# Why One-Way Hallways Are Safer Than Two-Way Hallways

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## 1. Introduction

- **As a result of the COVID-19 pandemic, schools and buildings face the problem of social distancing in hallways**

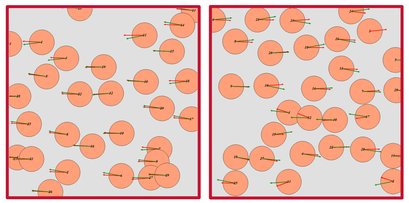
*Crowded Hallway*

*Photo Credit: https://www.tmhspost.com/opinion/2019/10/08/crowding-causes-chaos/*

- **Identify the hallway model that minimizes viral risk by measuring the number of close contacts and the contact time between pedestrians**

## 2. Methodology

- **Python simulation environment[1] tests two pedestrian scenarios: one-way hallway and two-way hallway**
- **Tested the parameters:**
  - **Number of Pedestrians**
  - **Size of Environment**
  - **Velocity of Pedestrians**
- **Data recorded:**
  - **Number of Close Contacts**
  - **Average Close Contact Time (sec)**



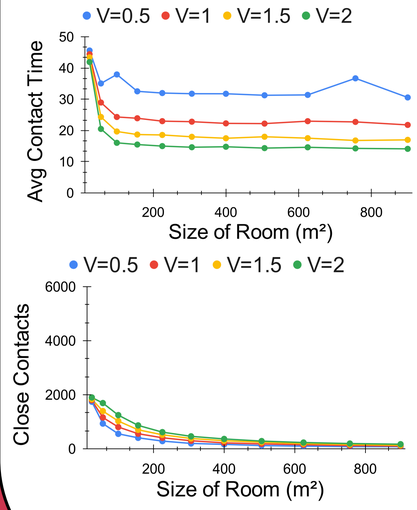
*One-way hallway (left), Two-way hallway (right)*

**Source Code**

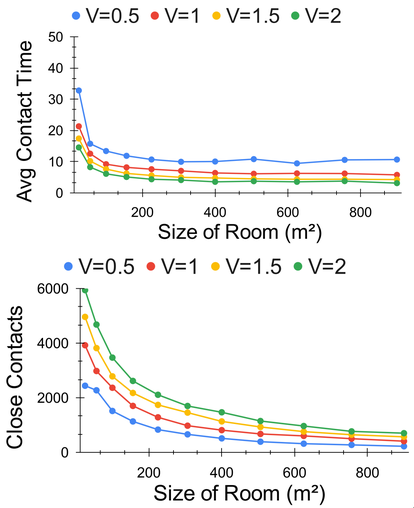
[1] *Karamouzas, I. Skinner, B. J. Guy, S. "A universal power law governing pedestrian interactions" Phys. Rev. Lett. 113, 238701 (2014)*

## 3. Effect of Velocity

### One-Way Hallway




### Two-Way Hallway

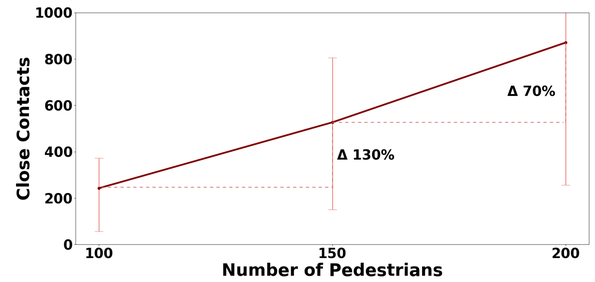



## 6. Conclusion

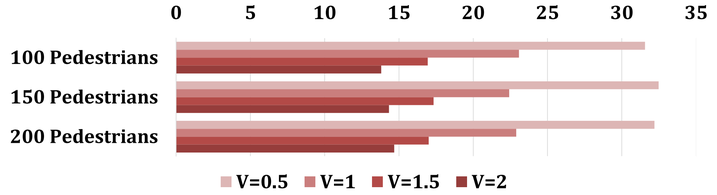
| Benefits of One-Way Hallway Model |
|---|
| 68.62% lower number of close contacts |
| Minimizes risk in narrow or dense hallways |
| Moves more people without a significant increase in risk |

# One-Way Hallway

## 4. Effect of Number of Pedestrians




### Number of Pedestrians and Asymptotic Avg. Contact Times




## 5. Effect of Environment Size and Density

- **Number of contacts continually decreases with increase of environment size**
- **Average contact time stabilizes and asymptotes when density is less than 2 (pedestrians/m²)**