

## HIV Barrier Model

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## Abstract

HIV is a prevalent infectious disease worldwide. Although it is more common in third-world countries, it is a problem in the United States as well. Our client, Dr. Marge Sutinen, requires a portable device that demonstrates the strength and durability of condoms against HIV infection and other sexually transmitted infections. She plans to use this device in her class, Contemporary Issues is HIV/AIDS. Many design alternatives were considered including: free falling medal rods, water/dye, and beads, as well as folding and telescoping poles. After testing each new idea against the old model a final design was chosen based on client preferences. The final design utilizes water with telescoping poles on a hand trolley. This design will give Dr. Sutinen and her students the desired dramatic effect necessary to capture the attention of non-believers.

## Introduction

### Background

HIV is a sexually transmitted disease that slowly destroys the human body's ability to fight off infection. Transmission of HIV can happen through blood or the secretion of other bodily fluids. One of the most common ways HIV can be spread is by having unprotected sex with an infected partner. According to a recent study, wearing a condom during sexual intercourse reduces the chances of spreading HIV by 80%. The FDA and private condom companies currently perform various pre-sale tests on condoms including the water leak test, the tensile test, the airburst test, and the electrical conductance test.

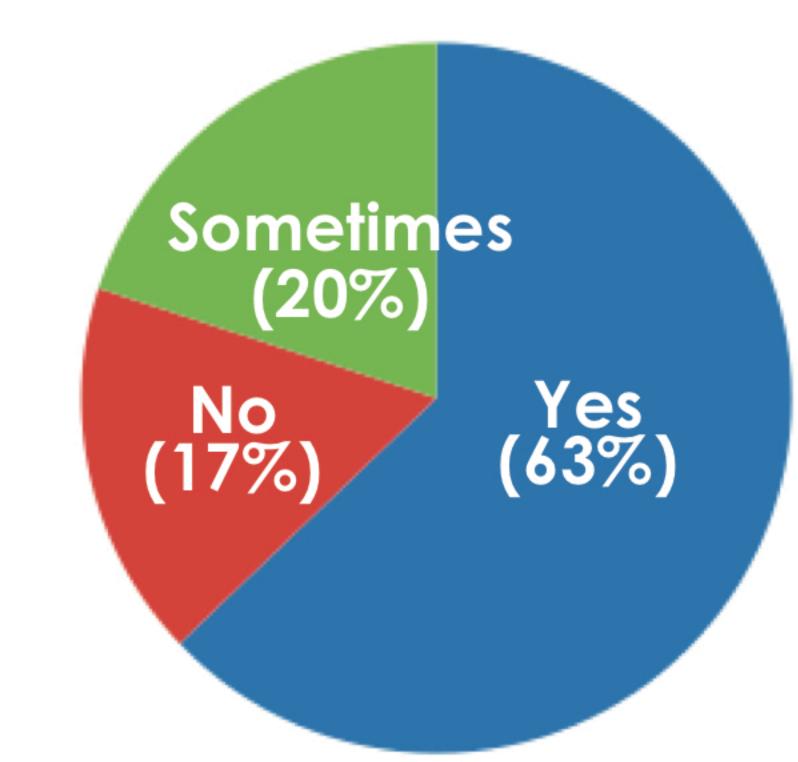
#### Motivation

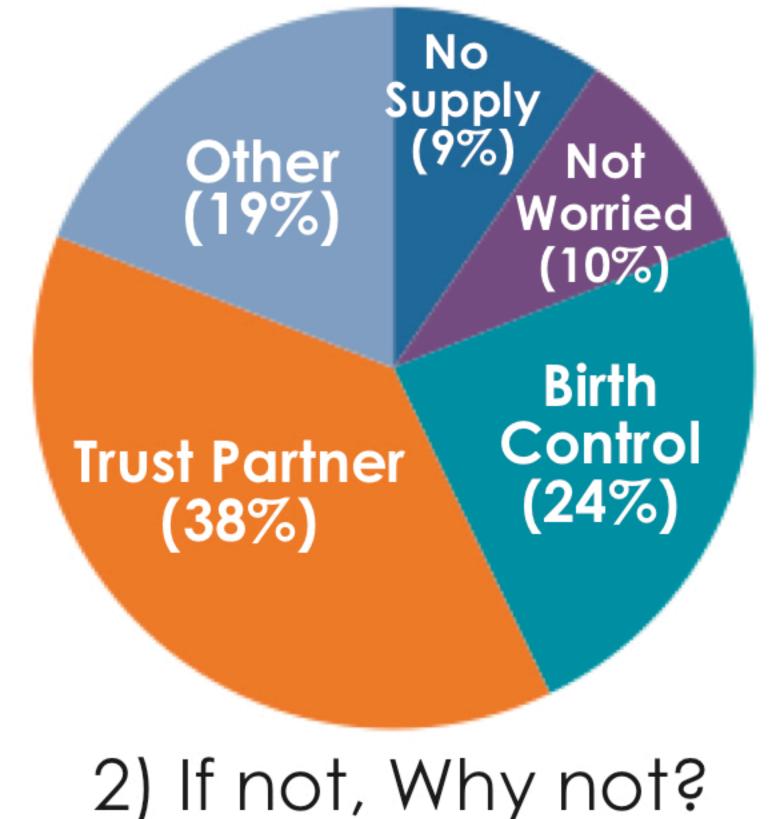
The client, Dr. Marge Sutinen would like a demonstration tool that tests the strength and stretchability of condoms. The device will be used in her class, Contemporary Issues is HIV/AIDS. With this device, her goal is to promote safer sex by educating people on condoms. She hopes that her demonstrations will let students see for themselves the strength of condoms and lead them to use condoms more consistently. Greater and more consistent condom use will lead to a healthier campus social life at UW-Madison.

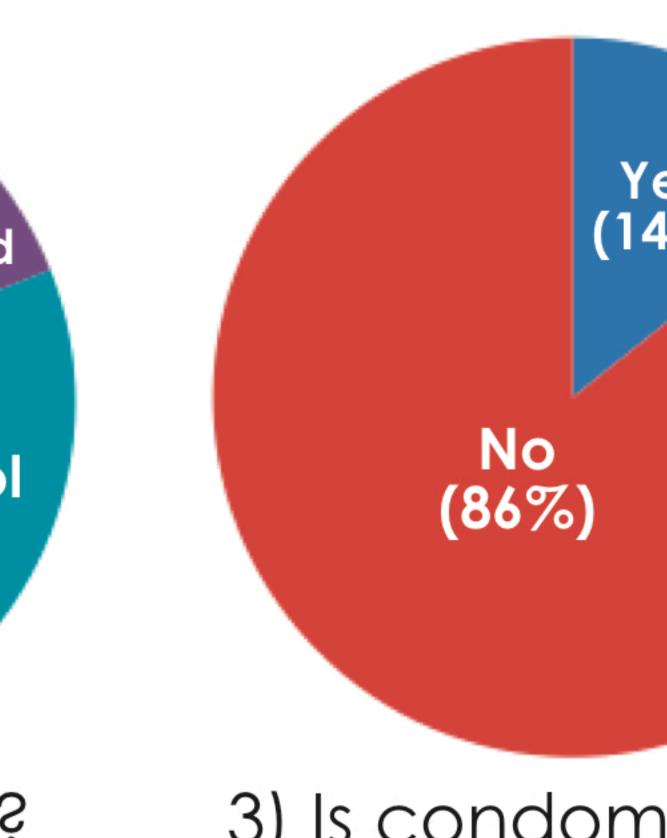
## Testing

#### Demo in Client's Class

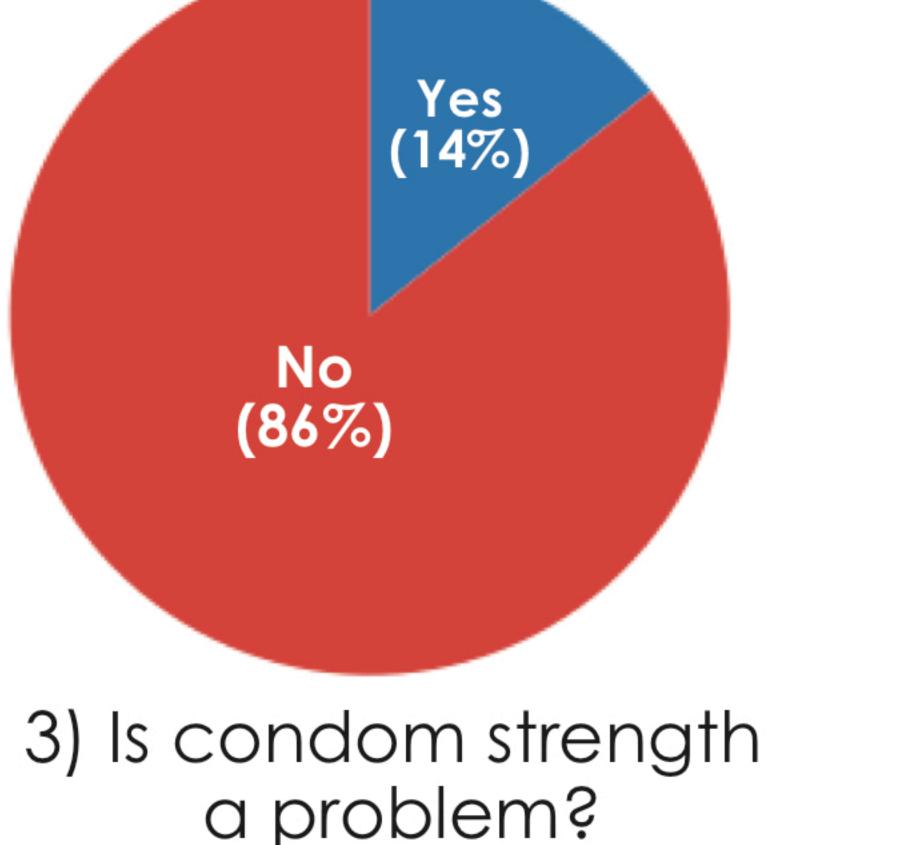
#### Before Presentation Questionnaire







Beads

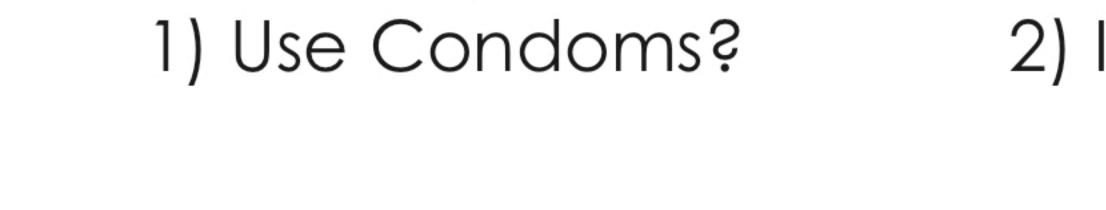


Water

(88.57%)

0.33m

(13in)



#### After Presentation Questionnaire

- 4) Opinion change on condom use? 71% Yes
- 5) More likely to keep supply? 63% Yes
- 6) Improve confidence in condom strength? 89% Yes
- 7) More comfortable conversation with partner? 60% Yes
- 8) Which presentation mechanism was more impressive?

# Higher Transportability Time Consuming Installation Water-Splashing Problem Releasing-Water Problem Adaptability to Different Environments Various Breaking Points If Water is Not Available Fabrication Measurements Positioning **Draining System** (Back view)

## Final Design

#### Design Criteria Design Features More dramatic demonstration Water Hand Trolley + Removable Device

One-Piece Model

Plexiglass Gaurd 2 \* Draining System (3) Standing / Table Model

Telescoping Poles (1) Original Beads Applicable

\*Numbers correspond to the labeled parts on the design illustration

## Cost

Hand Trolley \$23.17 Telescoping Poles \$27.41 Plexiglass (36'x48') \$24.97

2-Gallon Bucket \$4.32 Wood Board Free Adhesives \$15.05

\$10.13 Paint

\$105.05 Total

Cutting Drilling

Assembly

Painting Coating

Gluing Final Assembly

Testing



### Demo Procedure

## Preparation

- (1) Secure device and hand trolley
- (2) Check that everything is in its proper place
- (3) Set the telescoping poles to an user-friendly height
- (4) Clamp an unrolled condom on the device

#### Demonstration

- (5) Pour the water slowly into the funnel
- (6) At 5 lbs, lower the poles carefully
  - (tip of condom should sit 5cm above the bottom of bucket)
- (7) Continue to add water till condom breaks

#### Clean-Up & Transportation

- (8) Remove the bucket from the device, and discard the water
- (9) Lower poles and replace bucket
- (10) The device is now ready to transport

## Conclusion

### Future Work

#### **Improvements**

- 1) Draining System
- 2) Lighter Overall Weight
- 3) Replacement of Compartments/Materials
- 4) Testing Mechanical Properties of Different Materials
- 5) Creating a Take-Home Model

#### Action on World AIDS Day (December 1)

Demonstrating the strength of the condoms using our model at least once a year on campus, especially around the World AIDS Day, would be effective in raising the awareness of AIDS.

0.43m (17in)