Published in final edited form as:

J Exp Soc Psychol. 2010 July 1; 46(4): 619–623. doi:10.1016/j.jesp.2010.02.008.

The Big, the Bad, and the Boozed-Up: Weight Moderates the Effect of Alcohol on Aggression

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Abstract

Most people avoid the “big, drunk guy” in bars because they don’t want to get assaulted. Is this stereotype supported by empirical evidence? Unfortunately, no scientific work has investigated this topic. Based on the recalibrational theory of anger and embodied cognition theory, we predicted that heavier men would behave the most aggressively when intoxicated. In two independent experiments (N s= 553 and 327, respectively), participants consumed either alcohol or placebo beverages and then completed an aggression task in which they could administer painful electric shocks to a fictitious opponent. Both experiments showed that weight interacted with alcohol and gender to predict the highest amount of aggression among intoxicated heavy men. The results suggest that an embodied cognition approach is useful in understanding intoxicated aggression. Apparently there is a kernel of truth in the stereotype of the “big, drunk, aggressive guy.”

Stereotypes pervade modern societies, including the stereotype of the “big, drunk aggressive guy.” In advice columns about what not to do in a bar, readers are told things like: “Avoid the big drunk guy who is pinwheeling his arms or spinning like a whirling dervish. If you stand next to that guy, you will be punched in the head. He can’t help it,” and “Do not maul or lay inappropriate hands on females. It is not proper etiquette. Plus that big drunk guy might be her boyfriend and knock your block off” (Monet, 2009).

Anecdotal evidence supports this stereotype, but does empirical research support it? Although there are no data on this topic, there are theoretical reasons to believe that the stereotype is true. Within evolutionary psychology and biology, there is a large body of research on the relationship between body size and aggression in males. Body size correlates positively with aggression in many male animals, from insects (Boake, 1989; Dixon & Cade, 1986; Goldsmith, Stewart, Adams, & Trimble, 1996; Nowbahari, Fénéron, & Malherbe, 1999), to fish (Beacham,

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1988; Rowland, 1989) to mammals (e.g., Booth & Parrott, 1986; Hilakivi-Clarke & Lister, 1992). The same is true of humans. Larger, heavier males are more aggressive than smaller, lighter males (e.g., Archer & Thanzami, 2009; Sell, Tooby, & Cosmides, 2009), a finding that has been confirmed in longitudinal studies (e.g., Raine, Reynolds, Venables, Mednick, & Farrington, 1998). In female animals and humans, there is generally no significant relationship between body size and aggression.

Why does body size relate to higher aggression in males, but not in females? The recalibrational theory of anger (Sell, Tooby, & Cosmides, 2009) offers some clues regarding why body size is a risk factor for male (but not female) aggression. According to this theory, men with higher physical strength are more able than weaker men to inflict costs on others in conflict situations, thereby increasing their bargaining position in these situations. Because nearly all women are physically weaker than the average man (Lassek & Gaulin, 2009), physical size should not be a risk factor for aggression in women because the amount of cost they could inflict on others would almost always be less than the cost men could inflict. Instead, possessing physical characteristics that place women in a heightened position to receive benefits from others, such as physical attractiveness (Budesheim, & DePaola, 1994; Mack & Rainey, 1990; West & Brown, 1975), should place women at risk for aggression. Consistent with this reasoning, Sell and colleagues (2009) showed that physical size was related to anger-proneness, feelings of entitlement, history of fighting, and endorsement of the use of physical aggression among men but not among women, whereas physical attractiveness was a risk factor for aggression among women but not among men. Crucially for the present research, weight was consistently associated with anger-proneness, history of fighting, and endorsement of personal aggression among men (Sell et al., 2009).

To be sure, the recalibration theory of anger relies both on evolutionary theory and on current social roles regarding the segregation of men and women. Because most societies do not segregate men and women from each other, the physically stronger gender (i.e., men) should be more likely to rely on their physical strength to negotiate conflict, whereas the physically weaker gender (i.e., women) should be more likely to rely on their physical attractiveness to negotiate conflict. In societies marked by gender segregation, however, strength should have a stronger relationship to anger and aggression among women too. The current experiments used samples from the United States, which is not segregated by gender and therefore should represent a cultural environment in which men with greater weight should be at risk for behaving aggressively.

Not only do evolutionary and cultural theories predict that men in our samples should be at risk for behaving aggressively, but embodied cognition theory makes the same prediction. From an embodied cognition perspective, links in semantic memory are rooted in the interaction between bodily experiences and the brain's sensorimotor systems (Barsalou, 2008). Weight is linked to importance in semantic memory. Specifically, greater weight is linked to enhanced feelings of importance (Jostmann, Lakens, & Schubert, 2009). Greater weight may therefore increase the likelihood of retaliating when provoked, especially when the ability to attend to, and act upon, societal inhibitions against aggression is reduced due to alcohol intoxication. To use an analogy, alcohol increases aggression in people with aggressive impulses by cutting the break line rather than by stepping on the gas. Chronically angry people, for example, are more likely than non-angry people to act on their aggressive impulses when they are drunk than when they are sober (Giancola, 2002). The same may be true for big men.

We predict that alcohol will be more likely to increase aggression among bigger, heavier men than among smaller, lighter men. Normally a "big guy" refrains from aggressing when provoked due to societal inhibitions, but after consuming alcohol these inhibitions are reduced and the "big guy" is more likely to act on his aggressive impulses when provoked. Because

physical size is not a risk factor for aggression among women (Sell et al., 2009), we expect that weight will have a unique effect on increasing intoxicated aggression among men. We test this hypothesis in Experiment 1, and replicate it in Experiment 2 using an independent sample of participants.

EXPERIMENT 1

Method

Participants—Participants were 553 (276 men) healthy social drinkers between the ages of 21 and 35 ($M=23.02$, $SD=2.85$) recruited via newspaper advertisements and paid \$75. Social drinking was defined as consuming 3–4 alcoholic beverages per occasion at least twice per month. Participants with serious mental illnesses, those with drug- or alcohol-related problems, and pregnant women were excluded, as were 10 individuals due to anomalies such as knowing the confederate, yielding a final sample of 543. Of these, 264 (133 men) received an alcoholic beverage, and 279 (138 men) received a placebo beverage, by the flip of a coin.

Procedure—Participants were weighed on a standard medical scale ($M=165.94$ lb, 75.27 kg; $SD=35.77$ lb, 16.22 kg). As expected, men weighed more ($M=183.61$ lb, 83.28 kg; $SD=31.75$ lb, 14.40 kg) than women ($M=148.53$ lb, 67.37 kg, $SD=30.53$, 13.85 kg), $t(551)=13.31$, $p<.001$, $d=1.13$, $\eta^2=.24$.

Next, participants were given 20 minutes to drink an alcohol or placebo beverage. Men who received alcohol were given a dose of 1g/kg of 95% alcohol mixed at a 1:5 ratio with orange juice. Because of differences in body fat composition, women were given a dose of 0.9g/kg of alcohol. The placebo groups received the same amount of orange juice mixed with 4 mls of alcohol, along with 4 mls on top of the juice, and alcohol sprayed on the rim of the glasses.

Aggression was measured using a modified version of the Taylor Aggression Paradigm (Taylor, 1967), a valid and reliable measure of laboratory aggression (Anderson & Bushman, 1997; Giancola & Chermack, 1998). The task was completed under the guise of a competitive reaction-time task. Participants competed against a fictitious opponent of the same sex to determine who could respond more quickly, with the winner delivering an electric shock to the loser. On each trial, participants chose the intensity (from 1=*low* to 10=*high*) and duration of shock the opponent would receive if the opponent lost the reaction-time trial. After each trial, shock intensities set by the participant and the opponent were displayed on the computer screen. Participants won half of the trials (randomly determined). All shocks were administered through electrodes attached to the index and middle fingers of the nondominant hand.

The aggression task consisted of two blocks of 16 trials (8 wins, 8 losses), which included two trials between each block to serve as a transition. Participants received the entire range of shock intensity and duration settings from their “opponent” over the course of the task. During the first block, participants received relatively low shock intensities ($M=2.5$, range 1–4), whereas they received relatively high shock intensities during the second block ($M=8.5$, range 7–10). On each of the transition trials, participant lost and received shocks of moderate intensity (i.e., 5 and 6, respectively). The average shock duration participants received across trials was 1 second. We programmed the aggression task in this way to mimic the violence escalation cycle in “real-life” situations (Anderson, Carnagey, & Bonacci, 2008). Hence our aggression task maximized both internal and external validity.

Breath alcohol concentration (BrAC) levels were measured using the Alco-Sensor IV breath analyzer (Intoximeters Inc., St. Louis, MO), at baseline, before, and after the aggression task. Participants in the alcohol group began the aggression task at an approximate BrAC of .09%. To enhance the effectiveness of the placebo manipulation, those in the placebo group began

the aggression task approximately 2 minutes following beverage consumption (Martin & Sayette, 1993). Participants who received alcohol were not released from the laboratory until their BrACs were lower than .04%. Finally, participants were debriefed.

Results and Discussion

BrAC Levels—All participants had BrACs of 0% upon entering the laboratory. Participants in the alcohol condition had a mean BrACs of 0.095% ($SD=0.01$) and 0.10% ($SD=0.02$) immediately before and after the aggression task, respectively. Participants in the placebo condition had mean BrACs of 0.02% ($SD=0.01$) and 0.01% ($SD=0.01$) immediately before and after the aggression task, respectively.

To rule out the alternative hypothesis that heavier people were more aggressive than lighter people simply because they were more intoxicated, we computed correlations between weight and BrAC before and after the aggression task. The correlations were nonsignificant (and negative) for all participants (r 's $-.08$ and $-.06$, respectively), and for men (r 's $-.06$ and $-.03$, respectively) and women (r 's $-.10$ and $-.09$, respectively) separately. If anything, heavier people were less intoxicated than lighter people, though not significantly so. Despite equating alcohol doses for weight, to be doubly sure to avoid the possible confound between weight and intoxication level, we began the aggression task at a BrAC as close as possible to .09%.

Aggression—Shock intensity and duration levels had high internal reliabilities (Cronbach α 's $.93$ and $.97$, respectively) and were significantly correlated, $r=.40$, $p<.001$. To create a more reliable measure of aggression, intensity and duration levels were standardized and summed.

We hypothesized that weight would moderate intoxicated aggression in men but not in women. To test this hypothesis, we conducted a hierarchical regression analysis with centered predictor variables (see Aiken & West, 1991). Beverage condition, weight, and gender were entered in Step 1, two-way interactions were entered in Step 2, and the three-way interaction was entered in Step 3. In Step 3, there were significant effects for alcohol, weight, and gender, t 's(535) $=2.64$, 2.23 , and 4.73 , respectively, p 's $<.03$, d 's >0.19 , η^2 's $>.0092$. These effects, however, were qualified by the predicted Alcohol $\times$ Weight $\times$ Gender interaction, $\beta=-.10$, $t(535)=-1.99$, $p<.05$, $d=0.17$, $\eta^2=.0073$ (see Figure 1).

To clarify the nature of this interaction, we examined the “simple” Alcohol $\times$ Weight interactions among men and women separately. As expected, we found a significant Alcohol $\times$ Weight interaction for men, $\beta=.18$, $t(535)=2.69$, $p<.01$, $\eta^2=.013$. We compared the effects of alcohol among relatively heavier ($+1 SD$) and relatively lighter men ($-1 SD$). Alcohol, compared to placebo, increased aggression among heavier men, $\beta=.33$, $t(535)=5.03$, $p<.001$, $d=0.43$, $\eta^2=.045$, but alcohol had little effect on lighter men, $\beta=-.02$, $t(535)=-0.18$, $p=.85$, $d=-0.02$, $\eta^2=.000061$. Further analyses examined the effect of weight on aggression among men in each beverage condition separately. In the alcohol condition, weight correlated positively with aggression, $\beta=.31$, $t(535)=3.10$, $p=.002$, $\eta^2=.013$, whereas weight did not relate to aggression in the placebo condition, $\beta=-.04$, $t(535)=-0.40$, $p=.63$, $\eta^2=.00030$. The Alcohol $\times$ Weight interaction was nonsignificant for women, $\beta=-.02$, $t(535)=-0.22$, $p=.83$, $\eta^2=.000090$.

These results are consistent with theoretical predictions. As expected, intoxicated aggression was more likely to occur among heavier men than among lighter men. In contrast, weight did not influence aggression levels in women. To ensure that these effects were reliable, we replicated Experiment 1 using an independent sample of social drinkers in Experiment 2

EXPERIMENT 2

Method

Participants—Participants were 327 (162 men) healthy social drinkers between the ages of 21 and 35 ($M=23.05$, $SD=2.86$) recruited via newspaper advertisements and paid \$75. Of these 327 participants, 165 (82 men) were randomly assigned to receive an alcoholic beverage, whereas 162 (80 men) received a placebo beverage.

Procedure—The procedures for Experiment 2 were the same as the procedures for Experiment 1. The average weight of participants was 167.52 lb, 75.99 kg ($SD=38.33$ lb, 17.39 kg). As in Experiment 1, men weighed more ($M=183.52$ lb, 83.24 kg; $SD=32.25$ lb, 14.63 kg) than women ($M=151.82$ lb, 68.86 kg, $SD=37.41$, 16.97 kg), $t(325)=8.20$, $p<.001$, $d=0.91$, $\eta^2=.17$.

Results and Discussion

BrAC Levels—All participants had BrACs of 0% upon entering the laboratory. Participants in the alcohol condition had a mean BrACs of 0.10% ($SD=0.01$) and 0.11% ($SD=0.01$) immediately before and after the aggression task, respectively. In contrast, participants in the placebo condition had mean BrACs of 0.01% ($SD=0.01$) and 0.01% ($SD=0.01$) immediately before and after the aggression task, respectively.

As in Experiment 1, we obtained nonsignificant negative correlations between weight and BrAC before and after the aggression task for all participants (r 's $-.03$ and $-.04$, respectively), and for men (r 's $-.08$ and $-.09$, respectively) and women (r 's $-.01$ and $-.00$, respectively) separately. These data contradict the alternative hypothesis that heavier participants were more intoxicated than lighter participants. Again, despite equating alcohol doses for weight, to be doubly sure to avoid any confound between weight and intoxication, participants began the aggression task at a BrAC as close as possible to .09%.

Aggression—Shock intensity and duration levels again had high internal reliabilities (Cronbach α 's $.93$ and $.96$, respectively) and were significantly correlated, $r=.49$, $p<.001$. Accordingly, we standardized and summed them to create a more reliable measure of aggression.

In the full model (Step 3), there were significant effects for alcohol and gender, t 's(319)=1.95 and 3.94, respectively, p 's $\leq .05$, d 's >0.22 , η^2 's $>.011$. These effects, however, were qualified by the predicted Alcohol $\times$ Weight $\times$ Gender interaction, $\beta=.12$, $t(319)=2.08$, $p<.04$, $\eta^2=.013$ (see Figure 2). To clarify the nature of this interaction, we examined the “simple” Alcohol $\times$ Weight interactions among men and women separately. As expected, we found a significant Alcohol $\times$ Weight interaction for men, $\beta=.25$, $t(319)=2.77$, $p<.01$, $\eta^2=.023$. We compared the effects of alcohol among relatively heavy ($+1$ SD) and relatively light (-1 SD) men. Alcohol, compared to placebo, increased aggression among heavier men, $\beta=.42$, $t(319)=4.62$, $p<.001$, $d=0.52$, $\eta^2=.063$, but alcohol had no significant effect among lighter men, $\beta=-.08$, $t(319)=-0.51$, $p=.61$, $d=-0.06$, $\eta^2=.00081$.

Further analyses examined the effect of weight on aggression among men in each beverage condition separately. In the alcohol condition, weight correlated positively with more aggression, $\beta=.36$, $t(319)=2.99$, $p<.01$, $\eta^2=.027$, whereas aggression levels did not relate to weight in the placebo condition, $\beta=-.13$, $t(319)=-1.00$, $p=.32$, $\eta^2=.0031$. The Alcohol $\times$ Weight interaction was nonsignificant for women, $\beta=.002$, $t(319)=0.03$, $p=.98$, $\eta^2=.0000028$.

We obtained the same findings (with nearly identical effect sizes) in Experiment 2 as in Experiment 1, dramatically reducing the likelihood that our effects are spurious. Intoxicated

aggression was again higher in heavier men compared to lighter men. Alcohol also increased aggression among women, but the effect did not depend on whether they were relatively heavy or light.

General Discussion

Aggression wreaks havoc on society and families. The first step in preventing aggression is identifying novel factors that place people at risk for behaving aggressively. The current research did just that. Previous research has established that alcohol increases aggression (e.g., Bushman & Cooper, 1990), particularly in men (Giancola et al., 2009), and that heavier men are more aggressive than others (e.g., Sell et al., 2009; Archer & Thanzami, 2009). However, this is the first set of experiments to demonstrate that physical weight is a reliable risk factor for alcohol-related aggression in men.

Our results are consistent with the recalibrational theory of anger (Sell et al., 2009) and theories of embodied cognition that link weight to greater feelings of importance (Jostmann et al., 2009). Physical size enables men (but not women) to inflict costs on others in aggressive situations, thereby increasing their likelihood to experience anger, to feel important and entitled to special treatment, and to behave aggressively toward others. Normally people inhibit their tendency to behave aggressively to avoid social sanctions. Indeed, aggressive people are routinely excluded by peers among both children and adults (Juvonen & Gross, 2005; Gottfredson & Hirschi, 1990), which can lead to further aggression (DeWall, Twenge, Gitter, & Baumeister, 2009; DeWall, Twenge, Bushman, Im, & Williams, in press). Because alcohol reduces aggressive inhibitions, the effect of weight should be especially high among intoxicated people who are predisposed to behave aggressively. Both experiments supported this reasoning, showing that heavy, intoxicated men behaved more aggressively than all other participants. It seems that alcohol reduced the inhibition for heavy men to “throw their weight around” and intimidate others by behaving aggressively.

Limitations and Future Directions

The current experiments provided converging evidence that weight interacts with alcohol and gender to predict the highest amount of aggression. There are some limitations that warrant consideration, however. First, we did not measure potential mediating variables. Future research could examine whether feelings of importance or feelings of threat become exaggerated in heavy, intoxicated men. In addition, our results do not suggest that all big men have aggressive impulses that are released when they become intoxicated. As in most psychological experiments, we are explaining how weight increases the probability of an aggressive response among intoxicated men.

Future work may examine protective factors against intoxicated aggression that take into account the importance of bodily experiences. Manipulations involving supine body position, for example, reduce activation in the left prefrontal cortex in response to an anger provocation (Harmon-Jones & Peterson, 2009). Such a manipulation of body posture may attenuate the effect of weight on aggression among intoxicated men. Another limitation is that we only measured one type of physical size (i.e., weight), which precluded our ability to test whether height or body frame had similar effects. A final limitation is that we measured weight at only one time point. Our results suggest that weight loss interventions may alter the bodily experience of weight that guides behavior and perception, reducing feelings of importance and, among men, reducing levels of physical aggression while intoxicated. This possibility, which could have widespread implications, remains an open question for future inquiry.

Conclusions

No previous work has investigated how weight may offer a clue as to who is at risk to behave aggressively when drunk. The current investigation adds a new dimension to understanding intoxicated aggression by focusing on how body weight has consequences for predicting aggression in intoxicated men. To be sure, our results do not suggest that heavy, intoxicated men will always behave aggressively. There will inevitably be scrawny brawlers and big, nice, boozed-up imbibers. The current findings do suggest, however, that weight can be considered a general risk factor for alcohol-related aggression among men. There is a kernel of truth in the stereotype of the “big, drunk, aggressive guy.”

Acknowledgments

This research was supported by *NIAAA* (R01-AA-11691) and the *National Center for Research Resources* (Giancola).

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Figure 1.

Interaction between type of beverage consumed (alcohol vs. placebo), participant weight, and participant gender in predicting aggressive behavior. Values refer to the intensity and duration of shocks administered to an ostensible opponent of the same sex (standardized and summed) during a competitive reaction-time task. Experiment 1.

Figure 2.

Interaction between type of beverage consumed (alcohol vs. placebo), participant weight, and participant gender in predicting aggressive behavior. Values refer to the intensity and duration of shocks administered to an ostensible opponent of the same sex (standardized and summed) during a competitive reaction-time task. Experiment 2.