

## BACKGROUND

The increasing prevalence of chronic pain leads to the rise in demand for non-pharmacological pain relief devices, such as TENS units and braces, as consumers look for alternative pain relief options. Online platforms like Amazon provide vast amounts of customer feedback, offering valuable insights into product performance and satisfaction. Manufacturers can optimize their products based on feedback and buyers can utilize these insights to select products based on their needs. Prior research highlights the importance of these reviews in understanding product effectiveness in pain related categories (1). Other studies underscore the role of user perceptions and professional recommendations in the utilization of such devices but do not analyze the relationship between product pricing, customer satisfaction and popularity (2).

## OBJECTIVE

This study analyzes 265 pain relief devices listed on Amazon to detect patterns in customer satisfaction, assess how pricing influence reviews, and identify popular products based on sales and feedback. Specifically, it aims to answer the following research questions

1. What are general trends in customer satisfaction for pain relief products?
2. Is there a relationship between product pricing and customer ratings?
3. What's the popularity of pain relief products based on purchases and reviews?
4. What is the influence of product features on customer ratings and satisfaction?
5. What is the impact of review volume on perceived quality of products

## METHODS

The dataset of 265 products was collected using an artificial intelligence (AI)-enhanced web scraping tool built with Python's BeautifulSoup library. This AI integration allowed for efficient parsing of HTML and XML documents, facilitating the extraction of relevant product information. AI based natural language processing extracted the following key variables:

- **Device Name:** Descriptions and names of pain relief devices.
- **Reviews:** Customer ratings (out of 5 stars), the number of reviews, and additional indicators of popularity (e.g., "K+ bought in the past month").
- **Price:** Device prices, including any discounts or promotional offers listed on the website.
- **Device Features:** Key attributes such as brand, technology (e.g., TENS type), and intended use (e.g., sciatica, general pain relief).

Data analysis utilized:

- **Exploratory Data Analysis:** Applied descriptive and inferential statistics to explore trends and correlations.
- **Descriptive Statistics:** Calculated mean, median, and mode of customer ratings for satisfaction insights; analyzed product price range via minimum, maximum, and average prices.
- **Trend Analysis:** Used bar charts to visualize customer rating distributions across various products.
- **Correlation Analysis:** Examined relationships between product price and customer ratings, and review volume and average ratings.
- **Regression Analysis:** Employed simple linear regression to investigate if product price predicts customer ratings.

## RESULTS

- **High Customer Satisfaction:** The average rating was 4.24 stars (SD: 0.35), with most devices receiving 4 to 5 stars. Consistency across devices with median rating is 4.30, closely aligning with the mean.
- **Price Variability:** There is a wide range in the prices of pain relief devices, from \$4 to \$749, reflecting the diversity of device types (e.g., TENS units, ergonomic chairs, braces).
- **Weak Price-Rating Correlation:** A weak positive correlation (0.07) between price and customer ratings suggests that price is not a strong determinant of customer satisfaction. Higher-priced devices do not consistently receive better ratings.
- **Popularity vs. Rating:** Products with large number of reviews (1000+) tend to have ratings of 4 stars or higher, but lower-priced devices also perform well in terms of review counts, indicating that affordability contributes to device popularity.
- **Negligible Impact of Price on Ratings:** The regression analysis confirmed that price has a minimal impact on customer ratings, with a coefficient of 0.00032, further supporting the conclusion that customers prioritize factors other than price.

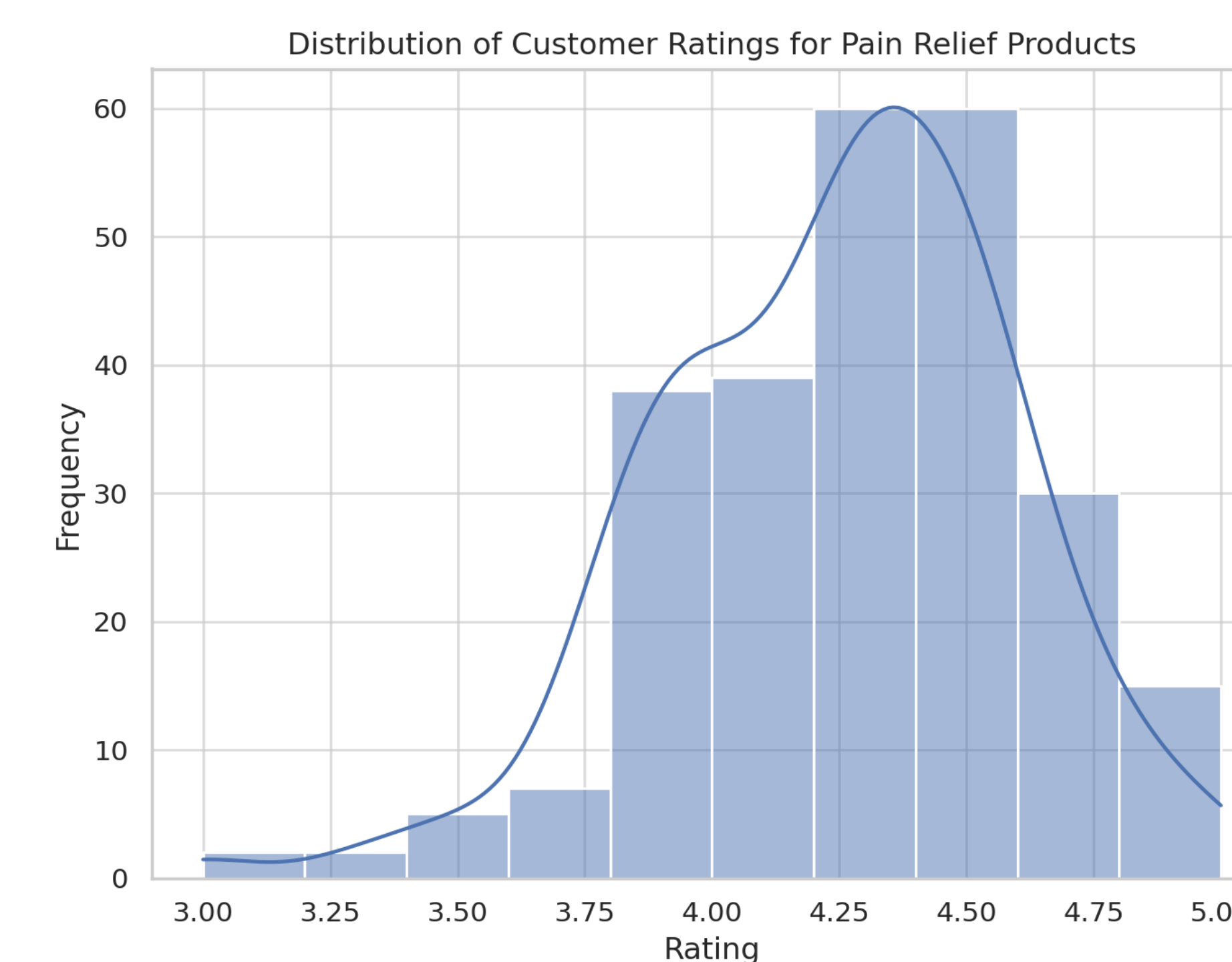


Figure 1. High customer satisfaction with average rating of 4.24 stars (SD 0.35)

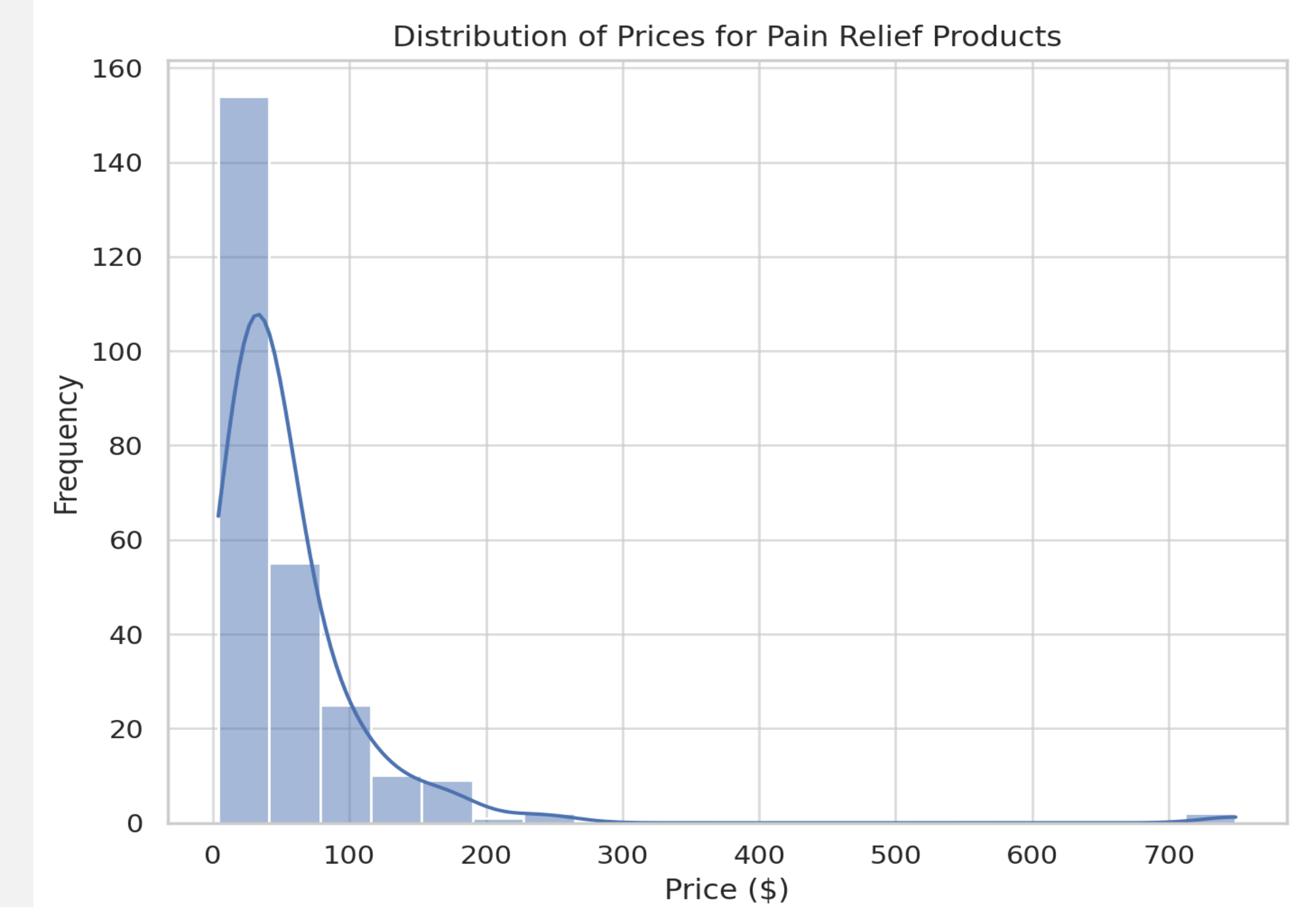


Figure 2. Price variability, ranging from \$4 to \$749, in pain relief devices

## CONCLUSION

- **Customer satisfaction is generally high** for pain relief devices, with most receiving favorable reviews.
- **Price is not a strong predictor** of customer satisfaction, seen by the weak correlation and regression analysis.
- **Consumers are likely focusing on device quality and effectiveness**, rather than price, when rating devices.
- **Affordability and popularity** seem to play a role in driving review counts, with lower-priced devices also receiving significant customer attention.
- **Manufacturers should prioritize quality and effectiveness** over pricing strategies to improve customer satisfaction and popularity.

Findings indicate that in pain relief devices, factors like effectiveness, quality, brand reputation, and innovation significantly influence customer satisfaction and purchasing decisions, overshadowing the role of price. This underscores the need for research across various e-commerce platforms for more devices to examine these factors.

## REFERENCE

- (1) Smith JA, et al. (2023). "Customer Reviews on Chronic Pain Products: A Sentiment Analysis of 1,589 Reviews."
- (2) Doe A, et al. (2022). "Analyzing the Role of Pricing and Customer Satisfaction in Online Reviews of Pain Relief Products."