

The More the Merrier?

Crowds and Disease Transmission



Healthy Actions • Community
Knowledge • Science

FOR GRADES
3-5 6-8

OVERVIEW

Students use powdered drink mix in plastic cups to simulate disease transmission in different size crowds.

LEARNING OBJECTIVES

Students will create a model that shows disease transmission in various sized crowds and use their model to explain how social distancing and avoidance of large gatherings can help slow the spread of certain infectious diseases.

SCIENCE, HEALTH AND MATH SKILLS

- Observing
- Comparing
- Measuring
- Interpreting

NGSS SCIENCE AND ENGINEERING PRACTICES

- Asking questions and defining problems
- Developing and using models
- Planning and carrying out investigations

TIME

- One class period

MATERIALS FOR SCIENCE INVESTIGATION

- 25 similar, small objects (such as marbles, similar size pebbles, pennies)
- 2 packages of powdered drink mix
- 4 clear, similar size containers (such as plastic food storage, jars with lids, etc)
- 2 white paper towels, folded to fit into 2 of the containers
- Spray bottle filled with plain water
- The More the Merrier Task Card (for students)

SET UP AND TEACHING TIPS

This activity can be conducted as a demonstration by you, the teacher, or by each student either in the classroom or at home.

PROCEDURE

■ ENGAGE

1. Ask students, *What is “social distancing”?* Accept all answers.
2. Explain that public health officials advise people to avoid large gatherings. *Why do you think it is important to not attend large events during a pandemic? How does limiting the capacity at sports stadiums or movie theaters help slow the spread of certain diseases?* Give students time to respond.
3. Inform students that while we cannot see the virus moving among people, we can use a model to represent disease transmission in different size crowds.

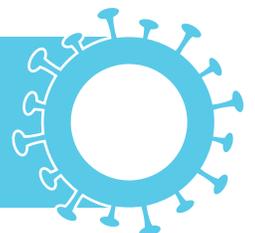
■ EXPLORE

4. If you, the teacher, are doing this as a demonstration, proceed with the steps below. If students are conducting this investigation, refer to “The More the Merrier Task Card” and review the steps with them.
5. Empty 1 package of powdered drink mix into a clean, clear container and add in 5 of the small objects (pennies, marbles, and similar size pebbles work well!). Close the lid and shake the container for 20 seconds.
6. Carefully remove the lid and use tongs to transfer each object to a clean container lined with a paper towel. Secure the lid to this container and shake for 20 seconds. After shaking, discard the small objects, leaving only the paper towel in the container.
7. Repeat Step 5 & 6, this time placing 20 small objects into the container with the drink mix.
8. Use the spray bottle containing water to spray the paper towel in each of the 2 containers 10 times.
9. After the demonstration, or student investigations, compare the results from the 2 containers.
10. Ask the students: *What differences do you observe between the 2 containers? What accounts for the differences observed?*
11. *How can this model be used to explain why it is critical to avoid large gatherings during a pandemic?*

■ EXTEND

12. *What further questions do you have that we could test using this same model to answer your questions?* Further probe student questions to narrow in on specific variables and what each represents in the model – for example, *What would happen if we used less powdered drink mix?* Or, *What would we expect to happen if we used larger containers or more small objects?*

When transmission of the disease is high in a community, large gatherings should be avoided to lessen the chances of encountering droplets from an infected individual. It is important to remind people if they do gather to wear masks, to not share objects, to maintain a distance of at least 6 feet apart, and to limit the number of persons.



THE SCIENCE

The virus that causes COVID-19 mainly spreads through droplet transmission. These droplets are released by an infected person, whether they show symptoms or not, when that person breathes, talks, coughs, or sneezes. When one of these droplets encounters another person, that individual can become infected as well. The more people you come into contact with, the higher your chances are of contracting the virus. When transmission of the disease is high in a community, large gatherings should be avoided to lessen the chances of encountering droplets from an infected individual. Other factors that increase the risk of becoming infected at a large gathering include the duration of time spent in contact with people at the gathering, the distance between people at the gathering, not wearing masks, sharing of objects, and the number of infected persons at a gathering. It is important to remind people if they do gather to wear masks, to not share objects, to maintain a distance of at least 6 feet apart, and to limit the number of persons at the gathering.

In the model created in this activity, the powdered drink mix represents the infection – the darker the resulting color of the paper towel, the more the disease has spread. The small objects represent the number of people in attendance. This model simplifies what happens in real life, because it is not just the number of infected people at a gathering that explains the likelihood of transmission of the virus that causes COVID-19. Other factors, such as not wearing masks and the distance between people also affect transmission of the virus.

■ RESOURCES

- Centers for Disease Control and Prevention (CDC). Considerations for Events and Gatherings. <https://www.cdc.gov/coronavirus/2019-ncov/community/large-events/considerations-for-events-gatherings.html>.

COVID HEALTHY ACTIONS, COMMUNITY KNOWLEDGE AND SCIENCE

■ A SCIENCE-BASED CURRICULUM FOR THE COVID-19 PANDEMIC

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- Author: **Katherine Harris**
- Web and Design Director: **Travis Kelleher**
- Copy Editor: **Lollie Garay**
- Graphic Designer: **Jose Chavero Rivera**
- Technical Reviewers: **Stacey Rose, Jennifer Anne Whitaker**
- Project Director and Series Editor: **Nancy Moreno**

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Department of Education, Innovation and Technology
Baylor College of Medicine
One Baylor Plaza, BCM411
Houston, Texas 77030
713.798.8200 | 800.798.8244
bioedonline.org | edoutreach@bcm.edu