**INFO TAB TEXT**

## WHAT IS IT?

**(“What is it”)**

This model aims to simulate the spread and development of safe sex attitudes and behaviors in response to the prevalence of a sexually transmitted infection (STI) throughout a social network of young adults. It also takes into account how these variables influence one another and change over time using theories of attitude change and certainty.

## HOW IT WORKS

Agents in this model are either male or female - the difference between these agents is distinguishable by their shape. Their color indicates their likelihood of engaging in safe sex (red = least likely --> green = most likely).

An agent's likelihood of engaging in safe sex is a probability that depends on his or her:

-- Attitude: their personal desire/intention to have safe sex (CONDOM-USAGE) is originally set by sliders dependent on gender.

-- Certainty: their conviction with which they hold their attitude. The influence of an individual's upbringing, such as parental beliefs and religious attitudes (symbolized by the MESOSYSTEM-CONDOM-ENCOURAGEMENT variable), represents their initial certainty.

-- Justification: the strength of the logical explanations to back up their attitude. Initially, this will be set to a variable representing a level of sex ed. Experiences such as contracting an STD, or a friend contracting an STD, would increase this parameter.

;; On each tick, agents talk to their friends (and partner, if any),

;; and potentially update their attitude about safe sex

Each time step (tick), if an agent is coupled, they increment the length of their relationship. The sexual relationship lasts for a limited period of time (based on the commitment levels of each partner), soif their relationship length has gotten too long, the two will break all links to one another when the sexual relationship ends.

If an agent is does not have a sexual partner on a tick, they attempt to find a mate that is single and of the opposite gender. First they examine their friends, if that is unsuccessful, they try finding a agent within the same social circle that they are not linked to, and as a last resort, they try to find the closest potential mate.

Every agent, regardless of coupled status, has a chance to make a new friend each tick, if their friend count has not already reached a maximum. (A maximum friend count is required so that the clusters remain somewhat discrete and do not form one large clump in the middle of the screen.)

On every tick while the two agents are coupled, if one partner is infected, the other partner is at risk for infection based on a probability of having sex and using protection. If an agent becomes infected through this interaction (and is of a symptomatic gender), they do not realize they are infected until the next tick.

## HOW TO USE IT

Using the sliders, choose the number of social groups (NUM-CLIQUES) to create and how many people should make up each social group (CLIQUE-SIZE). The agents within the clique are only connected to others within their social group, and will have about AVG-NUM-LINKS "friends", that they are connected to via a blue link. One of these links will be to the central "leader" of the clique. This "leader" is identical to other agents, except it additionally has links to all other clique "leaders", which helps set up a visual layout and generates a very loosely connected social network containing mostly discrete clusters.

Whether a central "clique leader" should have links to leaders of other cliques. Initializes limited links between groups, otherwise there are none on setup.

The SETUP button generates this network and assigns unique values to each individual, based on a normal distribution centered around the average values indicated by the sliders AVG-MESOSYSTEM-CONDOM-ENCOURAGEMENT and AVG-MALE-CONDOM-INTENTION/AVG-FEMALE-CONDOM-INTENTION (depends on agent's gender),as well as setting other variables that are not visible to the user in the same fashion (e.g. tendency to make a friend or sexual partner, maximum length of time willing to spend coupled with a sexual partner).

SETUP will infect one person in the population by default. If the user wants to infect another agent, they can do so through pressing the SELECT button and clicking on an agent, or pressing INFECT-RANDOM. This can also be done while the model is running.

An infected person is denoted with the addition of a dot on their body, and they will have a INFECTION-CHANCE chance of infecting a partner during unprotected sex. If they are of a gender that is symptomatic of the STI (set by the SYMPTOMATIC? chooser), they are aware of their infected status, the dot will be white, and the agent will automatically practice safe sex to protect his or her partners. However, if the agent is not a gender that is symptomatic, the dot will appear black, they will be oblivious to their infected state, and continue their normal probability of practicing safe sex.

The model stops when the entire population is infected, or if all agents have reached a single, unchanging safe-sex-attitude of either 0 or 100.

### Simplifying assumptions

## THINGS TO NOTICE

## THINGS TO TRY

**Things to try:**

Set one of the genders to not be symptomatic. What happens to their certainty, in comparison to the other gender? What happens to their attitude adjustment overall? (might need to change vocab….)\*\*\*

If you start with at least 1 person infected, can everyone have a positive attitude without infection spreading significantly? How long does it take for the most opposed person to change their mind significantly? How can this time be reduced?/what parameters can be changed?

Can everyone get negative? With a STI present in the population? Without a STI present?

Can everyone get positive? With a STI present in the population? Without a STI present?

Can some cliques form attitudes significantly different from those of other cliques?

Can there be someone who just refuses to change his or her mind?

## EXTENDING THE MODEL

**Extending the Model**

This model assumes that safe sex (using a condom) is always 100% effective in preventing the spread of infection - thus there is no [random] chance of the infection spreading if a condom is used. This could be modified in extensions to be more realistic and account for factors like incorrect/inconsistent condom usage, condom failure, or STIs passed through other means.

Symptoms of sexually transmitted infections aren't always visible or known, and some STIs display symptoms differently in different genders. These factors impact how often a particular gender might choose to get tested or use protection in sexual encounters. To better simulate real-life behaviors, implement the chance that females have a high likelihood of experiencing symptoms, while males do not. If a person experiences symptoms, they can become treated and cured of the infection in some defined amount of time. You can also implement the condition that if a person thinks they are infected, they will definitely use protection. See how these changes impact the outcome of the model.

In different relationships, condom use may vary. Additionally, condoms are not always effective or properly used, and may be used for some sexual acts, but not others. To more accurately account for likelihood of condom use and consequent transmission of infections, create different condom-use tendencies for each sexual orientation and create a probability that a condom is ineffective.

Condom use for the purpose of protection against sexually transmitted diseases (vs. just for pregnancy prevention) increased when fear of HIV/AIDS was prevalent in the media. Incorporate an element of media influence that impacts the attitudes and/or behaviors of the agents.

if coupled, have sex EVERY time! and if not coupled, ALWAYS looking for a partner….. 🡪 extension??

**Extensions/didn’t get to**

* interaction between sexual partners and peers equal or no?
* -- talking to partner is different than just friends, possible different genders of friends too
* strength of relationships 🡪 stronger relationship sexually = less to use condom? Stronger with friends = more likely to talk about it?? Didn’t find research to support these, but seems intuitive
* sexual partners don’t break up due to different attitudes!!! This could be big area of conflict, suggest an extension (duplicate above)
* media/environment influences - since a lot of articles written during time that hiv/aids was exploding, prior to that condom use/protection/safe sex more about preventing pregnancy…
* Social networks limited: 🡪 extension potential for both generation and analysis
  + More realistic interactions between groups, less social butterfly potential?
  + -- use the networks extension
* Creating “advocates” – at NU, SHAPE program
* the ONLY way someone can know they are infected is through beings ymptomatic.. incorporate telling past partners if you realize you have an std, more responsible behavior. But also include a likelihood of people to do this.
* ;; don't need a had-std? variable or need to get treated, because assumption made is that having just 1 std will deter the person from having unsafe sex... but this isnt true
* -- monogamy
* getting randomly tested, like in aids model, and cost of treatment factors??

## NETLOGO FEATURES

**NetLogo Features**

~~should I have 2 breeds of sexual links? or just one with a type and color….? 2 breeds~~

* Breeds are used for the genders of turtles, as well as for distinguishing friend links from sexual partner links.
* n-of is used to split the agent population into two genders evenly.
* The random-near function generates many small random numbers and adds them together to determine individual tendencies. This produces an approximately normal distribution of values across the population.

[Relationship type is determined by link breeds.] Color of link indicates type of relationship between the two agents / is distinguished by color: a blue link denotes friendship, and magenta link denotes a sexual partnership link is magenta.

;; Set genders of turtles to be 50% male, 50% female

ask n-of (count turtles / 2) turtles [set breed females ]

## RELATED MODELS, CREDITS AND REFERENCES

**References, Related Models**

used sophias as a starting point, but only took relevant stuff, mostly just network generation and creating spatially separated clusters - e.g. no equivalent to bosses in my model, so removed...

Virus

AIDS

Disease Solo

Virus on a Network

STI model (Lizz Bartos & Landon Basham for LS 426, Winter 2013)

Sophia Sullivan Final Project (EECS372 Spring 11): http://modelingcommons.org/browse/one\_model/3023