TXT N DRV:
A Systematic Review of the Effect of Texting while Driving on Driver Performance

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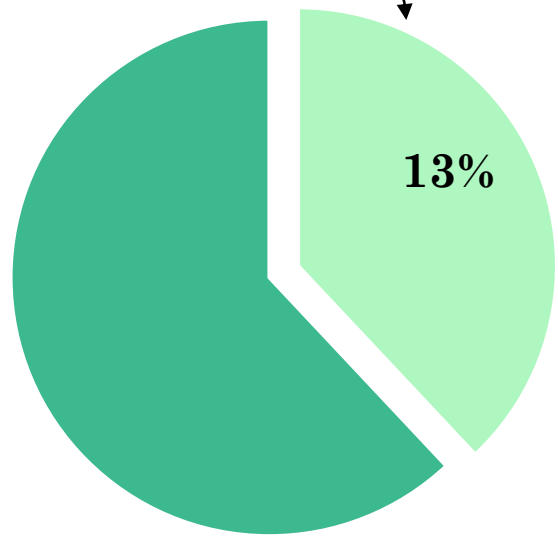
INTRODUCTION

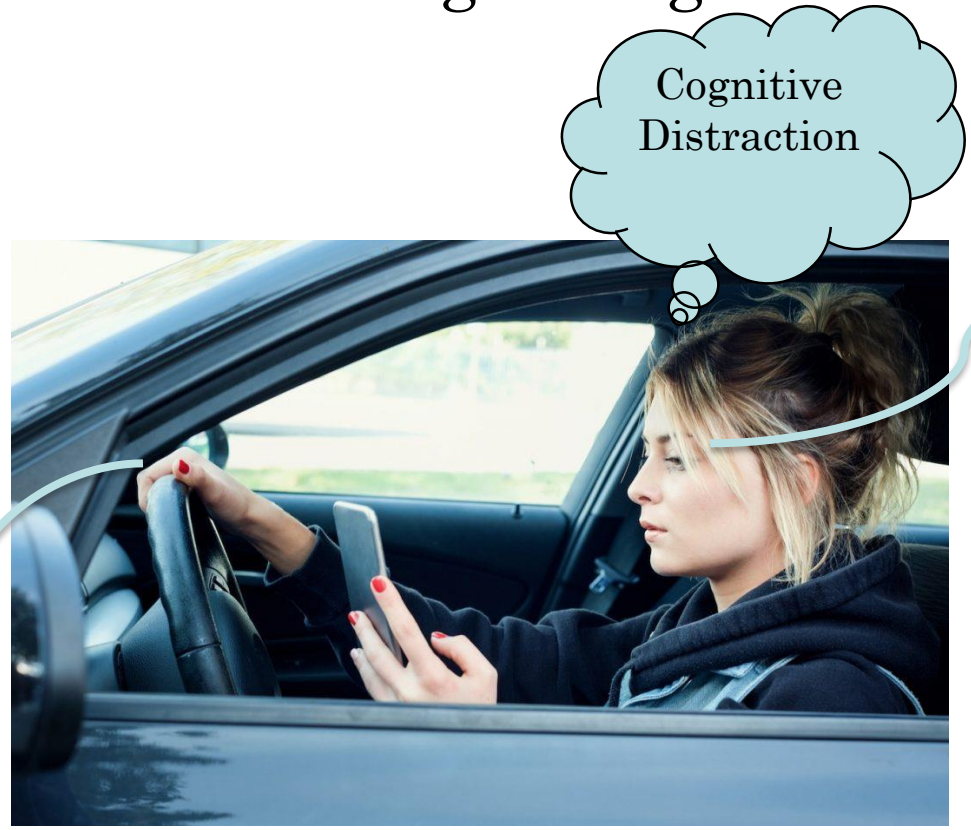
RTF by mobile phone distraction (NHTSA, 2018)



Texting While Driving (TWD)

TWD … the most performance degrading driver distraction (Choudhary and Velaga, 2017)

…At least three types distraction (Caird et al., 2014)

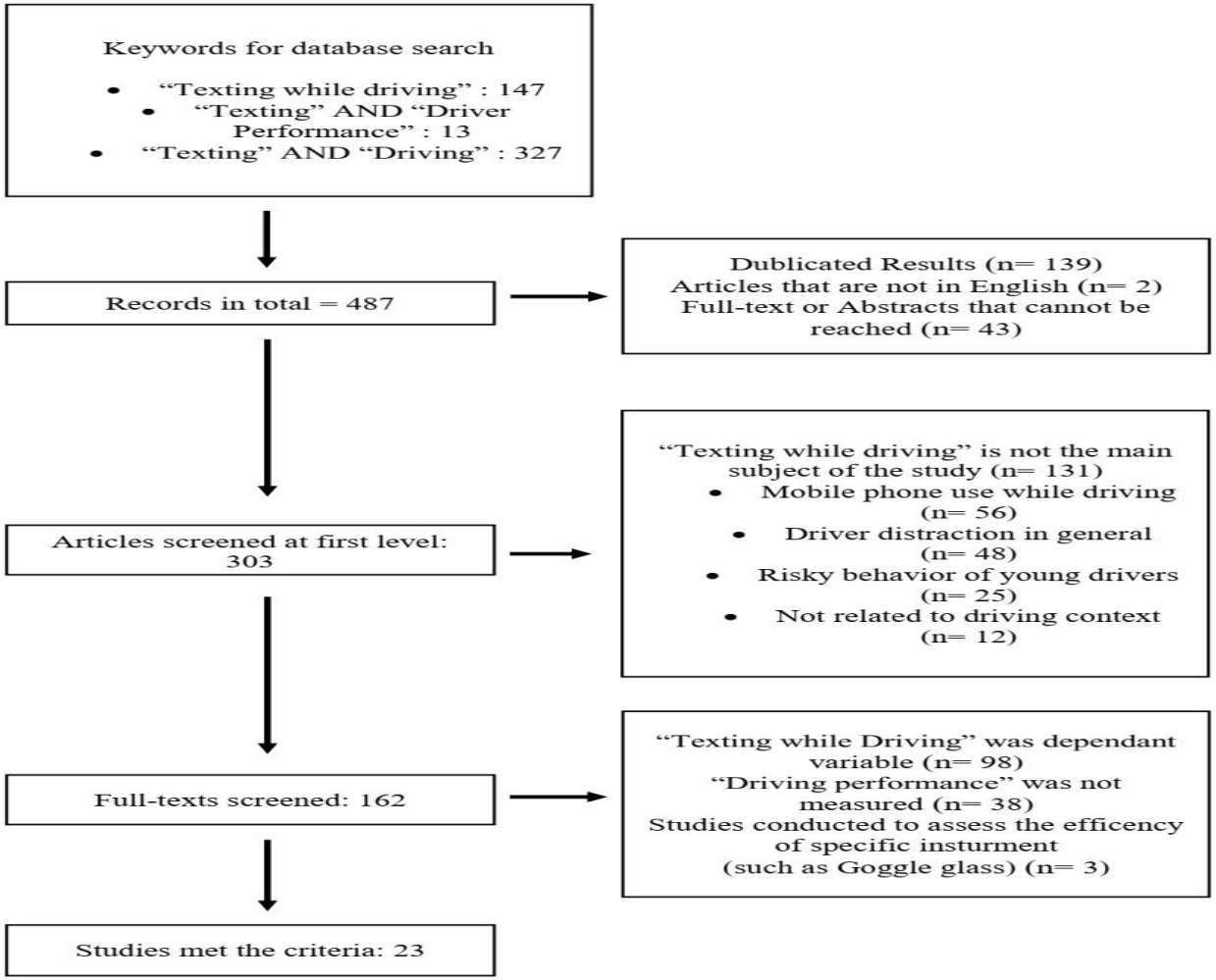


TWD & Driver Performance

The aim of the study

to review studies on the effect of the texting-while-driving (TWD) on driver performance and to create a holistic picture

Method


Keywords for database search
"Texting while driving" : 147
"Texting" AND "Driver Performance" : 13
"Texting" AND "Driving" : 327
Records in total = 487
Dublicated Results (n= 139)
Articles that are not in English (n= 2)
Full-text or Abstracts that cannot be reached (n= 43)
Articles screened at first level: 303
"Texting while driving" is not the main subject of the study (n= 131)
Mobile phone use while driving (n= 56)
Driver distraction in general (n= 48)
Risky behavior of young drivers (n= 25)
Not related to driving context (n= 12)
Full-texts screened: 162
"Texting while Driving" was dependant variable (n= 98)
"Driving performance" was not measured (n= 38)
Studies conducted to assess the efficency of specific insturment (such as Goggle glass) (n= 3)
Studies met the criteria: 23

Results & Discussion

23 Articles

The effect of TWD on driver performance (16)

1. Accident Probability
2. Lateral Vehicle Control
3. Longitudinal Vehicle Control
4. Visual Scanning Behavior
5. Reaction Time
6. Workload

The effect of handheld TWD vs. other driver distractions on driver performance (7)

1. Texting with In-Vehicle system
2. Texting with Speech-based Texting
3. Talking on the Phone
4. Eating

Results & Discussion

- **Accident Probability**… #of accidents

- The TWD increases accident probability

- If the road conditions was riskier, then this probability increased even higher.

  Drivers' awareness of environmental demands were reduced by TWD

➢ Lyngsie et al. (2013); Yannis et al. (2014); Bendak (2015); Yannis et al. (2016); Drews et al. (2009); Lansdown (2019)

Results & Discussion

- **The Lateral Vehicle Control** ….. SD of lane position, # of unneccessary lane change, #of missed lane change sings or steering wheel positions

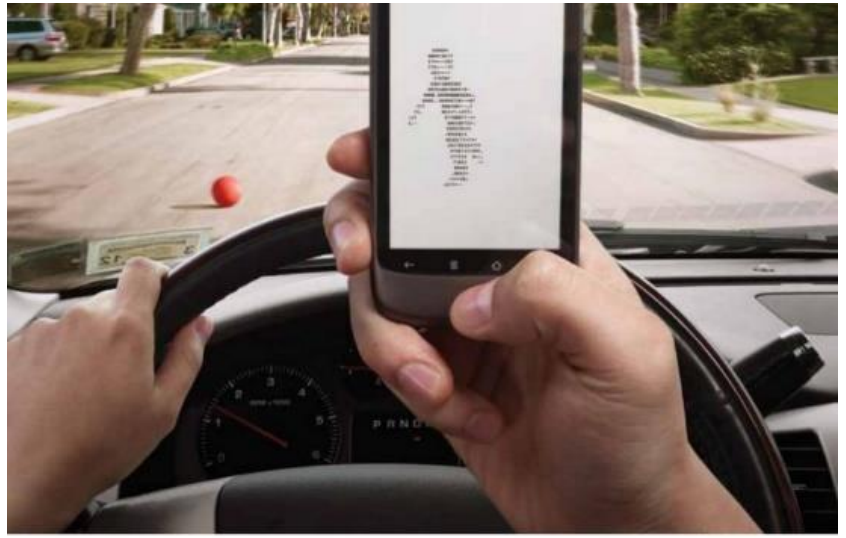
- Texting drivers
  - deviated the vehicle within and between lanes more than undistracted conditions,
  - missed more lane change signs and made more unnecessary lane changes and
  - reversed the steering wheel more than undistracted drivers

➢ Lyngsie et al. (2013); Rudin-Brown et al. (2013); McKeever et al. (2013); Young et al. (2014); He et al. (2015); Bendak (2015); Hosking et al. (2009); Rumschlag et al. (2015); Young et al. (2018); Lansdown (2019); Yan et al. (2015); Drews et al. (2009); Peng et al. (2014)

Results & Discussion

- **The Visual Scanning Behavior**….. # and duration of the driver's eyes off the road

- The texting while driving required more and longer glances off the road
  - Drivers in a study kept their eyes of the road for nearly one third of the driving time
  - Number of glances off the road was 30-50 times higher in texting condition than the driving only condition
- The degraded visual scanning behavior….to miss important safety signs on the road, or to be unaware of the risky road conditions where there is no warnings to alert the drivers



➢ Young et al. (2018); Hosking et al. (2009); Bendak (2015); Rudin-Brown et al. (2013); Lyngsie et al. (2013)

Results & Discussion

- **The Reaction Time**….. The brake response time to the brake light of a leading car
    - Reaction time was significantly higher in TWD condition
- **The Workload…..** NASA-RTLX (Byers Bittner, and Hill, 1989)
    - The workload was reported as singificantly higher in texting while driving than driving without distraction
    - Drivers are aware of the demanding nature of texting while driving

➢ The reaction time: Lyngsie et al. (2013); Yannis et al. (2014); Young et al. (2018); Yan et al. (2015); Drews et al. (2009); The workload: Rudin-Brown et al. (2013); Lansdown (2019); Young et al. (2014)

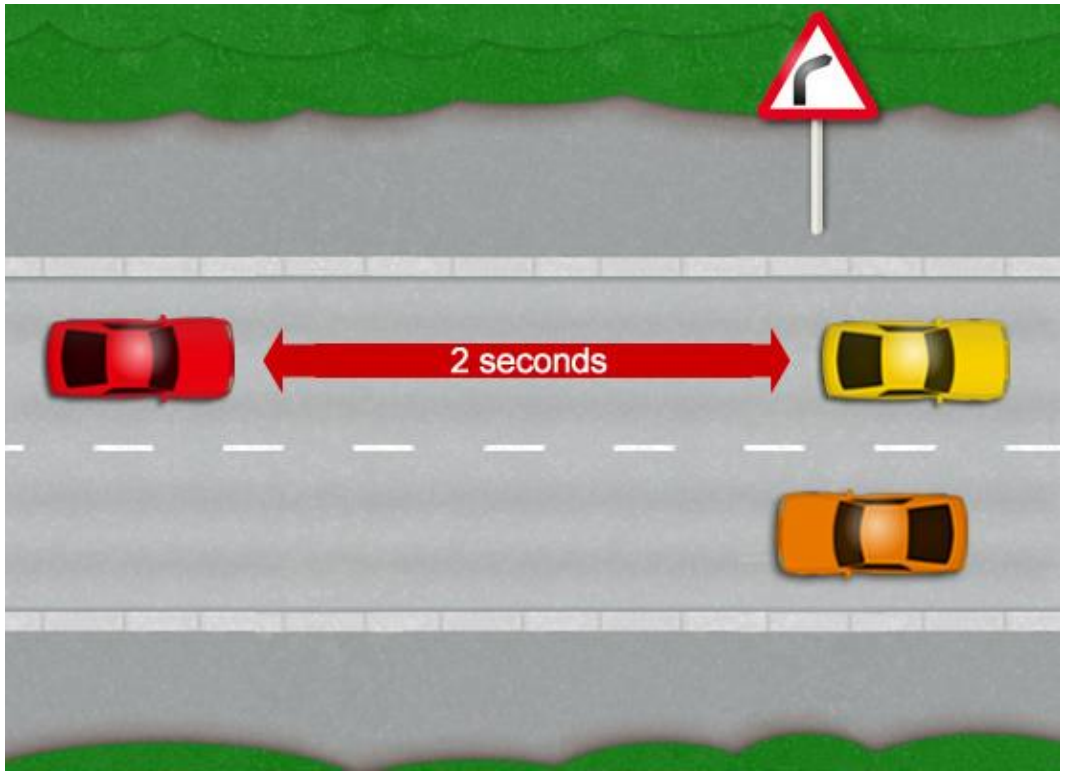
Results & Discussion

- **The Longitudinal Vehicle Control** ….. Mean/SD of speed, Mean/SD of headway time/distance; Mean/SD of following distance

- Reduction in mean speed
- Increase in mean headway time/distance
- Increase in mean following distance

HOWEVER,

- Increase in variability in;
  - Speed
  - Headway time/distance
  - Following distance

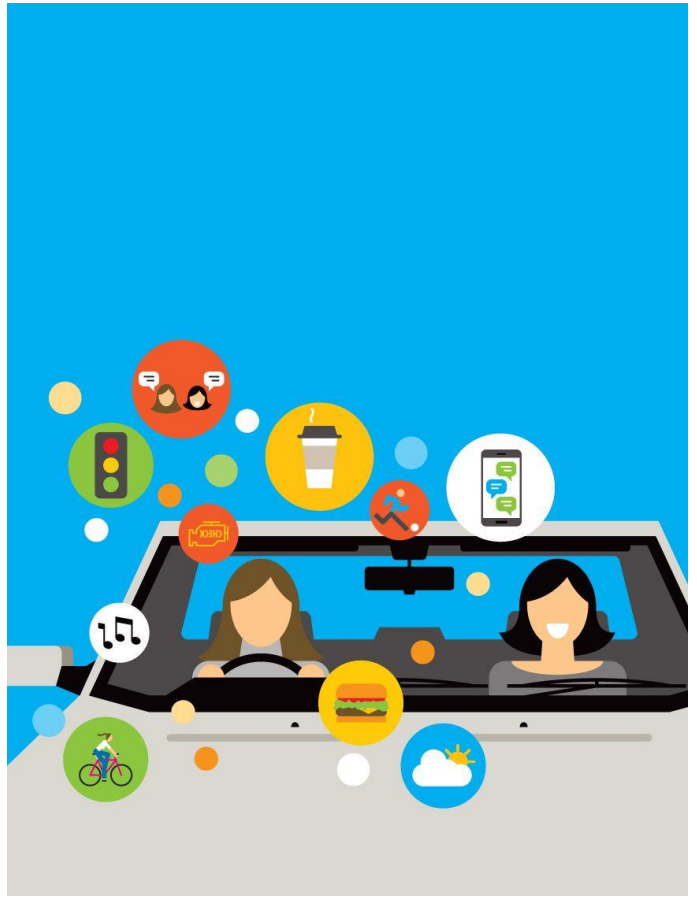


➢ Morgenstern et al. (2020); Lyngsie et al. (2013); Rudin-Brown et al. (2013); McKeever et al. (2013); Young et al. (2014); Yannis et al. (2014); Yannis et al. (2016); Hosking et al. (2009); Young et al. (2018); Yan et al. (2015); Drews et al. (2009); Peng et al. (2014)

Results & Discussion

TWD with handheld mobile phone vs Different driver distractions

- Handheld texting while was related to higher impairements in all driver performance indicators
  - Increased accident probability
  - Degraded lateral and longitudinal vehicle control
  - More and longer glancess off the road
  - Increase in workload & reaction time
- Handheld texting degrades driver's control over vehicle for more than 3 seconds after texting ended

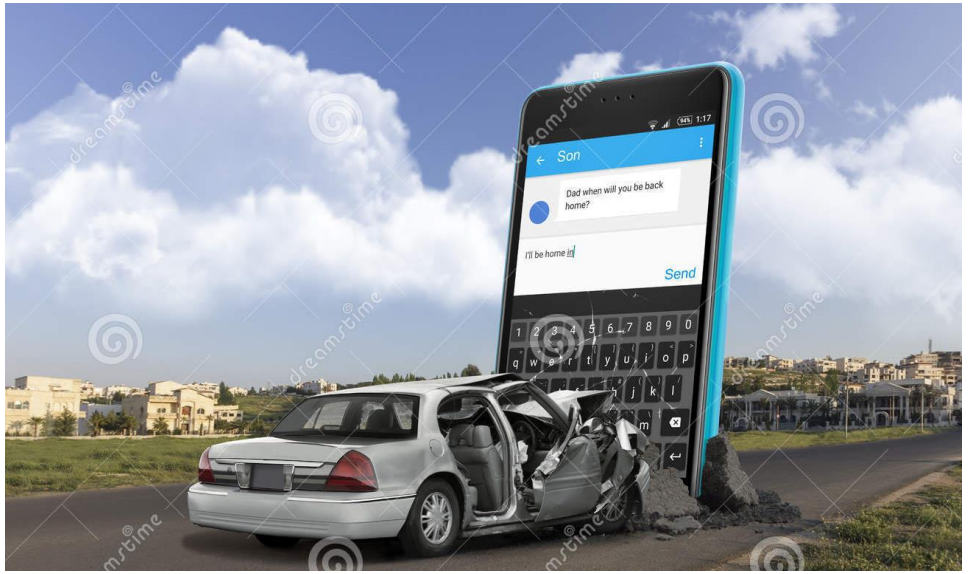


➢ **In-Vehicle System:** Owens et al. (2011). **Speech-Based Texting:** Terken et al. (2011); Chen et al. (2020); He et al. (2014). **Talking on the Phone:** Choudharya and Velaga (2017); Thapa et al. (2015). **Eating:** Alosco et al. (2012)

Implications & Future Directions

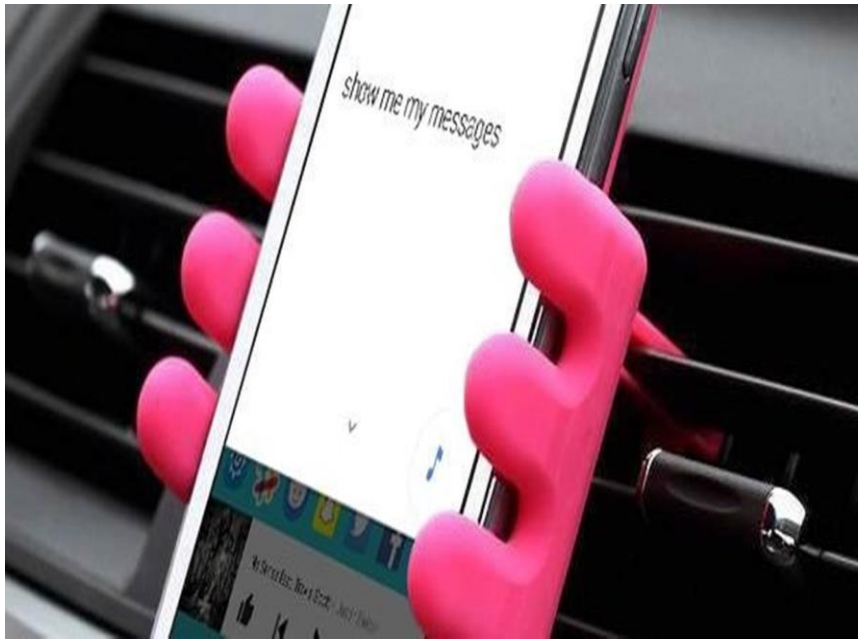
- TWD has critically detrimental effect on driver performance

- Compensation efforts



Implications & Future Directions

- Hands-free vs. Handheld texting
  - Hands-free is not risk-free
- Young drivers



Thank You For Listening