

ENHANCING PEDESTRIAN SAFETY THROUGH THE DEVELOPMENT OF ADVANCED OPERATIONAL STRATEGIES FOR CROSSWALKS IN RESIDENTIAL AREAS

Qinaat Hussain, Wael Alhajyaseen, Mohamed Kharbeche

Introduction

- Pedestrians are the most vulnerable group in the traffic and accounts for 40,000 deaths each year
- One of the reasons of these crashes is that drivers do not usually yield for pedestrians
- Pedestrians' illegal mid-block crossing behavior is usually observed in the state of Qatar[1]
- It is essential to develop advanced countermeasures to effectively reduce conflicts in residential area

Objectives

- To investigate the effectiveness of different innovative treatments at midblock marked crosswalks in residential areas

Apparatus

Driving simulator at QTTSC was used



- 135° horizontal view
- 5760 x 1080 pixels resolution

Participants

- ☐ 58 participants with a valid Qatari driving license
- 84.5% Male vs 15.5% Female
- 41% Asians, 51% Africans, 3.4% Americans, 3.4% Europeans
- Mean age: 26.69 years (SD: 6.9)

[1] Shaaban, K., Muley, D., & Mohammed, A. (2018). Analysis of illegal pedestrian crossing behavior on a major divided arterial road. Transportation Research Part F: Traffic Psychology and Behaviour, 54, 124-137. doi:https://doi.org/10.1016/j.trf.2018.01.012

BACKGROUND

Main findings

Scenario	Yielding rates	Conflicts (PET)	Speed
Control	83.6%	4.47 s	Least effective
LED	94.5%	6.83 s	Effective
VMS	98.2%	7.49 s	Effective
Physical	98.2%	5.12 s	Most effective
Zigzag	94.5%	5.06 s	Effective
Road-Narrowing	98.2%	5.20 s	Effective

Best Performance:
VMS and Physical

Recommendations

- VMS and Physical are recommended as a potentially effective treatments to improve safety at uncontrolled crosswalks
 - By improving yielding rates
 - By reducing vehicle-pedestrian conflicts
 - By motivating drivers to reduce their speed

CONCLUSION

 **Dr. Qinaat Hussain**

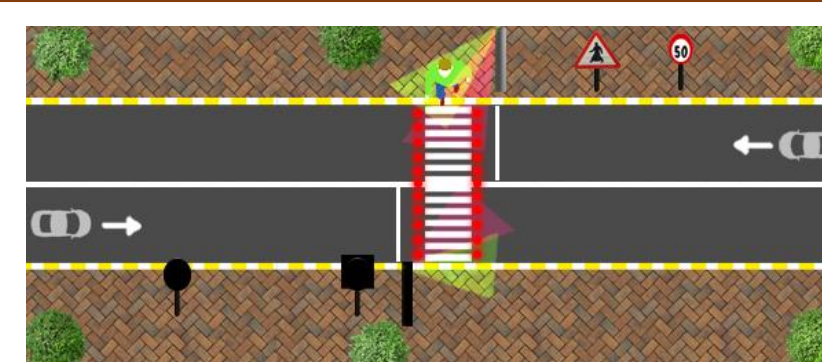
Qatar University
Qatar Transportation and Traffic Safety Center
Qinaat.hussain@qu.edu.qa
(974) 3353 1196

STUDY DESIGN

1 Control

- Typical crosswalk in residential areas in Doha City
- Untreated – only with the default static signs

6 scenarios



LED light units

2 LED light units

- Flashing yellow lights in the absence of pedestrians
- Flashing red lights upon the pedestrian detection



Variable message sign

3 Variable message sign

- SLOW message in case of no pedestrian
- Change to STOP message with animations upon the pedestrian detection



Physical road narrowing

4 Physical road narrowing

- Red pavement showing the message "SLOW"
- Barriers – narrowing the lane from both sides



Zigzag markings

5 Zigzag Markings

- Yellow zigzag markings
- V-shaped loops in the drivers' direction



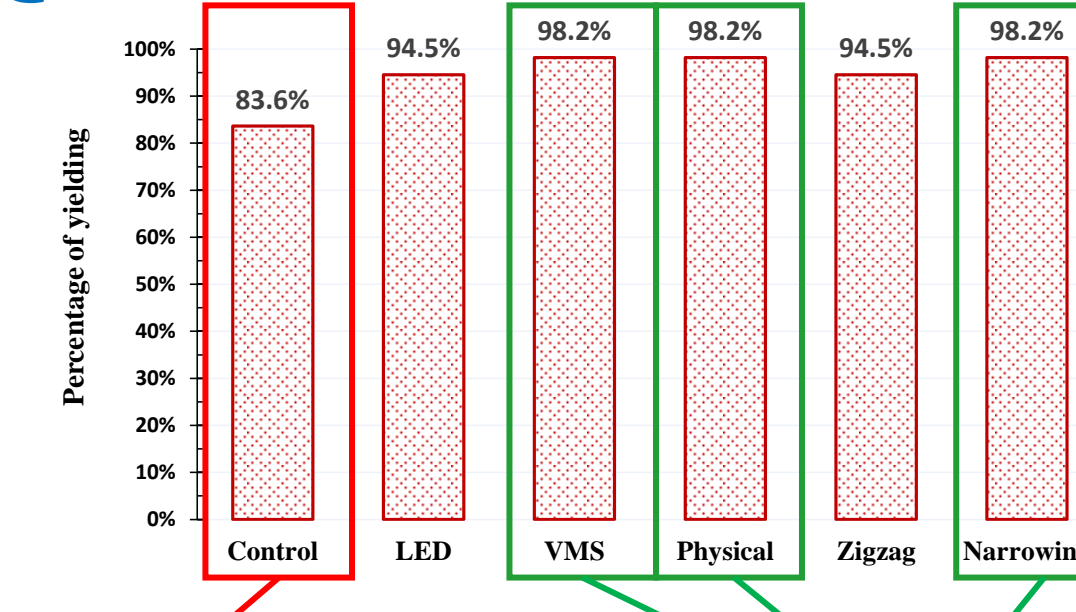
Road-Narrowing Markings

6 Road narrowing Markings

- Based on Japanese manual on pedestrian safety
- SLOW word in the V-shaped loop

RESULTS

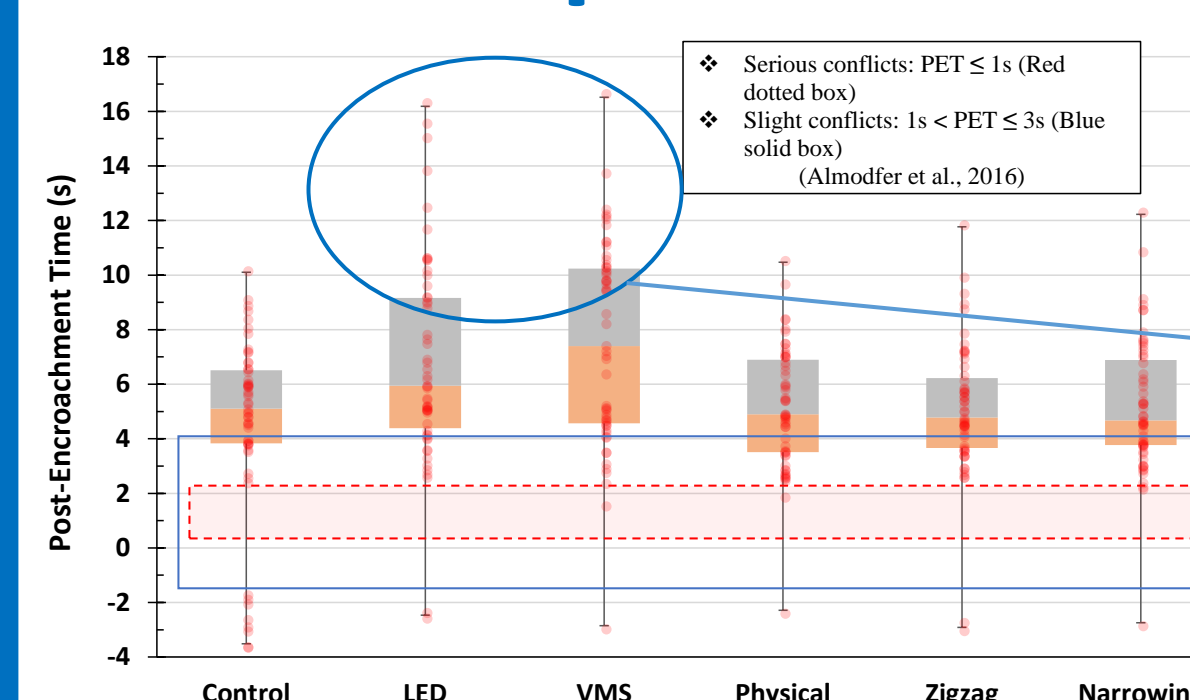
Yielding rates



Significantly lower yielding rates of 83.6% in the Control

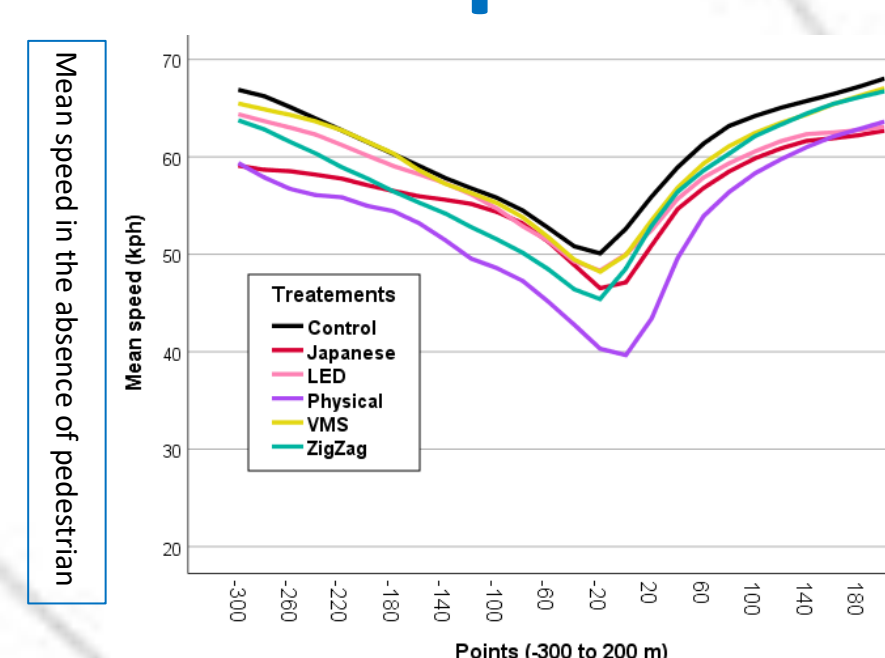
98.2% drivers yielded in LED, VMS and Physical conditions

Vehicle-pedestrian conflicts



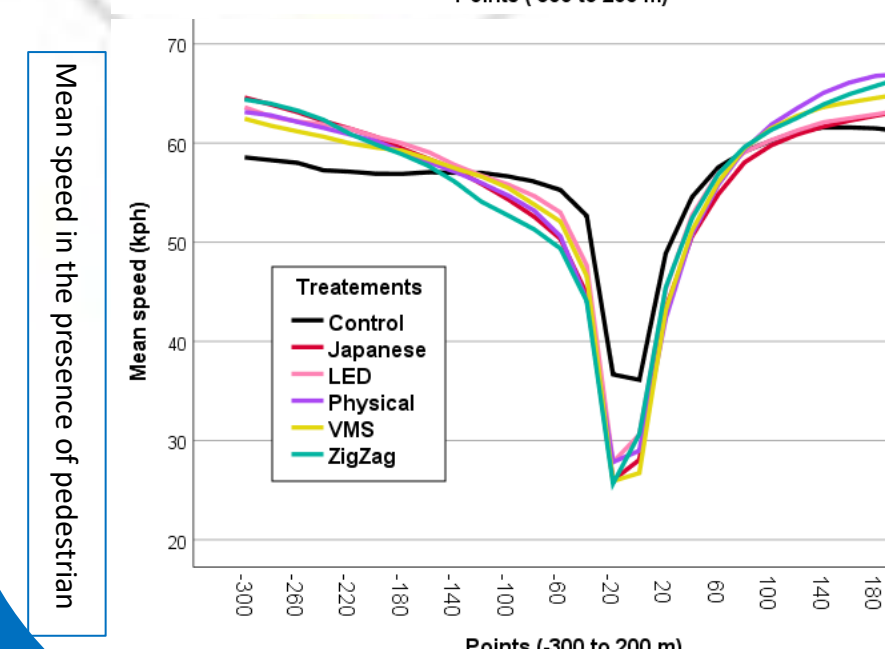
LED and VMS were helpful in improving the PET values

Mean speed



Pedestrian Absent Situation:

- Physical road narrowing was the most effective treatment
- Maybe due to the physical barriers lowering the lane width



Pedestrian Present Situation:

- Most of the participants stopped for the pedestrians in the treatment conditions
- All the treatments were effective in reducing drivers' speed