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What would I see in court?

A survey analysis of who americans would blame for self-driving vehicle crashes and traffic violations

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SYSTEMS ENGINEERING
COLORADO STATE UNIVERSITY

Problem Statement

Legal culpability as risk item for Self-Driving Vehicle (SDV) adoption

Who would a potential juror primarily blame in the event of a Self-Driving Vehicle (SDV) being involved in a traffic collision or a moving violation?

How would the advertising campaign of a SDV manufacturer impact a potential juror's blame assignment against the manufacturer?

Emerging Case Law

Verdicts are splitting between Tesla and those injured when Autopilot fails

- Jeremy Banner (2019)

  Model 3 drove under semi trailer

  Fatality – Lawsuit ongoing

- Walter Huang (March 23, 2018)

  Model X crash into median barrier

  Fatality – Tesla settled in 2024

- Tesla has prevailed in court in other trials

Credit: Forbes

Credit: NBC News

Risk to Self-Driving Vehicle Adoption

A look at novel environmental risks to SDVs

- Potential for class-action lawsuits

  Attempts underway in California, USA

- Potential for bankruptcy due to legal obligations

Credit: ASAE Center

Survey Design

Elements of an online anonymous survey

Elements of the Survey

Demographics

- Race or Ethnicity
- Education
- Marital Status
- Gender
- Household Income
- Vehicle Ownership
- Driving Frequency

Assessed Characteristics

- Risk Tolerance (GRiPS)
- Familiarity with Self-Driving Vehicles (SDVs)
- Comfort/Trust level with SDVs

Blame Assignment / Advertising

- Primary blame assignment
  - Driver
  - Manufacturer
  - Sign Maintainer
- Impact of manufacturer advertising on blame assignment

Familiarity Questions

ID	Question Text
1	I know about the concept of Self-Driving Vehicles.
2	I am willing to buy a vehicle that is capable of Self-Driving.
3	Limits should be placed on when Self-Driving can be used.
4	I would be willing to share the road with Self-Driving vehicles.
5	I know of the potential limitations of Self-Driving vehicles.
6	I have traveled in a vehicle using Self-Drive, such as Tesla Autopilot or like technology.

Comfort/Trust Questions

ID	Question Text
1	I would be willing to share the road with Self-Driving vehicles.
2	I would feel safe using Self-Driving capability within the next year on a Highway/Freeway with moderate traffic.
3	I would feel safe using Self-Driving capability within the next year on a Highway/Freeway in gridlock.
4	I would feel safe using Self-Driving capability within the next year in a residential neighborhood.
5	I would feel safe using Self-Driving capability within the next year in a school zone.
6	I would feel safe using Self-Driving capability within the next year in a busy parking lot.
7	I would feel safe using Self-Driving capability within the next year on urban/city streets.
8	Limits should be placed on when Self-Driving can be used.

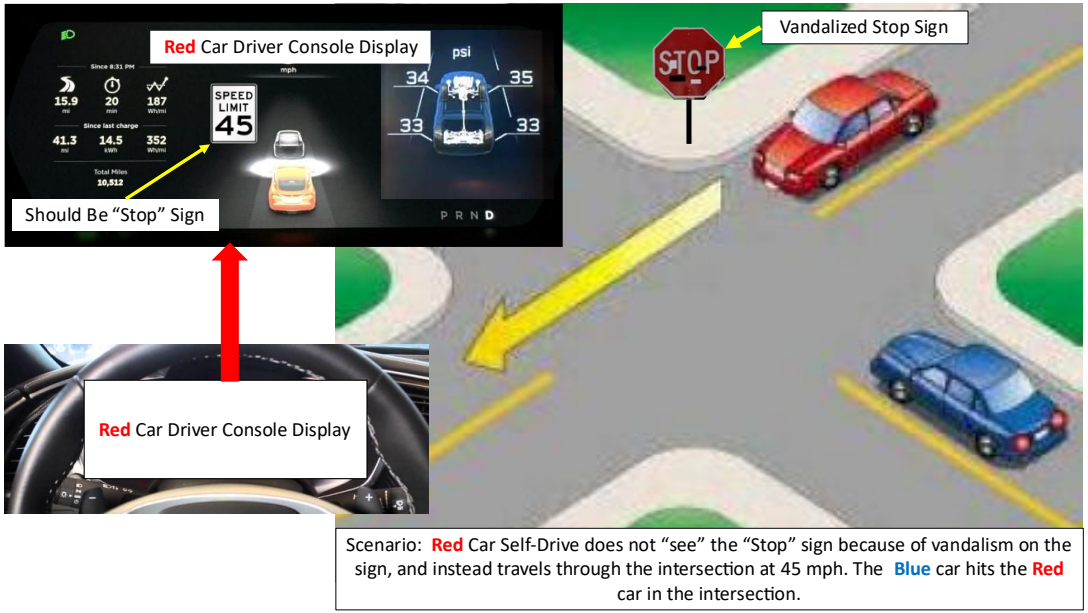
Survey Scenarios

TSR Failure = Traffic Collision or Moving Violation

Scenario 1

TSR failure due to sign vandalism

- Results in collision
- Driver could take control
- TSR result shown on driver console

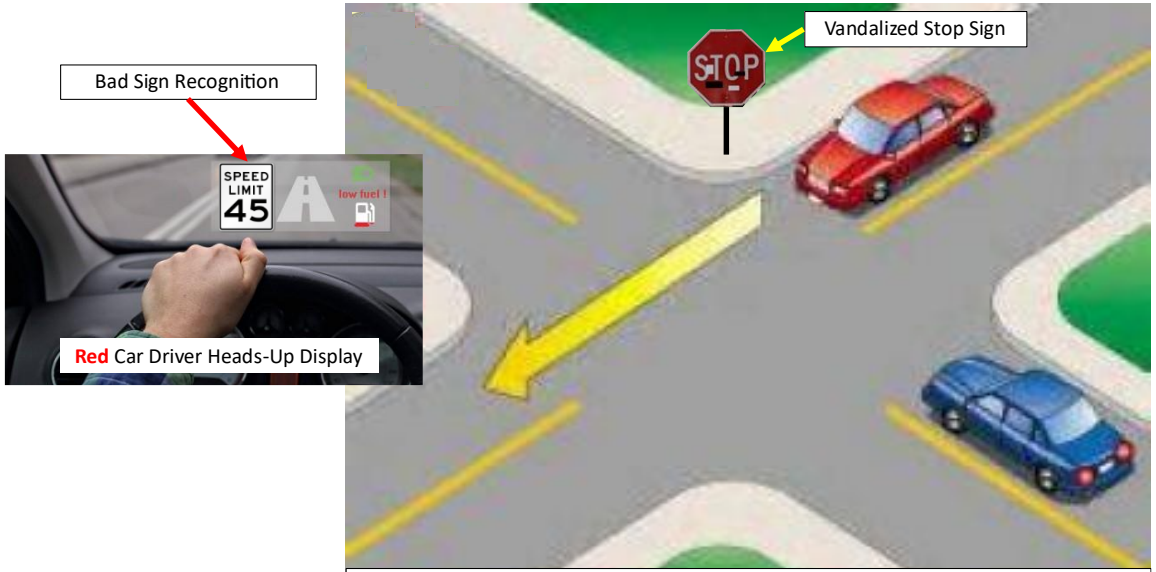


Scenario: **Red** Car Self-Drive does not "see" the "Stop" sign because of vandalism on the sign, and instead travels through the intersection at 45 mph. The **Blue** car hits the **Red** car in the intersection.

Scenario 2

TSR failure due to sign vandalism

- Results in collision
- Driver could take control
- TSR result shown on a heads-up display (HUD)



Scenario: **Red** Car Self-Drive fails to "see" the "Stop" sign because of vandalism on the sign, and instead travels through the intersection at 45 mph. The **Blue** car impacts the **Red** car in the intersection.

Scenario 3

TSR failure due to speed-limit sign damage

- TSR reads “Speed Limit 85” instead of “Speed Limit 65”
- Driver does not see error
- Result is a ticket for a moving violation

Event: Vehicle is driving along a highway with little traffic in Self -Driving mode. The vehicle passes a damaged 65 mph sign that the computer interprets to be an 85 mph speed limit sign. The vehicle speeds up to 85 mph. A cop pulls over the vehicle and issues a speeding ticket to the driver.

Scenario 4

TSR failure due to selection of wrong speed limit sign

- Workers are present in this scenario
- TSR selects “Speed Limit 75” sign
- Vehicle is speeding through a work zone
- Ticket is issued to the driver

Event: Vehicle is traveling along a highway in Self -Driving mode and drives by two speed limit signs: One for a 75 mph speed limit and one for a 45 mph speed limit when workers are working The vehicle only recognizes the 75 mph speed limit sign and maintains that speed. Workers are working in the work zone, and vehicle is pulled over by cop for speeding and the driver is given a speeding ticket.

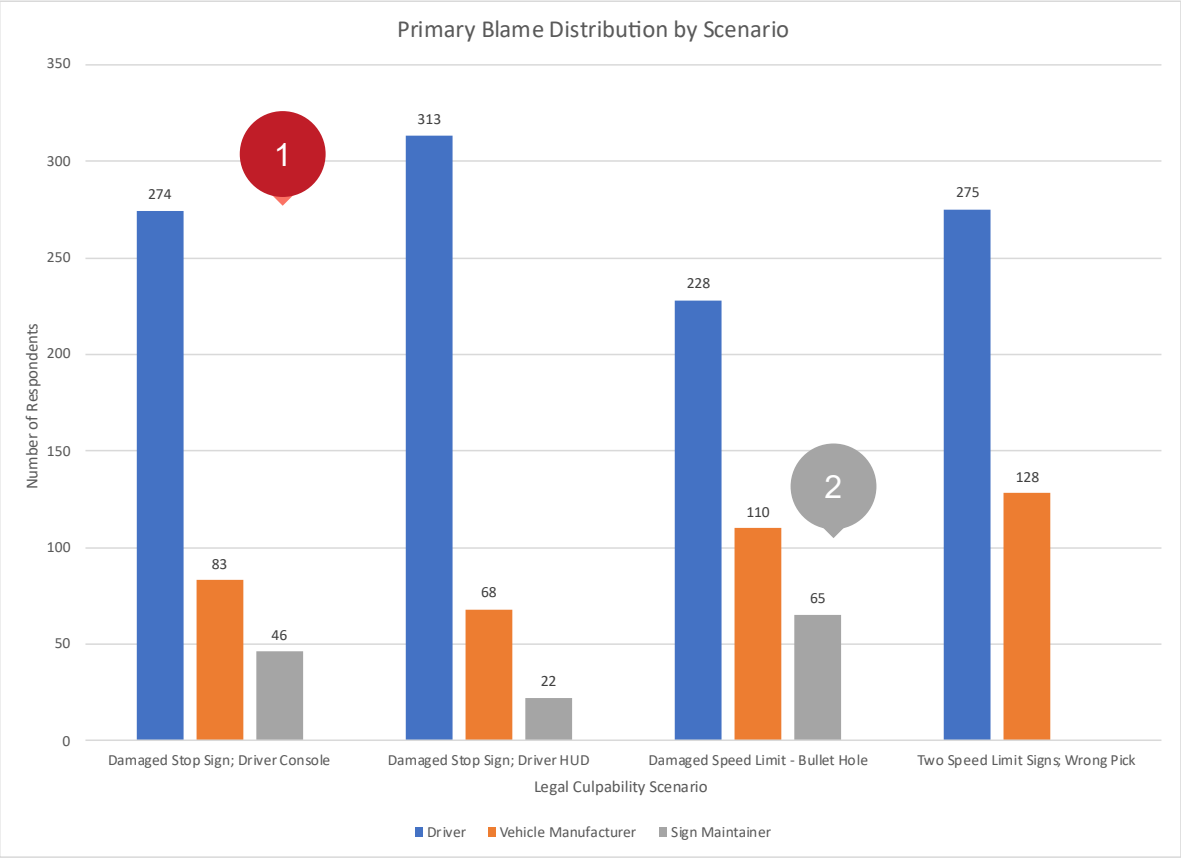
“In Event [X], the vehicle failed to [error description] but the driver did not notice and [failed to mitigate failure]. In this scenario, who do you believe is most to blame for the [event]? (Select One Answer)”

“If the vehicle manufacturer had shown commercials that the Self-Drive feature allows the driver to multi-task and not focus on road conditions or on how the self-driving car was driving, how would this information change your opinion on how much the vehicle manufacturer was to blame for this [event]?”

Survey Results

Based on 403 responses from U.S. respondents.

Primary Blame Distribution



1

Location of TSR Display

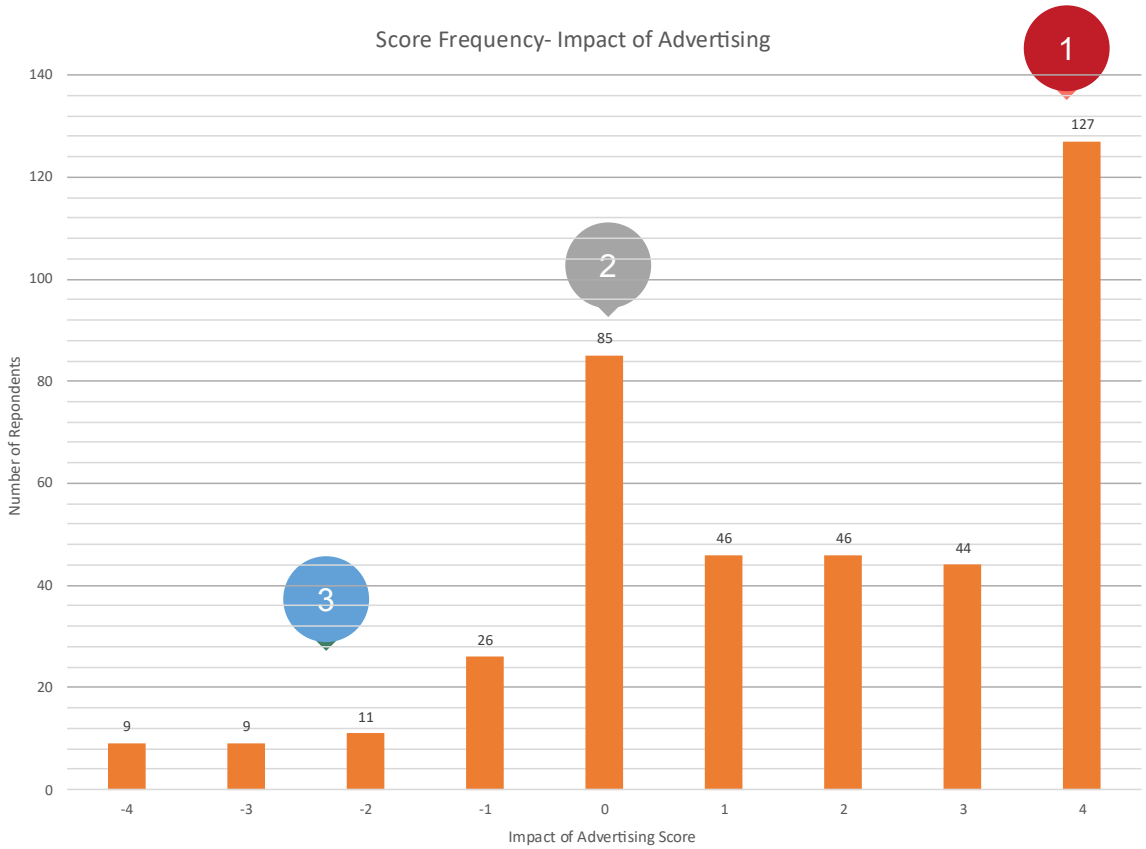
Increase in driver blame when TSR display was in HUD.

2

Type of Sign Damage

More blame for sign maintainer if numbers/letters no longer visible.

Impact of Advertising on Manufacturer Blame

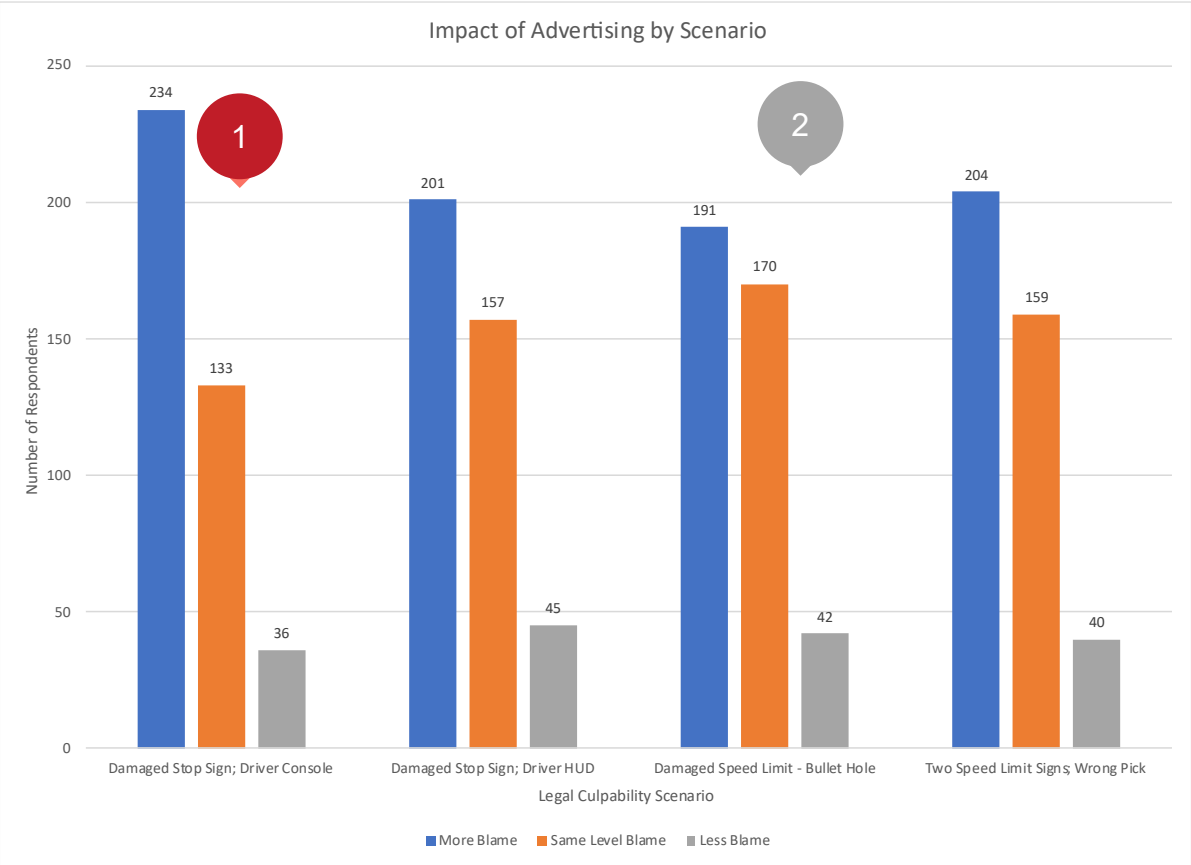


1 Increase in all scenarios
Promises of "no supervision required" increased manufacturer blame in all scenarios.

2 No impact from ads
Promises of no supervision required had no net impact blame assignment.

3 Ad claims reduced blame
Promises of no supervision required reduced manufacturer blame of negative scores.

Impact of Advertising on Manufacturer Blame by Scenario



1

Majority Level

202 or greater represents a majority of respondents

2

Greater Blame in all but Scenario 3

3 of 4 scenarios saw more than half of respondents increase blame to manufacturer due to advertisements.

Statistical Analysis of Results

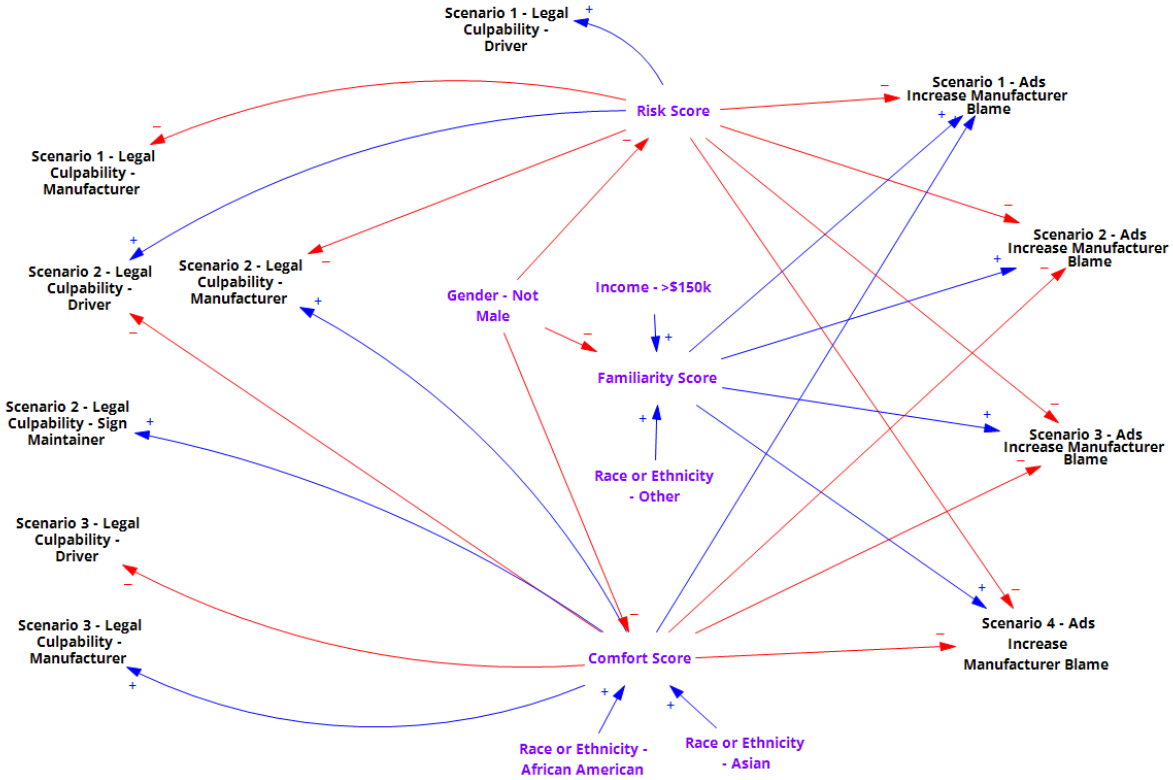
Determining Predictors of Blame Assignment, Impact of Advertising, and Comfort/Risk/Familiarity Scores

- **Linear Regression Analysis**
  - Used to determine if demographic factors were significant predictors of respondent score values (comfort, risk, and familiarity).
  - Predictors with $p < 0.05$ were considered significant.

- **Multinomial Logistic Regression**
  - Used to determine if score values (comfort, risk, or familiarity) were significant predictors of blame assignment for each scenario.
  - Predictors with $p < 0.05$ were considered significant.

- **Ordered Logistic Regression Analysis**
  - Used to determine if score values (comfort, risk, or familiarity) were significant predictors of advertising impact on manufacturer blame assignment for each scenario.
  - Predictors with $p < 0.05$ were considered significant.

System Interaction Model



Conclusions

Significant Predictors of Potential Jury Outcomes

- Who is More Likely to Primarily Blame Manufacturers?
  - Non-Male (vs. Male); Asian or African American (vs. White/Non-Latino)
  - Less risk tolerant
  - Higher comfort with SDVs

- Advertising Impact on Manufacturer Blame
  - Increasing SDV familiarity increases blame in all scenarios
  - Increasing risk tolerance reduces blame in all scenarios
  - Increasing comfort/trust reduces blame in all scenarios other than Scenario 1 (Vandalized sign + Driver console display)

- Manufacturers will need to balance financial benefits from advertising claims with increasing legal risks.

Conclusions

Predictor	Scenario 1 (Vandalized Sign + Driver Console)		Scenario 2 (Vandalized Sign + HUD)		Scenario 3 (Damaged Sign + Speeding Ticket)		Scenario 4 (Wrong Sign + Speeding Ticket)	
	Primary	Ad	Primary	Ad	Primary	Ad	Primary	Ad
Risk Score	Yes	No	Yes	No	No	No	No	No
Comfort Score	No	Yes	Yes	No	Yes	Yes	No	No
Familiarity Score	No	Yes	No	Yes	No	Yes	No	Yes

Questions?

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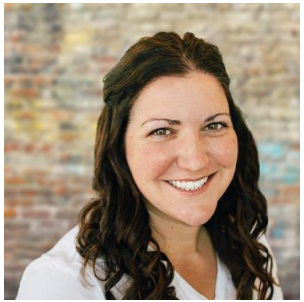

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