peer-to-peer education model, where local youth trained as DPV coaches deliver the curriculum, serve as mentors, and develop their own leadership abilities [6].

DPV and GRS are two sports-based programs that have been established worldwide to educate underserved or underprivileged youth about HIV risk factors and sexual health practices. Mercy Corps in Africa, Kick4Life, Whizzkids United, and F4 are just a few of the organizations that support sports-based health education with their main focus being reproductive health and HIV prevention [9-11]. These organizations all rely on assistance from the same funding bodies (UNAIDS, PEPFAR, etc.), yet their curricula vary with regards to implementation and primary focus [9-11]. Evaluation studies have been conducted of these programs to exam their effectiveness with the majority of them using a quasi-experimental or pre-post evaluation study design focused on examining knowledge, attitudes, stigma, communication, and self-efficacy [9-10, 26-41]. Many of the evaluations have shown that sports based education programs are effective in improving the knowledge of its participants [10, 26-29, 31,33-41]. However, very few focused on examining behavioral changes or differences in behavior between intervention and control groups [30,34]. In order for DPV to properly demonstrate that it is an effective program, it will be necessary to examine how exposure to this program is responsible for both changes in HIV knowledge and sexual practices. An evaluation of DPV was implemented during the summer of 2013 [7]. The purpose of this evaluation

was to determine whether exposure to the program resulted in significant improvements in HIV knowledge and prevention practices.

## METHODS

The study design was intervention-control using convenience based sampling for both intervention and control groups. Intervention participants were youth aged 10-26 years of age who had participated in DPV within the previous year. Control participants were youth 10-26 years of age, had no previous exposure to the program, and were from communities that were new to DPV or had not yet had any exposure to DPV. Intervention and control participants were not matched on any characteristic. With assistance from local members of the DREAM Project community, researchers contacted DPV coaches and regional coordinators to arrange meetings with individual communities where surveys would be conducted. During the three month evaluation, study teams travelled to the following cities within the regions of Puerto Plata, Santiago, and Esperanza: Sabaneta De Yásica, La Yaguita del Pastor, Batey Libertad, Cangrejo, San Francisco de Macoris, Saman, La Unión, Los Ciruelos, Nuevo Luz, Puerto Plata for the pilot, and to the DREAM school in Cabarete. Figure 1 shows the consort diagram for this survey. Consent forms were distributed beforehand to potential DPV or control participants, so that they could decide if they were interested in participating. For potential participants under the age of 18, minor assent and parental consent were obtained. Knowledge and Practices (KAP) surveys were conducted using electronic surveys developed with FormHub (Columbia University, New York, NY) and were administered by study staff using tablets and laptops. The survey instrument was based on the United Nations General Assembly Special Session (UNGASS) standards for HIV knowledge and the Centers for Disease

Control and Prevention (CDC) sexual health questions for practice. UNGASS standards for HIV knowledge rely on a simple five question assessment [46]. The questions are as follows:

1. Can the risk of HIV transmission be reduced by having sex with only one uninfected partner who has no other partners?
2. Can a person reduce the risk of getting HIV by using a condom every time they have sex?
3. Can a health-looking person have HIV?
4. Can a person get HIV from mosquito bites?
5. Can a person get HIV by sharing food with someone who is infected?

Participants that respond correctly to all questions are counted as having successfully "passed", acquiring the minimum level of HIV knowledge and demonstrating their knowledgeability of HIV. The first two questions regard immediate risk factors of HIV transmission, such as the importance of having one partner and using condoms. The last three questions are aimed at dispelling myths about the disease with regards to transmission by way of sharing food, mosquito bites, and how a healthy looking individual could still carry the disease. The sexual practices portion of the KAP survey was adapted from sexual health survey questions of the CDC's 2013 Youth Risk Behavior Survey [47]. It consists of six questions that measure sexual health practices among sexually active at-risk youth. These questions address the age of first sexual encounter, number of partners throughout the participants' lifespan and during the last two months, as well as drug, alcohol, and contraception usage during the participants' last sexual encounter.

*Pilot*

A pilot of the study was conducted in Puerto Plata with students who recently completed a DPV course through their participation in A Ganar, DREAM's workforce development and vocational training program. The pilot study tested the survey instrument and helped adapt implementation strategies to improve the timing and efficiency of conducting this study. Twelve students participated in the pilot, where the full survey and consent process was carried out within approximately two hours. In order to save time and increase efficiency, the consent process was completed in advance, allowing participants ample time to consider whether or not they wanted to participate. As a result of this improvement, 30 participants in another location, Sabaneta de Yásica, were able to complete the full process in the same amount of time that it took to complete twelve surveys in the pilot. Data from the pilot was included in the study results, as no significant changes were made to the survey instrument afterwards.

*Analyses*

Data was aggregated using Microsoft Excel (Microsoft Corporation, Redmond, WA) and results were calculated using SAS 9.3 (SAS Institute, Cary, NC). Educational background of the participants was collected, but was found to have many potentially invalid responses and was excluded from analysis. Mid-P values for study demographics were calculated using chi squared. A bivariate analysis was conducted comparing intervention and control groups with their ability to answer all 5 knowledge questions correctly. Mid-P exact values, conditional maximum likelihood odds ratios (CLME OR), 95% confidence intervals and chi squared values were calculated to analyze the association between passing and participation in DPV. Participant data was also stratified

by subgroups to determine if certain populations were more knowledgeable than others. Multivariate logistic regression with backwards elimination ($p<0.10$ to remain in model) was used to determine if any covariates affected the association between knowledge and intervention. Age, sex, religion, language, ethnicity, and region were the variables being controlled for by this model. Adjusted odds ratios (AOR), 95 percent confidence intervals, chi squared, and p-values were calculated for this analysis.

A separate subset of the data was created for use in our practices analyses with only participants that had sex during their lifetime. Multiple univariate and bivariate analyses were conducted using mean, standard deviation, and two sample independent t-tests to compare intervention and control groups with regards to age of first sexual encounter and the number of partners (lifetime and the last two months). Mid-P exact values, CMLE ORs, 95% confidence intervals and chi squared values were calculated to compare contraceptive and alcohol/drug use between intervention and control groups. Statistical significance was at alpha = 0.05.

## RESULTS

### *Study Demographics*

Overall, there were 70 (53%) intervention participants and 62 (47%) control participants (Table 1). The distribution of females and males was balanced in both groups ($p=0.684$). The majority of all participants was less than 19 years of age, came from the Puerto Plata region, was Christian, had Dominican nationality, and primarily spoke Spanish. Compared to the intervention group, the control group had a larger proportion of participants less than 19 years of age (80% versus 61%, $p=0.005$) and a greater proportion were from the Puerto Plata area (85% versus 69%, $p=0.003$).

*Knowledge Results*

Table 2 shows a bivariate analysis of various characteristics of the intervention and control groups, examining their success in demonstrating HIV knowledge. Compared to the control group, the intervention group was almost 6 times more likely to be knowledgeable about HIV ($p<0.001$). This effect was also strong when stratified by either gender (Male OR=5.8; p=0.003, Female OR=6.1; p=0.017). The Puerto Plata region had the highest significant association among the regions (OR=9.4; $p<0.001$). Religion played a factor in how well our intervention group passed the knowledge survey. While religious intervention participants demonstrated a higher knowledge than religious control participants (OR=4.7, p=0.006), the effect of the intervention was even more pronounced in non-religious participants (OR=21.7, $p<0.001$). While no statistically significant association was found for HIV knowledge among participants over the age of eighteen, no control participants eighteen and under were capable of passing compared to 23% of intervention participants under the age of eighteen ($p<0.001$).

Multiple linear regression analysis produced a model containing religion and age as important covariates. In that model, the AOR for the association between participation in DPV and demonstrating HIV knowledge was 3.3 (95% CI = 1.1, 9.8; p=0.036).

*Practices Results*

Table 3 shows the univariate analysis of sexual health practices from study participants who have had at least one sexual encounter (n=57). More participants within the intervention group said that they had at least one sexual encounter in their lifetime than did control members (51 percent versus 34 percent; p=0.045). The average age of sexual activity was 14.4 years of age for the entire cohort. Intervention and control

participants had their first sexual encounter at relatively similar ages (14.5 vs. 14.1 years of age, p=0.482). No significant associations were found between intervention and control groups with regards to any other practices question.

Table 4 demonstrates the results of a bivariate analysis of condom usage. No significant association was found in this analysis. Seventy-three percent of males and 29 percent of females in the intervention group were using condoms.

## DISCUSSION

### *Knowledge Assessment*

In order for students to meet UNGASS criteria for HIV and AIDS knowledge, they were required to answer all five survey questions correctly. DPV students were many times more likely to accomplish this task, demonstrating a result that was expected and was seen in several other evaluation studies [10, 26-29, 31,33-41], HIV knowledge in general was much higher for DPV students, which indicates the effectiveness of the DPV program in increasing HIV/AIDS knowledge. The results also indicate a general lack of HIV/AIDS knowledge among Dominican communities along the north coast. Only 10 percent of control group participants were able to answer all five questions correctly, in stark contrast to the national average where approximately 34 percent of the national population ages 15 to 24 years of age met UNGASS criteria (answering all five questions correctly).

Two other important associations regarded sex of the participants and region. Both males and females showed a strong association for participation in DPV. Because this is a sports-based program, it is assumed that the curriculum and activities would appeal more to males than to females. This result would indicate that the program's

structure and teaching method is well suited to improve HIV knowledge regardless of the gender of participants. The region of Puerto Plata also had a very strong association with DPV participation and improved HIV knowledge. Based out of this region, DREAM first developed and ran DPV from this specific area and their expansion to other regions has only occurred in recent years. Had there been any changes to DPV's curriculum, it would have been made to ensure that the program was more suitable to students from this area. This may be the reason why participants of the program had a stronger association than in any other region.

One of the more disconcerting aspects of the results regards the performance of minors in the study. No control group participants under the age of 19 met UNGASS standards, thus raising concerns about the quality or lack of sexual health education programs in these communities. These findings could be a major point of concern for community leaders, and the results support the expansion of DPV to more participants and/or communities in order to increase youth access to HIV/AIDS education. The training and development of more DPV coaches and the implementation of more programs will be a crucial step in improving HIV knowledge in this high-risk group. As for those over the age of eighteen, the lack of a statistically significant association between HIV knowledge and DPV participation may be due to the small sample size for this population (N=39).

*Practices Assessment*

Sexual practices of the intervention and control groups were not significantly different. This may show that although DPV students retain knowledge, they may not put into practice what they learned. This is only in slight contrast from previous sports-based

education evaluations that showed only a small, but significant association with certain improved sexual health practices [30,34] The main principle of these programs is that sexual health education will lead to improved sexual health behavior [6, 9-10]. It was expected that the results of this evaluation would show that participants of DPV would see greater knowledge of HIV risk factors, as well as having better sexual health practices. Comparing the results of the practices analysis with that of the knowledge, it may be more plausible to assume that the central dogma of sports-based HIV education programs may be incorrect and that HIV knowledge does not directly translate into changes in behavior. This result should not deter from the fact that DPV accomplished its primary goal of improving knowledge.

Because there were no significant differences between DPV participation and a change in sexual practices, it is safe to assume that this program does not promote riskier sexual behavior. This study showed no difference in either group with regards to the age of first sexual experience, the number of partners an individual had during the last two months or in their lifetime, and whether alcohol, drugs, or a contraceptive was used during a participant's last sexual encounter. One of the issues that program implementers have with sexual health education is the worry that their program may encourage risky sexual practices. This result shows that DPV does not cause such an effect. A significant majority of DPV participants were more likely to have had sex at least once in their lives in comparison to control participants. Although the intervention may appear to promote sexual activity by making sex a topic of common discussion, it may be that DPV participant are more comfortable with discussing sexual health. Other studies have shown that sports-based HIV education decreases the stigma that is associated with this topic,

making it more likely for students to talk about sexual practices [10,30-31,38]. Participants of DPV would be more likely to discuss and admit the fact that they have had sexual relations during their lifetimes more so than control participants. Alternatively, control participants would be less likely to report that they had sex at all. The instrument was designed to show practice questions, once a participants answered YES to the question, "Have you had ever had sex?" Participants uncomfortable with answering these questions may falsely indicate that they have not in order to avoid detailing their sexual practices.

*Study Limitations And Validity*

Our greatest limitation to the external validity affecting both study implementation and our analysis regarded having enough participants to create homogenous intervention and control groups, as well as adequate sample size for more detailed analyses. The number of surveys obtained was sufficient to calculate a statistically significant difference in knowledge between our two study arms, but was a limiting factor with regards to our practices analysis. Additional surveys will need to be collected over the coming year in order to have a sufficiently homogenous and ample study population. Internal validity faced two main challenges that dealt with preparedness and consistency of the data collection teams, causing a loss in data and reducing the sample size available for our study. As noted earlier, data on student education was also incorrectly logged into our surveys, making a potential confounder unavailable for our analysis. Because this was a cross-sectional study, where the exposure of interest occurred before surveying participants, it would also not be possible to ascertain exactly whether the knowledge and practices of our participants would have changed due to this

exposure or due to some other exposure. These issues were limited with the inclusion criteria requiring students of the program to have participated in DPV within the last year. The structure of the knowledge survey also created a possible limitation. Each question was structured with two choices for the response (yes, no), in which participants lacking the knowledge would have a 50 percent chance of guessing each answer correctly and a four percent chance of answering all five correctly.

*Conclusion*

The most apparent recommendation for DREAM Project would be to expand DPV to areas that have had little prior participation in the program. DPV serves as both an educational and empowerment tool and the effectiveness of the curriculum shows that participants of the program do obtain the knowledge they need to make smart decisions about their sexual well-being. The results of the control group demonstrated a large disparity in knowledge and it will be paramount to prioritize the expansion of DPV in these communities. The average age of initial sexual activity in the study was around 14 years of age, thus future expansions should be aimed at those slightly under the age of 14 in order to have the greatest impact. By making DPV more commonly available and readily accessible to the most at-risk populations, DREAM can continue having a positive impact on the sexual health of youth in the Dominican Republic.

TABLES

***Table 1 – Demographics For Intervention And Control Groups***

| | Intervention | % | Control | % | P-Value |
|---|---|---|---|---|---|
| *Sex* | | | | | |
| Male | 37 | 53% | 35 | 56% | - |
| Female | 33 | 47% | 27 | 44% | 0.684 |
| *Age* | | | | | |
| 10-14 Years of Age | 17 | 24% | 33 | 53% | - |
| 15-18 Years of Age | 26 | 37% | 17 | 27% | - |
| 19-21 Years of Age | 17 | 24% | 9 | 15% | - |
| 22+ Years of Age | 10 | 14% | 3 | 5% | **0.005** |
| *Region* | | | | | |
| Esperanza | 10 | 14% | 9 | 15% | - |
| Puerto Plata | 48 | 69% | 53 | 85% | - |
| Santiago | 12 | 17% | 0 | 0% | **0.003** |
| *Religion* | | | | | |
| Christian | 21 | 30% | 20 | 32% | - |
| Catholic | 17 | 24% | 23 | 37% | - |
| Evangelical | 7 | 10% | 3 | 5% | - |
| No Religion | 19 | 27% | 15 | 24% | - |
| Other | 6 | 9% | 1 | 2% | 0.192 |
| *Nationality* | | | | | - |
| Dominican | 49 | 70% | 53 | 85% | - |
| Haitian | 13 | 19% | 7 | 11% | - |
| Mix or Other | 8 | 11% | 2 | 3% | 0.078 |
| *Primary Language* | | | | | |
| Spanish | 49 | 70% | 53 | 85% | - |
| Creole | 10 | 14% | 3 | 5% | - |
| More than 1 | 11 | 16% | 6 | 10% | 0.085 |
| *n =* | *70* | | *62* | | |

***Table 2 – Bivariate Analysis of UNGASS Knowledge Assessment***

| | PARTICIPANTS THAT PASSED | | | | | 95% CI | | |
|---|---|---|---|---|---|---|---|---|
| | INTERVENTION | % | CONTROL | % | CMLE OR | Low | High | Mid-P Value |
| All Participants | 27 | 39% | 6 | 10% | **5.8** | **2.3** | **16.6** | **<0.001** |
| *Sex* | | | | | | | | |
| Male | 16 | 43% | 4 | 11% | **5.8** | **1.8** | **22.6** | **0.003** |
| Female | 11 | 33% | 2 | 7% | **6.1** | **1.3** | **44.2** | **0.017** |
| *Age* | | | | | | | | |
| 10-14 Years of Age | 2 | 12% | 0 | 0% | - | **0.6** | - | 0.111 |
| 15-18 Years of Age | 8 | 31% | 0 | 0% | - | **1.8** | - | **0.011** |
| 19-21 Years of Age | 12 | 71% | 4 | 44% | **2.9** | **0.5** | **17.3** | 0.232 |
| 22+ Years of Age | 5 | 50% | 2 | 67% | **0.5** | **0.0** | **9.0** | 0.685 |
| 18 & Under | 10 | 23% | 0 | 0% | | | | **0.002** |
| 19 & Over | 17 | 63% | 6 | 50% | **1.7** | **0.4** | **7.0** | 0.473 |
| *Region* | | | | | | | | |
| Esperanza | 1 | 10% | 1 | 11% | **0.9** | **0.0** | **38.8** | 0.947 |
| Puerto Plata | 24 | 50% | 5 | 9% | **9.4** | **3.3** | **30.7** | **<0.001** |
| Santiago | 2 | 17% | 0 | - | - | - | - | - |
| *Religion* | | | | | | | | |
| Christian | 8 | 38% | 5 | 25% | **1.8** | **0.5** | **7.5** | 0.395 |
| Catholic | 3 | 18% | 0 | 0% | - | **0.8** | - | 0.069 |
| Evangelical | 2 | 29% | 0 | 0% | - | **0.1** | - | 0.467 |
| Other | 2 | 33% | 0 | 0% | - | **0.0** | - | 0.714 |
| No Religion | 12 | 63% | 1 | 7% | **21.7** | **2.9** | **550.2** | **<0.001** |
| Any Religion | 14 | 29% | 5 | 11% | **4.7** | **1.5** | **16.2** | **0.006** |
| *Nationality* | | | | | | | | |
| Dominican | 22 | 45% | 5 | 9% | **7.7** | **2.7** | **25.0** | **<0.001** |
| Haitian | 5 | 38% | 1 | 14% | **3.5** | **0.4** | **103.1** | 0.321 |
| Mix or Other | 0 | 0% | 0 | 0% | - | - | - | - |
| *Primary Language* | | | | | | | | |
| Spanish | 23 | 47% | 5 | 9% | **8.3** | **2.9** | **27.1** | **<0.001** |
| Creole | 1 | 10% | 0 | 0% | - | **0.0** | - | 0.769 |
| More than 1 | 3 | 27% | 1 | 17% | **1.8** | **0.1** | **58.7** | 0.693 |
| *n =* | *27* | | *6* | | | | | |

***Table 3 – Univariate Analysis of Sexual Health Practices***

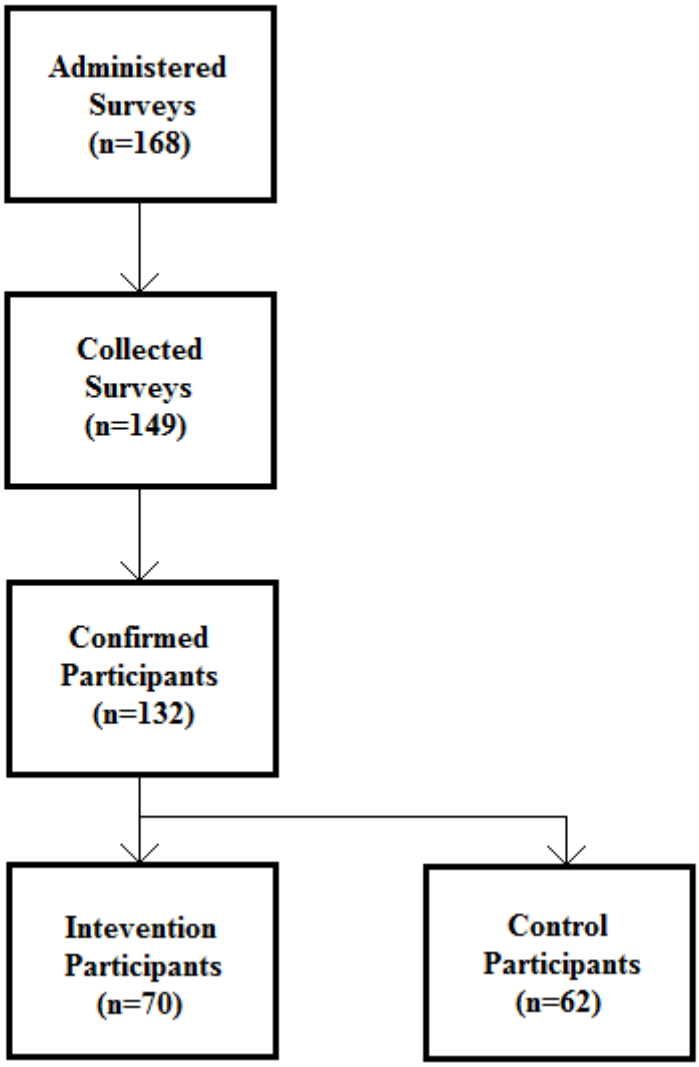
| | n | Intervention | (SD) | Control | (SD) | | Mid-P Value |
|---|---|---|---|---|---|---|---|
| *Ever Had Sex* | 57 | 36 | | 21 | | | **0.045** |
| *First Sexual Encounter (age in years)* | 53 | 14.5 | 1.8 | 14.1 | 2.2 | | **0.482** |
| # of Partners | | | | | | | |
| Lifetime | 50 | 3.23 | 1.94 | 2.75 | 1.97 | | **0.398** |
| Last 2 Months | 51 | 1.17 | 1.31 | 0.74 | 0.88 | | **0.111** |
| | n | Intervention | % | Control | % | OR | Mid-P Value |
| *In Last Sexual Encounter* | | | | | | | |
| Alcohol/Drug Used | 51 | 1 | 3% | 2 | 12% | **0.2** | **0.287** |
| Contraceptive Used | 52 | 24 | 69% | 12 | 71% | **0.9** | **0.899** |
| *Last Method Used (n=)* | | 30 | | 16 | | | |
| Condoms | 27 | 20 | 67% | 7 | 44% | - | - |
| Birth Control Pills | 5 | 3 | 10% | 2 | 13% | - | - |
| Pull out | 5 | 1 | 3% | 4 | 25% | - | - |
| None | 9 | 6 | 20% | 3 | 19% | - | **0.138** |
| Condoms (ref=Anything But Condoms) | 19 | 10 | 33% | 9 | 56% | **2.5** | **0.152** |

***Table 4 - Bivariate Analysis of Condom Use***

| | | Condom Usage | | | | | 95% CI | | |
|---|---|---|---|---|---|---|---|---|---|
| | n | Intervention | % | Case | % | CLME OR | Low | High | P-Value |
| ***Sex*** | | | | | | | | | |
| Male | 36 | 16 | 73% | 6 | 43% | 3.4 | 0.8 | 15.3 | 0.091 |
| Female | 21 | 4 | 29% | 1 | 14% | 2.3 | 0.2 | 68.9 | 0.541 |
| ***Religion*** | | | | | | | | | |
| Any | 37 | 11 | 52% | 6 | 35% | 2.0 | 0.5 | 7.8 | 0.312 |
| None | 18 | 8 | 62% | 1 | 20% | 5.8 | 0.5 | 176.3 | 0.162 |
| ***Age*** | | | | | | | | | |
| 18 or Older | 30 | 13 | 59% | 3 | 38% | 2.3 | 0.4 | 14.6 | 0.334 |
| Under 18 | 27 | 7 | 50% | 4 | 31% | 2.2 | 0.4 | 11.8 | 0.346 |

FIGURES

Figure 1 - Consort Diagram of Survey Collection and Confirmation Process



## Chapter III – Summary, Public Health Implications, and the Future of DPV

### SUMMARY OF RESULTS

The results of this study show that DPV is an effective program at improving youth HIV knowledge in underprivileged communities of the Dominican Republic. Its effectiveness varies however on several factors such as age of the participant, religious belief, sex, and nationality. DPV participants demonstrated a much stronger understanding of the risks, prevention methods, and myths of HIV. Although participants of DPV had a higher level of demonstrated HIV knowledge in comparison to control participants, no significant difference in behavior was found between the intervention and control groups.

### DPV AND THE DOMINICAN REPUBLIC

In the last decade, the Dominican Republic was known as one of the fastest spreading Caribbean countries for HIV [48]. Lack of health services and testing, poor education, and the large prevalence of sex workers all contributed to the epidemic the country is currently facing [48]. DREAM Project is one of the few organizations that are helping improve HIV knowledge within the country. USAID, PEPFAR, and COPRESIDA all rely on programs such as DPV to assist in the education of those that need it the most [11]. The results of our study would suggest that this relationship should continue to flourish and that it will be necessary to expand DPV to other areas of the country. The program is currently being implemented in several communities throughout the north coast and in some areas in the east, west, and south of the country. Future development of the program may require the need for additional funding and partnerships with other NGOs. Part of the effectiveness in DPV's curriculum can be seen in its core

teachings that rely not only on educating participants, but reducing the stigma and discrimination that are associated with the topic [6,11]. It is an inexpensive, effective program that relies on locally trained coaches and requires little oversight from DREAM Project itself. The expansion of DPV in the Dominican Republic would be beneficial in filling an educational gap, ensuring that bateyes and underprivileged communities benefit from the program.

## IMPLICATIONS FOR THE NGO

In communities where education is poor and resources are limited, programs such as DPV contribute a sense of community to the people living within them. While on the survey trail, our research team met with local coaches and community leaders. As had been mentioned earlier, the coaches of each community are usually former students of the program, who decide to undertake new responsibilities by converting themselves from mentees to mentors by learning the curriculum and teaching it to their fellow young community members. Their benefit from a program such as DPV goes beyond health education, as they are now seen as a role model and have become an importance resource to their area. They also earn a small stipend, which would contribute economically to their communities. Our interactions with community leaders also enlightened us of the importance of DREAM and DPV to smaller villages. In Sabaneta De Yásica, a community that had no previous exposure to DPV, we were fortunate enough to meet with the north coast's Red Cross President, who in fact was from that area. He was paramount in discussing with many of the parents of local youth to encourage their participation in the study. His reasoning for this assistance was that he saw an opportunity to help his community. Greater cooperation with us would mean DREAM

would introduce more educational services, such as DPV, which he saw as a way to improve the community. The presence that DREAM has in many of these poor areas has shown a great impact in creating cohesion and improving education. Any DREAM service that has seen a level of success will need expansion in order to continue to help out communities such as Sabaneta de Yásica to provide them better educational opportunities.

## CURRICULUM AND LITERACY

Based on this study's results, several adjustments could be made to improve the effectiveness of DPV. To combat the divide between knowledge and practice, DREAM may need to develop a complementary program targeted at older students (16 years of age and older), focusing less on the entertainment portion of the curriculum and more so on the knowledge being obtained. Since DPV is sports-based and developed to teach through entertainment, participants may not absorb the serious message being conveyed by the program. A new curriculum could be developed solely to teach reproductive health and risk factors for older students. DREAM could intertwine that with one of their other educational programs, such as A Ganar, a young adult vocational program that has seen major success in preparing Dominican youth for job hunting and trade development. It could be considered a second step after DPV, in which participants who have graduated would be able to enroll in this level two sexual health course. The curriculum would use a more mature theme to convey this message.

In addition to recommendations that stem from the quantitative results of this study, it is also important to consider external factors that may have affected the performance of study participants. Low literacy levels are a significant challenge for

children and youth in the Dominican Republic. A UNESCO run Second Regional Comparative and Explanatory Study (SERCE) examined language, math, and science aptitude in students in sixteen countries spanning most of Latin America and the Caribbean [49]. Utilizing a five level reading performance indicator, they ranked students on their level of literacy and reading comprehension (four being the highest, one being the lowest). Of the sixteen countries assessed, third graders of the Dominican Republic ranked last with over 78 percent at or below a level one reading score [49]. Dominican sixth graders also ranked last with only 53 percent at or below a level one reading score [49]. Without basic literacy skills, specifically the ability to read and comprehend what is read, many participants may have struggled with understanding some of the study's written documents, including the consent and assent forms. DREAM Project has worked tirelessly to provide quality education to students who would otherwise have had limited access and improving literacy levels of program participants should remain a focal point of the organization. In order to improve the results of any health education program literacy levels and the understanding of key words and health statements are necessary in order to demonstrate valid health knowledge.

Several aspects of our study show that the current format of the curriculum is effective in the target population that it has been tailored for. When stratified by sex, the equal yet strong association found in improved knowledge shows that gender specific-tailoring may not be necessary. Sports-based education, which would essentially be favored by males, would need to appeal and be directed at diverse communities in order to be effective. Gender sensitivity is an important topic for any HIV intervention and DPV excels at ensuring that both boys and girls benefit from this educational program.

The strong association found in the students of the Puerto Plata region show how the historical development of the program has been successfully tailored to individuals of that area. Because no significant associations were found for the other major regions of the study (Esperanza and Santiago), DREAM may need to begin adaptation of their curriculum in order to better serve those areas. Further evaluations would need to be done comparing the HIV knowledge of each region to examine whether or not this is necessary. For each region that requires improvement, focus groups with locals and pilots of newer curricula will help DREAM tailor the program so that each area benefits from these changes.

A final important aspect of the results was that although there were no significant differences in behavior between the intervention and control group, it shows that DPV does not promote risky behavior. This conclusion was also found in a systematic review of evaluated sports-based HIV education programs, where risky behavior was not seen in students that took part in these programs [25]. DPV would continue to be an effective method of HIV education without the risk of compromising sexual behavior.

FUTURE STUDIES

While our study showed that this program had some effectiveness in changing the behavior of condom use, it failed to exhibit statistically significant changes to other practices. This may be a fault related to study power, as only 57 participants had responded that they had been sexual active. As had been pointed out by a systematic review by Kaufman et al. [25], no studies had been conducted using biological endpoints to test the effectiveness of these programs. Many of the evaluation studies investigating sports-based HIV education programs were focused more on change in knowledge and

whether or not students and communities adhere to the program through measurements of stigma and attitudes [25]. The principle that drives sports-based HIV education is that a change in behavior would come about due to improvements to knowledge. The most logical choice for future studies of these programs would be to conduct a randomized control trial, using biological endpoints in order to measure whether or not participation in DPV actually improved sexual behavior. A feasibility study of such an endeavor has shown promise that this is both possible and achievable [42]. It will be up to organizations such as DREAM and GRS to endorse such a study, if they are to benefit from any further growth or expansion.

Another area of focus would look at the sexual practices of local coaches. Because they are immersed into the topic, as both graduates and teachers of this curriculum, coaches would essentially have the greatest exposure to the program [6]. A comparative study of DPV graduates and coaches would help ascertain if this extended exposure to the program's ideas and teachings would be beneficial and if the long term exposure of being a trainer would actually ensure strong changes in sexual health practices.

## UNGASS STANDARDS FOR HIV KNOWLEDGE

One of the points of contention in our analysis regards the method in which HIV knowledge was measured. UNGASS standards require that all five of their knowledge questions be answered correctly in order to pass, demonstrating that an individual was capable of proving their basic knowledge of HIV. While this appears to be a simplified and easily implementable method of measuring knowledge, it may not be the most effective benchmark for use in evaluating program impact. Would there be a great

difference in knowledge between those that answer four questions correctly instead of five? Subsequently, would that cause a substantial change in individual practices? The first two UNGASS questions regard preventative techniques, while the latter three are concerned with myths about the disease. It would make more sense to place more weight on questions one and two, even though according to UNAIDS, they weigh the importance of knowing misconceptions of the disease as high as knowledge in prevention [46]. It will be necessary for future studies to look into whether answering all five baseline questions can effectively improve HIV knowledge and consequently improve behavior.

## ADVOCACY FOR ELECTRONIC INSTRUMENTS

One of the unique opportunities that our study piloted was the use of tablets as survey collection devices. This was the first time that DREAM had authorized and utilized tablets for data collection. Individual KAP surveys were administered and collected with no need for internet access, little to no paper trail, and with the participants feeling a high level of privacy. Anonymity and confidentiality in the study design required the use of randomized study ID numbers, instead of simple identifiers, and a saving method that would kept each collected survey out of view until it was uploaded onto an offsite server. As had been mentioned in the literature review, one abstract had delved into the prospect of implementing evaluations of sports-based HIV education programs with the use of touch screen devices [45]. They found that this collection method helped improve participant comfort, as well as significantly reducing recall bias. As part of the deliverables for this research study, a manual on the programming and development of electronic surveys was made especially for DREAM Project, so that they may be able to administer tests and evaluations electronically and discretely. All

subsequent evaluations of DPV will benefit from this collection method, as this pilot successfully demonstrated that it was both feasible and beneficial to administer surveys using electronic devices.

## THE FUTURE OF SPORTS-BASED EDUCATION

GRS, DPV, Kick4Life, Whizkids, F4, Mercy Corps, and other organizations utilize sports to promote healthy sexual practices, while teaching about the risks and misconceptions of HIV [25]. They rely on activities and role models to appeal to youth, educating those who would normally have little access to schooling. This study's results and the results of several other studies have shown participants of these programs benefit by obtaining and demonstrating an improved level of HIV knowledge [10, 26-29, 31,33-41]. For educators interested in adding HIV sexual health topics into their daily curriculum, it would be best to model their teaching methods after programs such as DPV. With regards to behavioral changes, only a handful of studies have found a significant association with sports-based education and improved sexual practices [30,34]. This study has shown that there was no significant difference in intervention and control participants, prompting the need for possible changes. The future of these programs will require two major developments to occur. The first will involve the expansion of evaluations, so that they have a component to measure behavioral differences. It will not only require that each program examines how well individual participant's behaviors change as a result of the program, but to compare the effectiveness of several programs to see which had the best balance between improving knowledge and behavior. The second major development may require a greater collaborate effort from other organizations. Implementers from each program will need to

sit down and examine the underlying problem as to why very little behavioral changes are seen in studies. As mentioned earlier, complex study designs and peer focus groups will be the best manner in ascertaining the problem, but it will be up to organizations such as DREAM Project and GRS to work together in producing solutions to these issues. They may need to create innovative curricula that not only educates underprivileged youth on HIV prevention, but also inspires them to make the right decision with regards to protecting themselves from HIV by making the right decisions about their sexual health.

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APPENDIX (INSTRUMENTS)

***Knowledge and Practices (KAP) PRE-Survey (Spanish Translation)***

Administrador de la Encuesta_____ Fecha _____

# De Identificación Por El Participante_____

CASO □ CONTROL □

Edad _____ año

MASCULINO □ FEMENINO □

Comunidad_____

Región_____

Nacionalidad _____ Idioma De La Casa _____

Religión: CATÓLICA EVANGÉLICO CRISTIANO TESTIGO DE JEHOVÁ PREFIERO NO RESPONDER OTRO_____

Participó en un programa de una educación para la SIDA: SÍ □ NO □

Número de sesiones asistido: _____Sesiones

Completó esta programa: SÍ □ NO □

El Nivel Más Alto de escuela completado _____

***Knowledge and Practices (KAP) Survey (Spanish Translation)***

Número De Identificación_____

## PARTE 1 – CONOCIMIENTO

¿Se puede reducir el riesgo de transmitir el VIH por tener sexo con solamente una pareja no infectada que tampoco tenga ninguna otra pareja?*

_____*SI* _____*NO*

¿Se puede reducir el riesgo de contraer el VIH por usar un condón en cada relación sexual?

_____*SI* _____*NO*

¿Es posible que una persona que parece saludable tenga el VIH/SIDA?

_____*SI* _____*NO*

¿Es posible contraer el VIH por una picada de un mosquito?*

_____*SI* _____*NO*

¿Es posible contraer el VIH por compartir comida con una persona infectada?*

_____*SI* _____*NO*

¿Has tenido sexo?

_____*SI* _____*NO* _____*Prefiero No Responder*

## PARTE 2 – PRÁCTICAS

¿A qué edad tuviste sexo por primera vez?

_____*11 años o menos* _____*12 años* _____*13 años* _____*14 años*

_____*15 años* _____*16 años* _____*17 años o más*

_____*Prefiero No Responder*

Durante tu vida, ¿con cuántas personas has tenido sexo?*

_____*1 Persona* _____*2 Personas* _____*3 Personas* _____*4 Personas*

_____*5 Personas* _____*6 o Más Personas* _____*Prefiero No Responder*

Durante los últimos dos meses, ¿con cuántas personas has tenido sexo?*

_____*1 Persona* _____*2 Personas* _____*3 Personas* _____*4 Personas*

_____*5 Personas* _____*6 o Más Personas* _____*Prefiero No Responder*

_____*He tenido sexo, pero no durante los últimos dos meses.*

En tu última relación sexual, ¿usaste alcohol o drogas antes de tener sexo?*

_____*SI* _____*NO* _____*NO SE* _____*Prefiero No Responder*

En tu última relación sexual, ¿usaste un preservativo o condón?

_____*SI* _____*NO* _____*NO SE* _____*Prefiero No Responder*

En tu última relación sexual, ¿qué método usaste tu o tu pareja para evitar el embarazo?*

_____*No usé ningún método para evitar el embarazo*

_____*Las pastillas anticonceptivas* _____*Condones*

_____*Retirarse ante de eyacular* _____*Otro método*

_____*No recuerdo* _____*Prefiero no responder*

***Consent Forms for Adults (Spanish Translation)***

**Título: Evaluación de Deportes Para La Vida, un programa educativo de VIH/SIDA y habilidades para la vida para la juventud dominicana.**

**Investigador Principal: Daud Lodin, Candidato de Maestría en Salud Publica, 2014, Universidad de Emory, Atlanta, GA, EE.UU.**

Facilidad de leer de la escala Flesch = 71.6

Nivel escolar de la escala Flesch-Kinard = 7.1

Fuente de Financiamiento: Dominican Republic Education and Mentoring (DREAM) Project, Universidad de Emory, Atlanta, Georgia, EE.UU.

**Introducción:**

Le pedimos que participe en un estudio de investigación, lo cual estamos realizando para aprender que sepan los jóvenes sobre la prevención del VIH/SIDA y como este conocimiento puede afectar sus decisiones en el futuro. Esta información nos ayudará a diseñar mejores programas educativos para los jóvenes de su comunidad. Hasta 600 jóvenes participarán en este estudio. Esta hoja describe todo lo que necesita saber para poder tomar una decisión sobre su participación. Tiene el derecho de decidir si quiere participar o no quiere participar en el estudio. Si decide que quiera participar, puede cambiar de idea más adelante y puede dejar de participar en el estudio en cualquier momento sin consecuencia.

Antes de tomar una decisión:

- Por favor lea este documento o le pida a otra persona que se lo lea a usted.
- Por favor nos hace preguntas en caso que algo no esté claro.

Usted puede mantener y guardar una copia de esta hoja. Debe tomar todo el tiempo que se requiere para pensar en la información presentada y decidir si quiera participar. Su firma de este documento no se quita ningún derecho legal.

**Procedimientos:**

Si decide que quiere participar, recibirá un número de identificación e irá a un espacio seguro y privado donde podrá dar sus respuestas a la preguntas de la encuesta. La encuesta consiste de doce (12) preguntas sobre su conocimiento de la prevención del VIH/SIDA y sobre su actividad sexual. Puede saltar (decidir no responder) a las preguntas a que no quiere responder. Después de un mes, estaremos en contacto con usted para que responda a la encuesta otra vez.

**Riesgos**:

La encuesta consiste de preguntas sobre el sexo que pueden ser sensibles si sus respuestas fueran conocidas por otras personas. Solo los administradores de la encuesta podrán ver los resultados de las encuestas. No vamos a compartir esta información con sus padres, otros miembros de la familia u otras personas de la comunidad. Su nombre, su foto, u otros datos personales no aparecerán en la encuesta.

**Beneficios**:

Este estudio no tiene como propósito beneficiar a los participantes de forma directa. Este estudio pretende aprender más sobre lo que sepan los jóvenes sobre la prevención del VIH/SIDA en su comunidad. Los resultados de este estudio pueden ser usados para fortalecer esfuerzos de disminuir el efecto de VIH/SIDA en el futuro.

**Compensación:**

Usted no recibirá dinero por su participación en este estudio.

**Confidencialidad/Privacidad:**

Los investigadores y otras autoridades pueden ver los archivos y resultados de este estudio. Agencias estatales y empleados de la Universidad de Emory supervisando el estudio pueden ver los archivos. La Universidad de Emory mantendrá privados los archivos al nivel que se exige la ley. Los números de identificación serán usados en los archivos de estudio en lugar de su nombre. Su nombre y otros datos personales que podrían identificarse no aparecerán en el estudio ni en la publicación de los resultados del estudio.

Los archivos del estudio pueden ser abiertos por orden judicial. También pueden ser abiertos en respuesta a una citación o una solicitud de producción de los documentos.

**Participación Voluntaria y Retirada del Estudio:**

Usted tiene el derecho de dejar el estudio cuando quiera sin consecuencia. Usted puede negar su participación en todas las actividades con que no se siente cómodo.

Los investigadores y la fuente de financiamiento (Universidad de Emory) tienen el derecho de parar su participación en este estudio sin su consentimiento si:

- Crean que la decisión sea en su mejor interés.
- Usted no está de acuerdo con algún cambio al estudio.

**Información de Contacto:**

Para más informaciones, puede contactar al Investigador Principal, Daud Lodin, (925-286-8965, ldaud@emory.edu) o DREAM Project (809-571-0497, molly@dominicandream.org):

Por favor, contáctanos:

- Si usted tiene otras preguntas sobre el estudio o su participación.
- Si usted tiene preguntas, dudas, o quejas sobra la investigación.

Puede contactar a la Junta de Revisión Institucional de la Universidad de Emory (404-712-0720, irb@emory.edu):

- Si usted tiene preguntas sobre sus derechos como un participante de la investigación.
- Si usted tiene preguntas, dudas, o quejas sobre la investigación.

**Consentimiento:**

Por favor, escribe su nombre y firma abajo si usted está acuerdo con su participación en este estudio. Con la firma de este documento de consentimiento, usted no perderá ningún derecho legal. Le daremos una copia de este documento si usted lo quiera.

_____

Nombre del participante

_____ _____

Firma del participante Fecha y Hora

***Consent Forms for Parents and Guardians (Spanish Translation)***

**Título: Evaluación de Deportes Para La Vida, un programa educativo de VIH/SIDA y habilidades para la vida para la juventud dominicana.**

**Investigador Principal: Daud Lodin, Candidato de Maestría en Salud Publica, 2014, Universidad de Emory, Atlanta, GA, EE.UU.**

Facilidad de leer de la escala Flesch = 71.6

Nivel escolar de la escala Flesch-Kinard = 7.1

Fuente de Financiamiento: Dominican Republic Education and Mentoring (DREAM) Project, Universidad de Emory, Atlanta, Georgia, EE.UU.

**Introducción:**

Le pedimos a su niño que participe en un estudio de investigación, lo cual estamos realizando para aprender que sepan los niños sobre la prevención del VIH/SIDA y como este conocimiento puede afectar sus decisiones en el futuro. Esta información nos ayudará a diseñar mejores programas educativos para los niños de su comunidad. Hasta 600 niños participarán en este estudio. Esta hoja describe todo lo que necesita saber para poder tomar una decisión sobre la participación de su hijo. Tiene el derecho de decidir si su hijo puede participar o no puede participar en el estudio. Si decide que su hijo pueda participar, puede cambiar de idea más adelante y su hijo puede dejar de participar en el estudio en cualquier momento sin consecuencia.

Antes de tomar una decisión:

- Por favor lea este documento o le pida a otra persona que se lo lea a usted.
- Por favor nos hace preguntas en caso que algo no esté claro.

Necesitamos el consentimiento de los padres o tutores de todos los niños que son menos de 18 años. Usted puede mantener y guardar una copia de esta hoja. Debe tomar todo el tiempo que se requiere para pensar en la información presentada y decidir si su hijo pueda participar. Su firma de este documento no se quita ningún derecho legal.

Le explicaremos el objetivo del estudio a su hijo y le preguntáremos si él/ella quiere participar en el estudio. Si usted está de acuerdo que su hijo participe en este estudio, pero su hijo no quiere participar, su hijo no participará en el estudio. Su hijo no puede decidir a participar en este estudio si usted no está de acuerdo con su participación.

**Procedimientos:**

Si ambos están de acuerdo con su participación, su hijo recibirá un número de identificación e irá a un espacio seguro y privado donde él/ella podrá dar sus respuestas a la preguntas de la encuesta. La encuesta consiste de doce (12) preguntas sobre su conocimiento de la prevención del VIH/SIDA y sobre su actividad sexual. Su hijo puede saltar (decidir no responder) a las preguntas a que no quiere responder. Después de un mes, estaremos en contacto con ustedes para que su hijo responda a la encuesta otra vez.

**Riesgos:**

La encuesta consiste de preguntas sobre el sexo que pueden ser sensibles si sus respuestas fueran conocidas por otras personas. Solo los administradores de la encuesta podrán ver los resultados de las encuestas. No vamos a compartir esta información con usted, otros miembros de la familia u otras personas de la comunidad. El nombre de su hijo, su foto, u otros datos personales no aparecerán en la encuesta.

**Beneficios:**

Este estudio no tiene como propósito beneficiar a los participantes de forma directa. Este estudio pretende aprender más sobre lo que sepan los jóvenes sobre la prevención del VIH/SIDA en su comunidad. Los resultados de este estudio pueden ser usados para fortalecer esfuerzos de disminuir el efecto de VIH/SIDA en el futuro.

**Compensación:**

Usted y su hijo no recibirán dinero por su participación en este estudio.

**Confidencialidad/Privacidad:**

Los investigadores y otras autoridades pueden ver los archivos y resultados de este estudio. Agencias estatales y empleados de la Universidad de Emory supervisando el estudio pueden ver los archivos de su hijo. La Universidad de Emory mantendrá privados los archivos al nivel que se exige la ley. Los números de identificación serán usados en los archivos de estudio en lugar del nombre de su hijo. El nombre de su hijo y otros datos personales que podrían identificar a su hijo no aparecerán en el estudio ni en la publicación de los resultados del estudio.

Los archivos del estudio pueden ser abiertos por orden judicial. También pueden ser abiertos en respuesta a una citación o una solicitud de producción de los documentos.

**Participación Voluntaria y Retirada del Estudio:**

Usted y su hijo tienen el derecho de dejar el estudio cuando quieran sin consecuencia. Usted puede negar la participación de su hijo en todas las actividades con que no se siente cómodo.

Los investigadores y la fuente de financiamiento (Universidad de Emory) tienen el derecho de parar la participación de su hijo en este estudio sin su consentimiento si:

- Crean que la decisión es en el mejor interés de su hijo.
- Usted no está de acuerdo con algún cambio al estudio.

**Información de Contacto:**

Para más informaciones, puede contactar al Investigador Principal, Daud Lodin, (925-286-8965, ldaud@emory.edu) o DREAM Project (809-571-0497, molly@dominicandream.org):

Por favor, contáctanos:

- Si usted tiene otras preguntas sobre el estudio o la participación de su hijo.
- Si usted tiene preguntas, dudas, o quejas sobra la investigación.

Puede contactar a la Junta de Revisión Institucional de la Universidad de Emory (404-712-0720, irb@emory.edu):

- Si usted tiene preguntas sobre sus derechos como un participante de la investigación.
- Si usted tiene preguntas, dudas, o quejas sobre la investigación.

Consentimiento:

Por favor, escribe su nombre y firma abajo si usted está acuerdo con la participación de su hijo en este estudio. Con la firma de este documento de consentimiento, usted no perderá ningún derecho legal. Le daremos una copia de este documento si usted lo quiera.

_____

Nombre del padre (o tutor legal)

_____

Relación con el/la participante

_____ _____

Firma del padre (o tutor legal) Fecha y Hora

***Assent Forms for Minors (Spanish Translation)***

**Título: Evaluación de Deportes Para La Vida, un programa educativo de VIH/SIDA y habilidades para la vida para la juventud dominicana.**

**Investigador Principal: Daud Lodin, Candidato de Maestría en Salud Publica, 2014, Universidad de Emory, Atlanta, GA, EE.UU.**

**Facilidad de leer de la escala Flesch = 80.9**
**Nivel escolar de la escala Flesch-Kinard = 5.9**

Número de identificación del participante: _____

Nombre de la comunidad: _____

Edad del participante: _____ años.

Una de las siguientes secciones de asentimiento informado para menores debe ser satisfecha. Marque el método de asentimiento utilizado para el participante.

1. ☐ (6-10 años) ASENTIMIENTO VERBAL (ver adjunto el documento de asentimiento)
El estudio y el tratamiento fueron explicados a este niño de una manera apropiada para su edad. El niño ha hecho preguntas, verbalizó su comprensión de la información, y proporcionó su consentimiento verbal.

_____ _____
Persona solicitando el asentimiento ---------- Fecha y Hora

2. ☐ (11-17 años) ASENTIMIENTO ESCRITO (ver adjunto el documento de asentimiento).

3. ☐ (todas las edades) NO SE PUEDE PROPORCIONAR SU ASENTIMIENTO
*De acuerdo con la política del IRB de la Universidad de Emory, si el niño es demasiado inmaduro o es incapaz de dar su consentimiento informado, el investigador se obliga manifestar lo siguiente:*

En mi opinión, este niño no puede dar consentimiento informado.

Razón(es):_____

_____ _____
Persona solicitando el asentimiento ---------- Fecha y Hora

_____ _____
Investigador Principal ---------- Fecha y Hora

# DOCUMENTO DE ASENTIMIENTO ESCRITO (O VERBAL)

Estamos realizando un estudio hoy para investigar que sepan los jóvenes sobre el VIH/SIDA y la salud sexual en su comunidad. Queremos que participe en este estudio por medio de completar una encuesta breve. Sus respuestas no serán enseñados a tus familiares, a tus maestros, a tus amigos, ni a los otros miembros de la comunidad. No recibirá nada por sus respuestas a la encuesta.

Tiene el derecho de negarse a participar (decidir no participar) en este estudio. Si no quiere participar, sus padres u otros miembros de su familia no pueden obligarse a participar. Si dice que quiere participar y después tiene un cambio de mente, puede dejar de participar en el estudio en cualquier momento.

Debe preguntarnos si tiene preguntas sobre el estudio. También debe hablar con sus padres u otros miembros de su familia si tenga preguntas sobre el estudio.

Las preguntas de la encuesta tienen que ver con lo que piensa (sus opiniones) o lo que ya sabe. Debe responder a las preguntas lo mejor que pueda. No habrá consecuencia en caso de respuesta incorrecta.

Si firma este documento, significa que leyó todo y que quiere participar en el estudio. Si no quiere participar, no debe firmar este documento. Participar en este estudio es su propia decisión y nadie será enojado o decepcionado si no firme este documento o si deje de participar después de empezar.

Si se pone de acuerdo a participar en este estudio, firme aquí:

_____ _____

Firma del participante Fecha y Hora

Número de identificación del participante: _____

Nombre de la comunidad: _____

_____ _____

Firma del testigo (Si el asentimiento sea verbal) Fecha y Hora

SAS CODE

```
*TO MERGE PRE-SURVEY WITH KAP;
proc sort data=kap;
by id_num;
run;
proc sort data=prekap;
by id_num;
run;
data dpv.final_kap;
merge kap prekap;
by id_num;
run;

*DATA CLEAN UP FOR COMPLETED SURVEYS;
data dpv.final_kap1 (where=(q1 ne ''));
set dpv.final_kap;
run;
data dpv.final_kap2 (where=(edad ne .));
set dpv.final_kap1;
run;

*LIST OF ALL VAR;
proc contents;
run;

*SCORE CONVERSION FOR THE HIV KNOWLEDGE PORTION OF OUR SURVEY;
data dpv.final_kap3;
set dpv.final_kap2;
if q1 = 'si' then q1correct = 1;
else q1correct = 0;
if q2 = 'si' then q2correct = 1;
else q2correct = 0;
if q3 = 'si' then q3correct = 1;
else q3correct = 0;
if q4 = 'no' then q4correct = 1;
else q4correct = 0;
if q5 = 'no' then q5correct = 1;
else q5correct = 0;
score = q1correct + q2correct + q3correct + q4correct + q5correct;
If edad le 14 then edad_gruppo = '10 to 14';
If edad gt 14 and edad le 18 then edad_gruppo = '15 to 18';
If edad gt 18 and edad le 21 then edad_gruppo = '19 to 21';
If edad gt 21 then edad_gruppo = '21 and older';
run;

*VERIFICATION OF THE SCORES;
proc freq;
table q1*q1correct q2*q2correct q3*q3correct q4*q4correct
q5*q5correct;
run;

*VERIFICATION OF PASS/FAIL;
proc freq;
```

```
tables pass*case score*case;
run;

*COMPARISON OF DEMOGRAPHICS AND INTERVENTION (CASE);
proc freq;
tables case*sexo case*comunidad case*region case*religion
case*score;
run;

*COMPARISON OF INTERVENTION AND CORRECT ANSWERS;
proc freq;
tables case*q1correct case*q2correct case*q3correct case*q4correct
case*q5correct;
run;

*COMPARISON OF INTERVENTION AND CORRECT ANSWERS;
proc freq;
tables edad*edad_gruppo;
run;

*COMPARISON OF AGE AND INTERVENTION;
proc freq;
tables edad_gruppo*case;
run;

*COMPARISON OF INTERVENTION, AGE, AND PASS/FAIL;
proc freq;
tables case*pass;
by edad_gruppo;
run;

*INDICATION OF HOW MANY PARTICIPANTS HAD SEX IN EACH GROUP;
proc freq;
tables case*q6;
run;

*SUBSET CREATED TO DETERMINE PRACTICES, VARIABLES CONVERTED;
data dpv.kap_sex (where=(q6 = 'si'));
set dpv.final_kap3;
if q7 = "11anos" then q7n = 11;
if q7 = "12anos" then q7n = 12;
if q7 = "13anos" then q7n = 13;
if q7 = "14anos" then q7n = 14;
if q7 = "15anos" then q7n = 15;
if q7 = "16anos" then q7n = 16;
if q7 = "17anos" then q7n = 17;
if q7 = "no_responde" then q7n = .;
if q8 = "no_responde" then q8n = .;
if q8 = "1persona" then q8n = 1;
if q8 = "2personas" then q8n = 2;
if q8 = "3personas" then q8n = 3;
if q8 = "4personas" then q8n = 4;
if q8 = "5personas" then q8n = 5;
if q8 = "6personas" then q8n = 6;
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```
if q9 = "no_responde" then q9n = .;
if q9 = "no_durante" then q9n = 0;
if q9 = "1persona" then q9n = 1;
if q9 = "2personas" then q9n = 2;
if q9 = "3personas" then q9n = 3;
if q9 = "4personas" then q9n = 4;
if q9 = "5personas" then q9n = 5;
if q9 = "6personas" then q9n = 6;
if religion = "NO TENGO RELIGION" then religion_YN = 0;
else if religion = "PREFIERO NO RESPONDER" then religion_YN = .;
else religion_YN = 1;
if edad LE 18 then edad_18mas = 0;
else edad_18mas = 1;
if q11 = 'si' then q11n = 1;
else if q11 = 'no' then q11n = 0;
else q11n =.;
run;

*COMPARISON OF INTERVENTION AND PRACTICES;
proc freq;
tables case*q7 case*q8 case*q9 case*q10 case*q11 case*q12;
run;

*DEMOGRAPHICS AND INTERVENTION;
proc freq data = dpv.final_kap3;
tables case*religion nacionalidad*case idioma*case;
run;
proc freq data = dpv.final_kap3;
tables case*comunidad*pass comunidad*pass;
run;

*VERIFICATION OF CODE;
proc freq data=dpv.kap_sex;
tables q7*q7n q8*q8n q9*q9n;
run;

*AVERAGES FOR PRACTICES DATA;
proc means data=dpv.kap_sex;
var q7n q8n q9n;
run;
proc means data=dpv.kap_sex;
class case;
var q7n q8n q9n;
run;

*TTEST OF PRACTICES;
proc ttest data=dpv.kap_sex;
class case;
var q7n q8n q9n;
run;

*UNIVARIATE ANALYSIS OF KNOWLEDGE;
proc freq data = dpv.kap_sex;
tables pass*case score*case;
```

```
run;

*MEAN OF AGE FOR SEXUAL PRACTICES DATASET;
proc means data=dpv.kap_sex;
var edad;
run;

proc freq data=dpv.final_kap3;
tables religion*case pass*religion*case;
run;

proc freq data=dpv.kap_sex;
tables case*religion;
run;

*BIVARIATE ANALYSIS OF PRACTICES (Q7,8,9);
data kap_sex_male (where=(sexo = 'Masculino'));
set dpv.kap_sex;
run;
proc ttest data=kap_sex_male;
class case;
var q7n q8n q9n;
run;
data kap_sex_female (where=(sexo = 'Feminino'));
set dpv.kap_sex;
run;
proc ttest data=kap_sex_female;
class case;
var q7n q8n q9n;
run;
proc ttest data=kap_sex_religious;
class case;
var q7n q8n q9n;
run;
data kap_sex_nonreligious (where=(religion_YN = 0));
set dpv.kap_sex;
run;
proc ttest data=kap_sex_nonreligious;
class case;
var q7n q8n q9n;
run;


*BIVARIATE ANALYSIS OF PRACTICES(Q10,11);
proc freq data=kap_sex_male;
tables case*q11n;
run;
proc freq data=kap_sex_female;
tables case*q11n;
run;
proc freq data=kap_sex_religious;
tables sexo*q11n case*q11n;
run;
proc freq data=kap_sex_nonreligious;
```

```
tables sexo*q11n case*q11n;
run;

*MEANS FOR NUMERICAL VAR;
proc means data = dpv.kap_sex;
     vars edad score q7n q8n q9n;
run;

*FREQ FOR DICHOTOMOUS VAR;
proc freq data = dpv.kap_sex;
     table case edad_18mas religion_YN pass q1correct q2correct
q3correct q4correct q5correct q6 q10 q11n;
run;

*FREQ FOR CATEGORICAL VAR;
proc freq data = dpv.kap_sex;
     table religion q12 idioma comunidad region religion;
run;

*NEW DATASET TO CHANGE CATEGORIES INTO NUMERICAL;
data kap_sex2;
set dpv.kap_sex;
if sexo = "Masculino" then sexo_n = 1;
else sexo_n = 0;
if q6 = "si" then q6n = 1;
if q10 = "si" then q10n = 1;
else if q10 = "no" then q10n = 0;
else if q10n = .;
run;

*TTEST FOR NUMERICAL VAR;
proc ttest data = kap_sex2;
class case;
var q7n q8n q9n;
proc ttest data = kap_sex2;
class sexo;
var q7n q8n q9n;
proc ttest data = kap_sex2;
class religion_YN;
var q7n q8n q9n;
run;

*MULTIVARIATE ANALYSIS OF KNOWLEGE;
*DATASET FOR MLR FOR KNOWLEDGE/PRACTICES;
data kap_Multi_knowledge;
set dpv.final_kap3;
if sexo = "Masculino" then sexo_n = 1;
else sexo_n = 0;
if q6 = "si" then q6n = 1;
if q10 = "si" then q10n = 1;
else if q10 = "no" then q10n = 0;
else if q10n = .;
```

```
if q7n ge 15 and q7n le 17 then lateencounter = 1;
else if q7n ge 11 and q7n le 14 then lateencounter = 0;
else lateencounter = .;
if q8n ge  1 and q8n le  2 then few_part_life = 1;
else if q8n ge  3 and q8n le  6 then few_part_life = 0;
else few_part_life = .;
if q9n = 1 then few_part_2mon = 1;
else if q9n = 0 then few_part_2mon = 1;
else if q9n ge 2 then few_part_2mon = 0;
else if q9n = . then few_part_2mon = .;
if q12 = 'condones' then condom_YN = 1;
else condom_YN = 0;
if region = "Puerto Plata" then region_n = 1;
else if region = "Esperanza" then region_n = 2;
else if region = "Santiago" then region_n = 3;
if religion = "NO TENGO RELIGION" then religion_YN = 0;
else if religion = "PREFIERO NO RESPONDER" then religion_YN = .;
else religion_YN = 1;
if edad LE 17 then edad_18mas = 0;
else edad_18mas = 1;
run;

*MULTIVARIATE ANALYSIS FOR KNOWLEDGE;
proc genmod descending;
model pass = case sexo_n religion_YN edad_18mas region_n idioma
nacionalidad/ link=logit dist=binomial;
run;

*FINAL MODEL;
proc genmod descending;
model pass = case religion_YN edad_18mas / link=logit
dist=binomial;
run;
```