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Anchor heuristics effect on heavy drinking in young people: Behavior economics perspective

El efecto de la heurística de anclaje sobre el consumo excesivo de alcohol en los jóvenes: Una perspectiva desde la economía conductual

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Abstract

There is a need for theory-based approaches to reduce heavy drinking in youths. Anchoring is a process in which people make estimates by starting from an initial value that is adjusted to yield a final answer. In this study, we determined the effectiveness of anchoring heuristics in estimating the price of a bottle of alcohol and its effect on heavy drinking in young people. In a sample of 327 young people in Mexico, participants completed a survey on alcohol drinking and anchoring heuristics. We found that when the anchor was shown and the participants were explicitly directed to the anchor value, the mean estimates of the price reported by the participants increased, indicating that the participants were pulled up toward the anchor. Anchoring effects were found to affect on the willingness of the alcohol consumers to pay. In this context, alcohol prices (anchor condition) were higher for heavy drinking. We discuss the implications of our results and future directions for research on anchoring effects in heavy drinking. We concluded that anchoring provides novel insights into the consequences of anchoring effects in alcohol drinking.

Keywords: anchoring heuristics, behavior economics, prices, heavy drinking

Resumen

Son necesarios enfoques basados en la teoría para reducir el consumo excesivo de alcohol en los jóvenes. El anclaje es un proceso en el que las personas hacen estimaciones a partir de un valor inicial que se ajusta para dar una respuesta final. En este estudio, determinamos la efectividad de las heurísticas de anclaje en la estimación del precio de una botella de alcohol y su efecto sobre el consumo excesivo de alcohol en los jóvenes. En una muestra de 327 jóvenes en México, los participantes completaron una encuesta sobre el consumo de alcohol y las heurísticas de anclaje. Encontramos que cuando se mostró el ancla y a los participantes se les dirigió de forma explícita hacia el valor del ancla, aumentaron las estimaciones medias del precio informado por los participantes, lo que indica que ellos eran atraídos hacia el ancla. Descubrimos que los efectos de anclaje afectaron la disposición a pagar (DAP) de los consumidores de alcohol. En este contexto, los precios del alcohol (condición ancla) eran más altos para el consumo excesivo de alcohol. Discutimos las implicaciones de nuestros resultados y las direcciones futuras para la investigación sobre los efectos de anclaje en el consumo excesivo de alcohol. Llegamos a la conclusión de que el anclaje proporciona nuevos conocimientos sobre las consecuencias de los efectos de anclaje en el consumo de alcohol.

Palabras clave: heurística de anclajes, economía conductual, precios, consumo excesivo de alcohol

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Alcohol consumption represents a risk factor for the development of psychological, social, and health problems (Cruz-Soto, Palacios, Lopez & Villagomez, 2019; Palacios, 2018; Reséndiz et al., 2018). Behavior economics emphasizes how individuals make decisions based on heuristics and bias (Aston & Cassidy, 2019; Kahneman, 2003). Anchoring is a type of heuristic that leads people to adjust their (numerical) judgments based on previous pieces of external information known as anchors. Therefore, anchoring occurs when, in the course of the decision process, a person uses a reference value (an anchor) to choose a given course of action (Tversky & Kahneman, 1974).

There is preliminary evidence on several factors that influence the expression of anchoring (Ariely, Loewenstein & Prelec, 2003; Berthet, Autissier & de Gardelle, 2022; Furnham & Boo, 2011; Jung, Perfecto & Nelson, 2016; Lynch & Ariely, 2000). Research suggested that responses exist that may reflect the tendency to respond in a normative manner based on an initially presented value parameter (Kahneman & Tversky, 1996; Gigerenzer, 1991). Early explanations of anchoring heuristics suggest that anchor values serve as the reference point for people to adjust their response to the range of plausible values (Epley & Gilovich, 2001; Epley & Gilovich, 2010). Based on this concept, several researchers found changes in the prices of consumer goods (Brzozowicz & Krawczyk, 2022; Green, Jacowitz, Kahneman & McFadden, 1998; Shan, Diao & Wu, 2020). These studies demonstrated that consumers will tend to change their payments in line with anchoring.

Regarding the use of anchoring in alcohol consumption, the results revealed by Epley and Gilovich (2006) indicated that university students who were sober provided estimates further from their anchor values than participants who had been drinking in the last 12 hours. However, there is scarce work in this area of research that considers the fact that heavy alcohol use may be affected by heuristics, specifically considering anchoring effects. Therefore, we asked the following questions: Can anchoring effects reduce binge drinking? Based on behavioral economics regarding alcohol (MacKillop & Murphy, 2007; MacKillop et al., 2009; MacKillop et al., 2014), can the estimated price of a bottle of alcohol be modified? Further, as a result of this modification, can these modifications decrease alcohol consumption in young people? Using the answers to these questions, one can create a context based on external cues to establish a price that serves as a reference for young people to make decisions about their alcohol consumption.

Given how often young people choose the price of alcoholic beverages, anchoring could be important across many contexts of consumption, specifically in the purchase of bottles of alcohol (Byrnes, Shakeshaft, Petrie & Doran, 2013; Morrell, Reed & Martinetti, 2021; Murphy, Correia

& Barnett, 2007); therefore, alcohol price and heuristics are two possible candidates for the explanation of anchoring effects.

Behavioral economic theory assumes that alcohol-demand-related increases in price are associated with decreased consumption (Bickel, Green & Vuchinich, 1995). Previous studies found that an increase in the price of alcoholic beverages reduces the quantity, frequency, and intensity of alcohol consumption (Heckley, Jarl & Gerdtham, 2017) across various types of beverages and all types of drinkers, ranging from light to heavy (Ayyagari, Deb, Fletcher, Gallo & Sindelar, 2013; Shrestha, 2015; Wagenaar, Salois & Komro, 2009); however, there is insufficient evidence regarding how anchoring may contribute to explaining binge drinking.

The purpose of the current research was to determine the effectiveness of the anchoring heuristic in estimating the price of a bottle of alcohol and its effect on heavy drinking in young people. We hypothesized that youths who were anchored in their price would increase the amount they were willing to pay for the price of a bottle more often the next time they decided to buy a bottle of alcohol. We further hypothesized that if heuristic anchoring modifies the price drinkers were willing to pay for a bottle of alcohol, it was likely to estimate the price of a bottle of alcohol, changing the magnitude of these effects regarding binge drinking. We expected that higher bottle prices might be associated with greater heavy alcohol consumption, resulting in the reinforcement of drinking.

Method

Study Design

A cross-sectional design was used to verify behavioral changes, considering that estimates of alcohol prices would be affected by heuristic anchors.

Participants

To calculate the sample size, an average of 1200 complete surveys were considered from people aged 18 to 60 years as the population. A 50% prevalence of alcohol consumption was estimated (Palacios, 2019), as well as a 95% confidence interval and a 5% margin of error, resulting in a sample of 291 participants. For this study, the sample consisted of 327 young people (57.8% female and 42.2% male, with an age range between 16 and 35 years [$M = 20.99$, $SD = 2.7$]) selected using a random, non-probabilistic sample. The sample was predominantly from Chiapas State in Mexico. The participants reported having at least a bachelor's degree. Of the participants, 63% studied, 6.4% worked, and 30.3% studied and worked.

Measures

Alcohol Consumption

Drinking was measured using questions on the age of onset of alcohol consumption, frequency of alcohol use in the last month (from *never* to *daily*), quantity of alcohol consumed per event (number of drinks consumed per occasion), incidence of heavy alcohol drinking (5 or more glasses per event) (from *never* to *daily*), and number of drinks they think they need to get drunk (number of drink glasses per event) using the Alcohol Questionnaire (Palacios, 2019). The measurement was adapted to the Mexican sociocultural context (Palacios, 2021; Palacios & González, 2020).

Alcohol Purchase Questionnaire (APQ)

A questionnaire was adapted for this study from the version used by other authors (Bickel et al., 1995; Mackillop et al., 2009). We asked the participants to estimate the number of standard drinks they would purchase and consume. We administered a brief 3-item questionnaire that was designed to assess alcohol demand: (1) *price* was measured with an indication of the money participants would pay for a bottle of alcohol; (2) *intensity*, which represents the maximum spent and consumed (intensity of demand), was measured with the interaction between the money spent and the quantity of alcohol consumed; and (3) *persistence* was measured using the sensitivity to increasing the price up to drunkenness.

Anchoring Heuristics

We adapted the task used by Jacowitz and Kahneman (1995) to measure the price of a bottle of alcohol and its susceptibility to anchoring. With the use of an open-question format, participants were first asked about the amount of money they were willing to pay for a bottle of alcohol.

After completing the alcohol drinking questionnaire, participants were presented with a hypothetical anchoring task involving the price of a bottle. In this task, participants were shown the following instructions: “A new limited-edition bottle of alcohol from your favorite brand just came out for \$25 USD (\$21 EUR; \$500 Mexican pesos).” This initial activity served as the “anchor.” Immediately, all participants were then asked to estimate the exact price they would pay for it (i.e., their willingness to pay (WTP)). Participants were also asked to mention how willing they would be to buy it using a Likert scale format (between 1—*nothing willing* and 4—*very willing*).

Procedure

The information was obtained over a month. The instrument was applied to the participants digitally through a form developed in Google Forms and was shared through social networks, with an approximate response time of 20 minutes. The purpose of the study was explained on the

form, and the participants were asked to answer honestly, as their responses would be used for research.

Ethical Considerations

All participants were informed about what the project consisted of (previously approved by the University Ethics Committee, with the registration number PCSUVM-012021). It was made clear to them that their participation was voluntary, that the information was anonymous, and that the confidentiality of the data provided was guaranteed. Participants provided electronic consent and then completed the survey. The research protocol was established in accordance with the regulations of the General Health Law, specifically its section on research with human beings (Secretaría de Salud, 2011).

Data Analysis

Data analyses were performed by considering the descriptive statistics for alcohol drinking. For descriptive analyses of the anchoring effects, we used an anchoring index (AI) proposed by Jacowitz and Kahneman (1995) to measure the movement of the median estimate of anchored subjects toward the anchor to which they were exposed. The anchoring index score was calculated as follows: (median estimate [high anchor] – median estimate [low anchor]) / (high anchor – low anchor). In the anchoring index, the plausible values range from 0 (no anchoring effect) to 1 (the median estimates of anchored subjects coincide with the anchors shown). In the present research, the low and high anchors were, respectively, at the 15th and 85th percentiles of estimates for the alcohol bottle price.

To examine the impact of anchoring heuristics on alcohol price consumption, we used a related *t-test* to compare the change in the price of a bottle of alcohol after introducing the anchor. Finally, a one-way ANOVA was conducted to test the statistical significance of the price of the bottle after the anchor was introduced between the different levels of heavy alcohol drinkers. Throughout all analyses, $p \leq 0.05$ was interpreted as statistically significant. Effect sizes were reported using Cohen's d and eta square (η^2).

Results

The results showed that 64.8% of youths drank alcohol. The participants started drinking at 16.75 ($SD = 2.4$) years of age. Moreover, 41% had a frequency of drinking of once a month or less, 27.2% drank just once per month, 10.4% drank every fifteen days, 3.3% drank three or four times a month, 1.5% drank two or three times a week, and 16.5% had never drunk. The percentage of participants who reported heavy alcohol consumption within the last month, which was defined as five glasses or more in a single instance, was 31.2%. The range of the number of drinks consumed varied between 1 and 50 ($M = 5.38$, $Md = 4.0$,

Table 1
Differences in anchoring price (in MXN) by willingness to pay

Willingness	<i>M</i>	<i>Md</i>	<i>SD</i>
Nothing willing	253.33	250.00	126.5
Few willing	308.78	300.00	133.7
Moderately willing	492.66	136.17	500.0
Very willing	642.86	500.00	276.5

Note. *M*—mean, *Md*—median, *SD*—standard deviation.

SD = 5.8). In addition, participants reported the mean number of standard drinks they considered necessary to get drunk was 8.6 (*Md* = 6.0, *SD* = 8.9). The participants reported a mean drink bottle price of \$312 MXN (*Md* = \$250 MXN, *SD* = \$225 MXN; USD 14.92, EUR 13.47). The relationship between the amount of money they spent per week and the amount of money they spent when buying an alcohol bottle was analyzed and no significant relationship was found ($r = 0.086$, $p = 0.21$).

We calculated the anchoring effect using the difference between the price they pay for a bottle of alcohol ($M = \$322.37$ MXN, $Md = \$250$ MXN, $SD = \$225.4$ MXN) and the estimate of the price they would pay after shown the anchor. The mean anchoring effect ($M = \$354.73$ MXN, $Md = \$300$ MXN, $SD = \$176.9$ MXN) was higher than the price they pay for a bottle. There was a significant difference between the price shown with the anchor and the price that the participants estimated after the presence of the anchor ($t_{(206)} = -2.28$, $p < 0.05$), indicating that participants' estimates were pulled up toward the anchor (Cohen's $d = 0.44$). Another measure of the size of the effect was the correlation between the price they paid and the subjects' price estimates after seeing the anchor. The correlation obtained was $r = 0.50$, $p < 0.001$.

We conducted an ANOVA to compare the mean anchor price between the categories and the participants' willingness to pay. There was a significant difference in the anchor price ($F_{(3, 246)} = 51.04$, $p < 0.001$, $\eta^2 = 0.38$), indicating that participants who were very willing to pay the price of the bottle shown (anchor) estimated a higher

Table 2
Differences in alcohol price (in MXN) by drinking level

Drinking Level	<i>M</i>	<i>Md</i>	<i>SD</i>
Never	300.47	300	233.9
Only once	304.24	300	185.8
Once a month or less	355.11	300	148.9
Every fifteen days	331.82	300	118.8
Three or four times a month	425.00	350	175.1
Two or three times a week	500.00	500	0.00
Daily or almost daily	500.00	500	0.00

Note. *M*—mean, *Md*—median, *SD*—standard deviation.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

price to pay for it (Table 1). The results clearly showed that the anchor price led to a substantial difference in their responses based on their willingness to pay for the alcohol consumers in our sample. These effects were demonstrated by the high price difference between the willingness-to-pay conditions and the predominance of the large effect sizes for the anchor. Additional comparisons were performed to analyze the money spent per week between the two WTP cases. The results did not show significant differences in weekly spending ($F_{(3, 246)} = 0.29$, $p = 0.82$) between the WTP cases.

For the anchoring index (AI), the data revealed a value of 0.77, i.e., the anchoring score was higher than the normative value of 0. The median was \$500 MXN for the high anchor and \$190 MXN for the low anchor. The percentiles provided clues regarding the effectiveness of the anchors. Some participants may be pulled toward low anchor values or would otherwise be pulled up toward high values. The results showed that 11.3% of the participants were located below the low anchor (15th percentile) and 21.1% were located above the high anchor (85th percentile).

We used an analysis of variance (ANOVA) to test the anchoring effect on heavy drinkers (Table 2). The ANOVA results revealed that heavy drinking had a significant effect on anchoring ($F_{(6, 244)} = 2.18$, $p < 0.05$, $\eta^2 = 0.05$), indicating that the estimated price per bottle of alcohol (anchor condition) was higher for the heavy drinkers than

Table 3
Alcohol behavior comparison by anchor level

	Anchor		<i>M</i>	<i>SD</i>	<i>t</i>
	High <i>N</i> = 62	Low <i>N</i> = 32			
Price (MXN)	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
	502.97	272.7	145.79	94.5	-8.83***
Quantity	7.21	7.9	3.12	2.7	-2.80**
Binge drinking	9.88	7.8	5.65	5.8	-2.68**

Note. *M*—mean, *SD*—standard deviation.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

participants who engaged in low alcohol consumption. To verify that the results were due to anchoring and not because heavy drinkers had more money and were therefore willing to spend more money on alcohol, we conducted further analyses. The results showed that not differences were found in the total money spent per week and the excessive consumption of the participants ($F_{(6, 244)} = 1.01, p = 0.41$).

Finally, we aimed to specifically verify the effects of the low and high anchors on alcohol-drinking behavior. The *t*-test results presented in Table 3 indicate significant differences in price, quantity, and binge drinking. Therefore, the high and low anchors altered the estimation of the alcohol price (Cohen's $d = 1.46$), and high anchors produced a greater effect on alcohol drinkers (Cohen's $d = 0.61$) and binge drinkers (Cohen's $d = 0.58$).

Discussion

This study contributed to verifying the association of alcohol price with binge drinking and understanding the anchoring heuristic in estimating the price of a bottle of alcohol and its effect on heavy alcohol drinking.

We examined the hypothesis that anchoring has effects on modifying the price of a bottle of alcohol and changing the magnitude of these effects in binge drinking. In this study, our results demonstrated that anchoring effects occurred with the estimate of the price participants would pay after being shown the anchor. This study provided the first evidence that an increase in the price of a bottle of alcohol could increase their estimation of its price after presenting the anchoring heuristic and its effect on heavy drinking in young people. Our data confirmed the proposed hypothesis, which maintained that price heuristic anchoring affected the price that the participants were willing to pay for a bottle of alcohol. In particular, we provided evidence regarding the difference between the alcohol price shown with the anchor and the price that the participants estimated after the presence of the anchor. Previous research (Epley & Gilovich, 2001; Gigerenzer, 1991; Jacowitz & Kahneman, 1995; Tversky & Kahneman, 1974) established that when an anchor contains not only a number but also semantic information consistent with a target (e.g., the hypothetical price of an alcoholic drink), the anchor value is highly compatible with the target value, and this affects the numerical estimation of the target. In addition, we identified the contributions to the effectiveness of anchor heuristics and the conditions under which it facilitated behavior change, with a medium effect size supporting the effectiveness of the anchor heuristic.

In our research, we analyzed the WTP the alcohol anchor price. These results confirmed that the participants who were willing to pay the price of the bottle (anchor) estimated a higher price to pay for it. Therefore, the anchored price was contingent on their willingness to pay,

and this estimate may have also been affected by anchoring (Brzozowicz & Krawczyk, 2022; Green et al., 1998; Shan et al., 2020).

In the present study, we provided evidence of the anchor effect in alcohol pricing. The data showed that people adjusted their initial estimate to meet the anchor estimate, demonstrating that there were anchoring effects produced by the anchored price in the anchoring index. Our empirical results supported the effects of a high and low anchor (Jacowitz & Kahneman, 1995). We showed that the percentage above the high anchor was greater than the percentage below the low anchor. In addition, the median price reported by the participants located in the high percentile was similar to the price of the anchor. These results showed that the price shown as an anchor influenced the participants who were pulled up toward high values in the alcohol price estimation task, which was consistent with previous research (Berthet et al., 2022; Epley & Gilovich, 2001; Jacowitz & Kahneman, 1995; Jung et al., 2016).

We compared the anchoring effect on heavy drinkers. Our data revealed that heavy drinking had a significant effect on anchoring. Consistent with previous research (Epley & Gilovich, 2006), individuals with heavy drinking adjusted their price estimate with the values of the displayed anchor. The results showed a growing adjustment in the estimated price to buy a bottle of alcohol (anchor condition), where there was an increase in heavy drinking. Finally, in terms of behavioral economics, the number of alcohol drinkers was higher above the high anchor in comparison with below the low anchor. Prominent alcohol consumption was sensitive to increases in the response cost expressed in the price, which started very low and escalated to very high levels in heavy drinkers. These findings contribute toward empirically identifying the underlying effect of alcohol anchor prices on the differential increase in heavy drinking in young people. Such findings are in line with several previous studies (Berthet et al., 2022; Brzozowicz & Krawczyk, 2022; Epley & Gilovich, 2006; Jacowitz & Kahneman, 1995; Tversky & Kahneman, 1974) on anchoring heuristics.

Although these results are promising, the present study had several limitations. First, our sample was not representative of the entire country, and thus, further research should be conducted on more representative samples. Second, the type of currency in each country may affect the price of alcoholic beverages and, consequently, lead to an increase or decrease in their consumption. Third, our research did not incorporate an analysis by sex. In future research, we must consider an analysis by sex regarding alcohol consumption and the anchoring heuristic. Fourth, generally, anchoring experiments use two groups: one group with a low anchor condition and one group with a high anchor condition. We only used one group divided by low and high conditions. Further

research should be conducted with two groups (low and high conditions) to test the robustness of the results. Finally, a replication of this result is needed in other samples to confirm its effect. This is an important and necessary step before beginning to establish predictive associations with other variables of interest.

Research on behavior economics and alcohol anchoring has important preventive implications. Based on the results, strategies could be implemented in individual preventive actions. We propose that an intervention strategy based on behavioral economics incorporating anchoring heuristics can be used to reduce alcohol consumption in young people. The design of these interventions must consider young people as a target group based on the consumption levels of the participants.

Among the strengths of this research, this was the first study with these characteristics that was carried out in Mexico and Latin America on anchoring heuristics and their effect on heavy drinking in young people. Future research can help to determine the application of the anchoring heuristic in binge drinking. We will seek to understand the value of the reinforcer (immediate or delayed) involved in the evaluation of binge drinking. Understanding strategies by which individuals approach decisions about alcohol consumption has relevant implications. It is important to recall that the tendency to respond impulsively is associated with problematic behaviors. In addition, to continue from the present study, affective states and prefrontal cortex functions will be incorporated as antecedents involved in anchoring.

Conclusions

Consistent with a behavioral economics approach (Bickel et al., 1995; Kahneman, 2003; MacKillop et al., 2014), this study represented the first research in Mexico and Latin America on anchoring heuristics regarding estimating the price of a bottle of alcohol on heavy drinking in Mexican young people. Researchers interested in the potential effects of anchoring heuristics and their implications will find that this study shows the presence of consistent anchoring effects produced by an anchored price in the *anchoring index* and that the anchor's price impact increased when the level of anchoring increased. In particular, individuals with high levels of alcohol drinking were more sensitive to anchor cues and were more willing to pay for the bottle when the anchor was shown.

Conflict of interests

The authors have no competing interests to declare

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