

### Introduction

Current literature documents that graphic warning labels on nicotine containing products have been more effective than text-only labels in increasing perceived health risks.<sup>1</sup> These graphic warning labels on cigarettes improve smokers' recall of health risk by increasing visual attention.<sup>2</sup> This project aimed to extend prior work on cigarettes to alcohol. Per the NIH, in 2016 21.3% of deaths due to alcohol consumption were from digestive issues (cirrhosis, pancreatitis) and 12.6 from cancers.<sup>3</sup> In this study, the effects of narrative warning labels, warning labels displaying the humanistic toll of alcohol use, and non-narrative warning labels showing the pathology were examined. Parameters assessed were the participants' visual attention and reactance and how that altered risk perceptions, and behavioral intentions to stop/reduce drinking.

It was hypothesized that narrative vs. non-narrative warning labels will lead to greater visual attention and less reactance. Narrative vs. non-narrative warning labels will lead to higher risk perceptions and intentions to reduce and stop drinking through increased visual attention and decreased reactance.

### Aims and Objectives

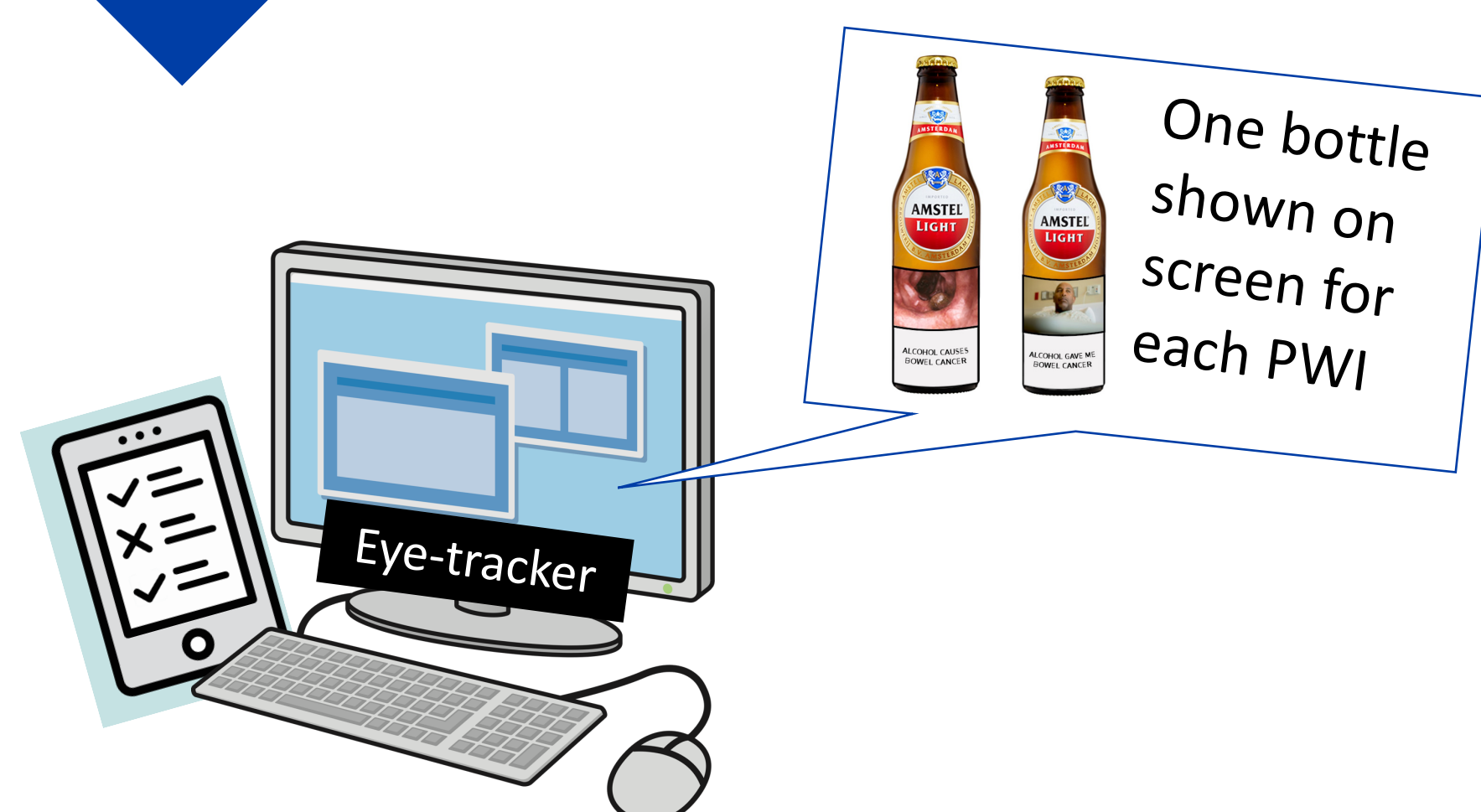
- Aim 1 evaluate gaze behavior towards narrative and non-narrative warning labels
- Aim 2 utilize survey responses to gauge reactance towards warning labels
- Aim 3 assess risk perceptions and intent of behavioral modifications after viewing warning labels

### Methods

- Consent and preliminary surveys
- Eye-tracking calibration

- Eye-tracking task to view pictorial warning label (PWI)
- Survey questions to gauge reported attention and reactance
- Repeat for second PWI

- Survey questions to assess risk perceptions and intent to modify behavior



Participants averaged 28.96 years old ( $\sigma$  11.19) and were split 55% female, 45% males. They were recruited from the local community. A total of 26 responses were recorded, but a preliminary analysis of the eye-tracking was performed using a subset of the first 7 participants.

Heat map data revealed roughly 4 areas of visual attention on narrative PWIs and 2-3 areas on non-narrative PWIs (figure 1), suggesting that more effort and concentration was required to view the narrative PWI.

Minimum fixation duration was also significantly longer in the narrative PWI group, showing longer minimal visual attention with a mean difference of an increase 53.3 ms ( $p$  0.003) (figure 2a). Although the non-narrative PWI group revealed increased number of fixations on the warning label, averaging 16.9 more fixations than the narrative PWI group (figure 2b).

Both experimental groups reported somewhat agreed that the PWIs grabbed their attention. In regards to reactance however, both groups somewhat disagreed that the warnings affected them emotionally or that they could picture themselves in those situations and neither disagreed nor agreed that their attention was captivated, mentally involved, and did not think that the warnings were difficult to put out of their mind. Thus overall reactance for both groups was nominal. Participants in the narrative group, did however score slightly higher in thinking that the warning showed a story, although the  $p$ -value calculated by  $t$ -test was statistically insignificant (table 1).

Table 1: Self-reported and Survey Results of Visual Attention and Reactance

	Narrative*	Non-narrative*	p-value
*1 = strongly disagree; 2 = disagree; 3= somewhat disagree; 4= neither; 5= somewhat agree; 6=agree; 7=strongly agree (std deviation)			
<b>Visual attention</b>			
How much did the bottle grab your attention?	5.15 (1.72)	5.04 (1.65)	0.82
<b>Reactance</b>			
The warnings affect me emotionally.	3.92 (1.64)	3.08 (1.69)	0.21
I could picture myself in the situation shown in the warnings.	3.62 (1.69)	3.92 (1.98)	0.68
My attention is fully captured by the warnings. I am mentally involved in the warnings while viewing it.	4.38 (1.64)	4.67 (1.75)	0.67
The warnings are difficult to put out of my mind.	3.69 (1.59)	3.15 (1.83)	0.43
This warning shows a story.	4.73 (1.53)	4.15 (1.61)	0.19
I recognize a story in the warning.	4.58 (1.78)	4.42 (1.64)	0.74

Baseline evaluation prior to viewing the PWIs, revealed that the majority of participants reported knowledge that alcohol increases risk of liver and bowel cancer (figure 3). However, in terms of risk perceptions post-PWI exposure, both experimental groups averaged unconcern that they themselves would develop cancer from drinking, the non-narrative to a greater extent of nonchalance (figure 4).

### Results

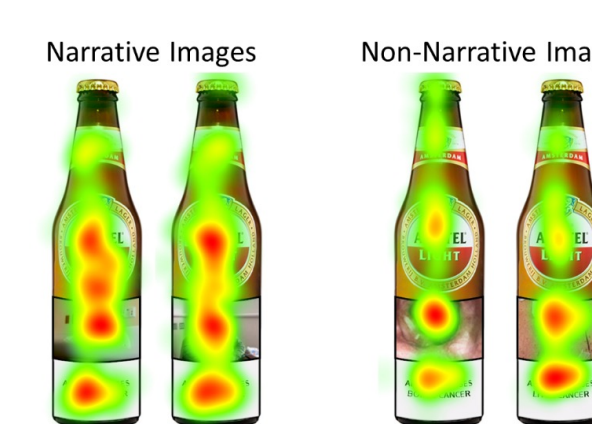


Figure 1: Example heat map of gaze behavior. Warmer areas indicate increased fixation events

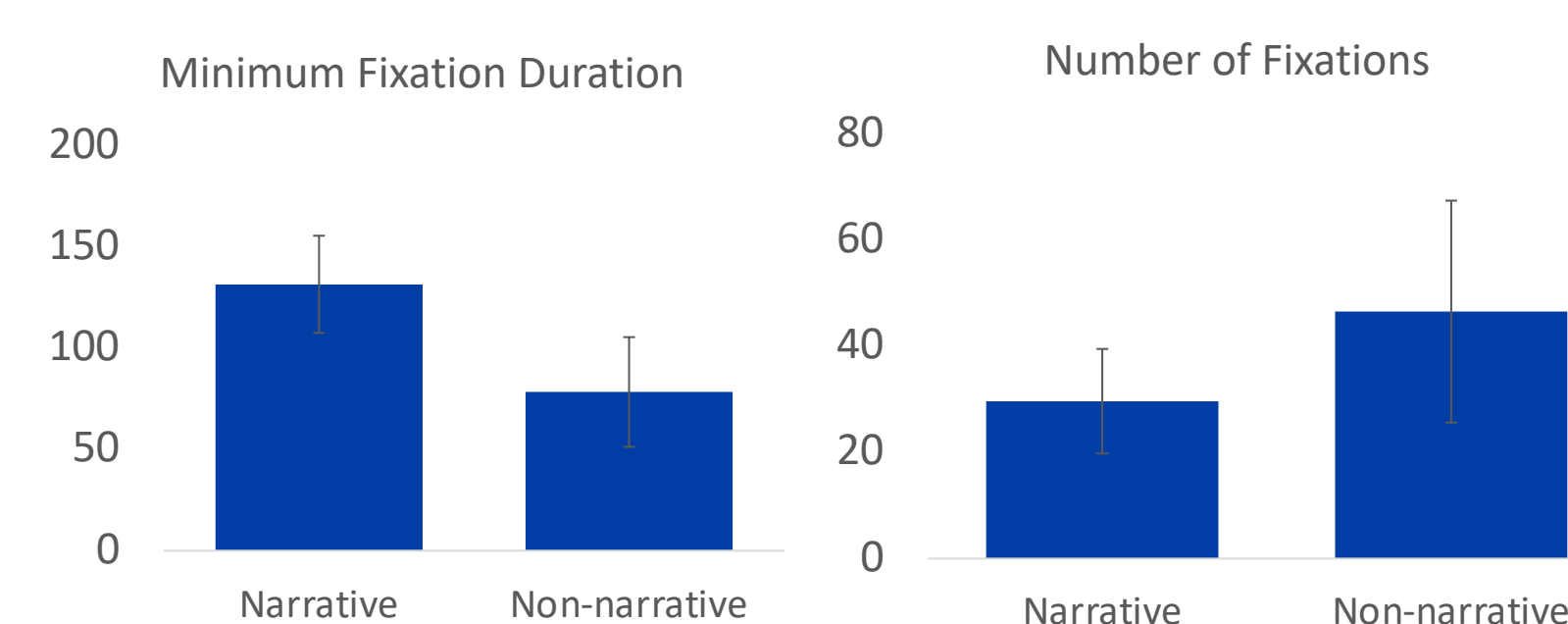


Figure 2a(left): y-axis, time (ms); mean difference 53.3,  $p$ -value 0.002  
b(right): y-axis, occurrences (#); mean difference 16.9,  $p$ -value 0.066

In terms of risk perceptions, there was overall less concern for cancer risks reported by the non-narrative group than the narrative group. (figure 3). Taking the survey responses and averaging them, although both groups disagreed with an intent to change their drinking habits in the next 30 days, the narrative group averaged closer to somewhat disagree and the non-narrative group closer to disagree (table 2). However,  $p$ -values ranged from 0.11-0.20, so results are overall statistically insignificant.

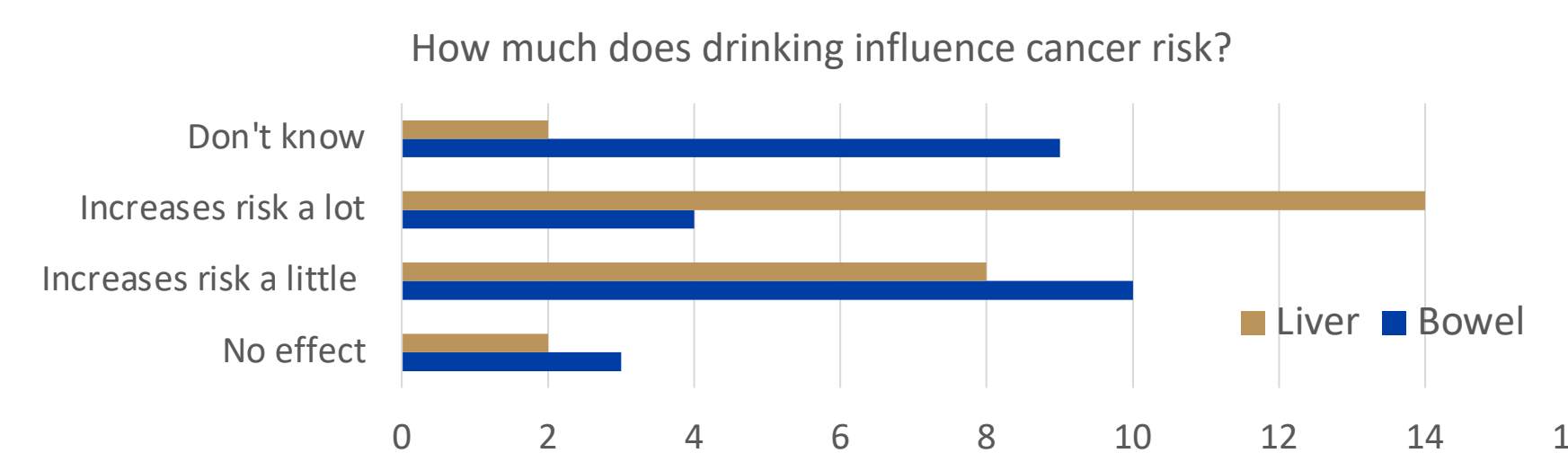


Figure 3: Baseline risk perceptions pre-PWI exposure

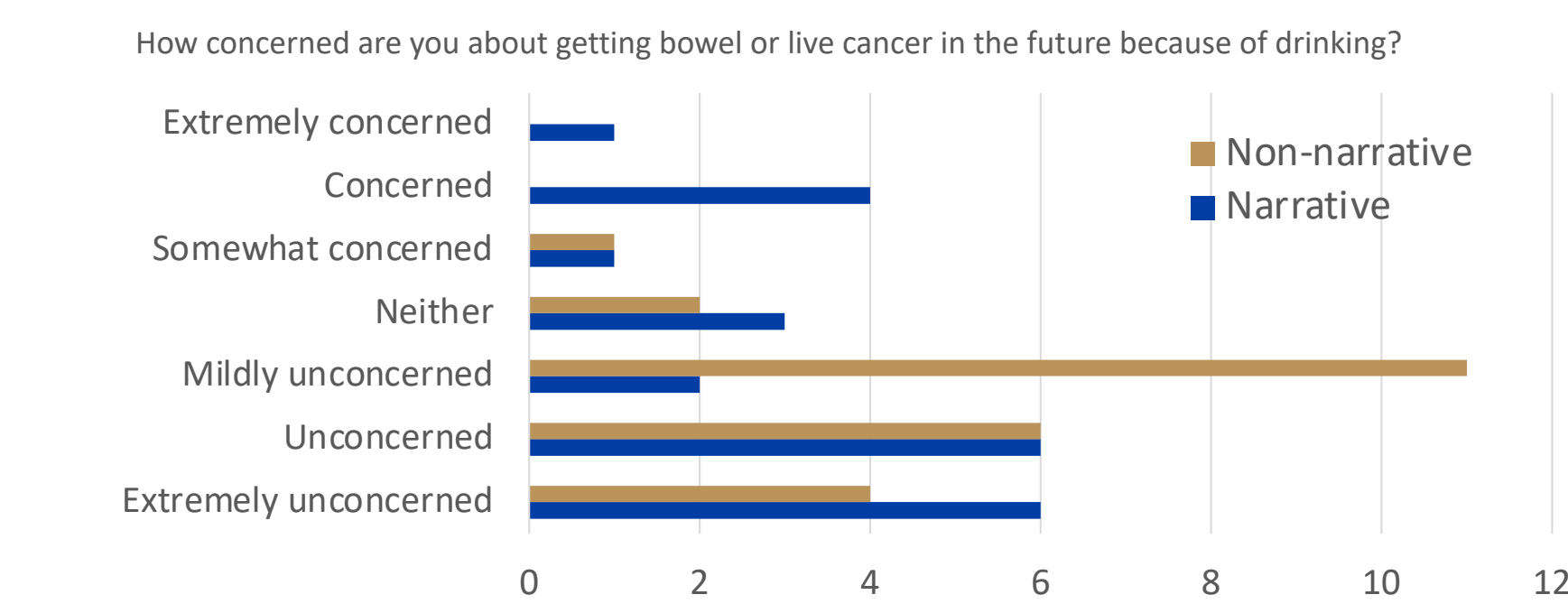


Figure 4: Risk Perceptions of self cancer risk from drinking post-PWI

Table 2: Self-reported Intent to Modify Drinking Habits Between Narrative and Non-narrative Warning Viewers

	Narrative*	Non-narrative*	p-value
*1 = strongly disagree; 2 = disagree; 3= somewhat disagree; 4= neither; 5= somewhat agree; 6=agree; 7=strongly agree (std deviation)			
How interested are you in stopping drinking in the next 30 days?	3 (2.69)	1.92 (1.14)	0.201
How much do you plan to stop drinking in the next 30 days?	3.08 (2.53)	1.92 (1.14)	0.15
How likely are you to stop drinking in the next 30 days?	2.77 (2.29)	1.61 (1.00)	0.113

### Conclusions

The eye-tracking data offers data to suggest that the narrative PWIs invoke greater visual attention given the increased areas of concentration throughout the bottle itself. Minimum fixation duration is also significantly longer in narrative group, revealing longer minimal visual attention and suggesting that there is a characteristic about the narrative PWI that commands longer visual attention than the non-narrative PWI. However, self-reported survey results did not endorse at cognitive level a difference. There likely is a component of cognitive dissonance whereupon people's thoughts don't necessary align with their actions. The survey results also not support the hypothesis that narrative labels induce less reactance than non-narrative labels as survey responses were inconclusive. Risk perceptions and intentions to change drinking habits also remained unchanged in both groups. Responses averaged some disagreement that drinking is harmful and overall participants disagreed with planning to change drinking habits in the next month. However, given the cognitive dissonance between the eye-tracking data and self-reported survey results, participants may not yet acknowledge the effect the PWIs had on their future behavior. This defensive behavior has been noted in previous studies of cigarette warning labels.<sup>4</sup>

Overall, the data is limited due to the small sample size. As this is a pilot study, it is hoped we will be able to continue data collection and expand the sample size to better understand the public's perception of health warning labels and how/if it will modify consumers' behavior and improve health outcomes. Additionally, given the comments from adult participants already acknowledging a baseline understanding of the detrimental effects of alcohol use, it may be worthwhile to consider examining youths' knowledge and perceptions. From open-ended comments that participants left regarding bottle design, we also would propose a more realistic mock-up of the stimuli.

### Take home

Although not conclusive, our data suggests that narrative warning labels are experienced differently than non-narrative labels and may lead to different behavioral outcomes. Further research is warranted.

### References

- <sup>1</sup>McQueen A, Kreuter MW, Boyum S, et al. Reactions to FDA-Proposed Graphic Warning Labels Affixed to U.S. Smokers' Cigarette Packs. *Nicotine Tob Res.* 2015;17(7):784-795. doi:10.1093/ntr/ntu339
- <sup>2</sup>Strasser AA, Tang KZ, Romer D, Jepson C, Cappella JN. Graphic warning labels in cigarette advertisements: recall and viewing patterns. *Am J Prev Med.* 2012;43(1):41-47. doi:10.1016/j.amepre.2012.02.026
- <sup>3</sup>Alcohol Facts and Statistics. National Institute on Alcohol Abuse and Alcoholism. <https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/alcohol-facts-and-statistics>. Accessed March 1, 2023.
- <sup>4</sup>Brinken L, Ferguson SG, Buscot MJ, Schüz B, Maynard O, Schüz N. A pilot RCT investigating the effects of including efficacy messaging on tobacco warning labels [published online ahead of print, 2022 Oct 4]. *Nicotine Tob Res.* 2022;ntac229. doi:10.1093/ntr/ntac229

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