**Title: Social modelling of health behaviours: Testing self-affirmation as a conformity-reduction strategy**

Short title: *SELF-AFFIRMATION AND CONFORMITY*

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**Abstract**

Objectives

Social conformity negatively affects health. Exposure to peers who model unhealthy alcohol or food consumption increases personal consumption. Self-affirmation alters processes related to the motivations underlying conformity. We therefore tested whether self-affirmation reduces conformity to unhealthy behaviour and does so by reducing affiliation needs and/or increasing self-regulation.

Design

In two studies, participants were randomised to one of four conditions in a 2 (low vs. high peer modelling) x 2 (self-affirmed vs. not) design.

Methods

In Study 1 *(N*=153), a confederate modelled low or high alcohol consumption. Participants’ alcohol consumption was recorded; mimicry of confederates’ sips was coded. In Study 2 (*N*=122), written information indicated others’ snack food intake during the study. Participants’ food consumption was recorded. Affiliative interest was assessed in both studies. Inhibitory control and private self-awareness were assessed in Studies 1 and 2, respectively.

Results

In Study 1, participants exposed to heavy drinking consumed significantly more alcohol and mimicked the confederate more frequently than participants exposed to the light drinking model. Self-affirmation did not reduce this tendency, nor did it affect affiliative interest or inhibitory control. Exploratory analysis supported that mimicry mediated the peer modelling-consumption relationship. In Study 2, participants ate more when they believed others had eaten a lot, as opposed to little. Self-affirmation did not reduce this tendency and did not affect affiliative interest. Self-affirmed participants had higher private self-awareness than those who were not self-affirmed, but self-awareness did not affect consumption.

Conclusion

Peer behaviour strongly influences personal consumption. Self-affirmation did not reduce behavioural conformity.

**Keywords:** alcohol; food intake; social influence; modelling; mimicry; self-affirmation

Social modelling of health behaviours:

Testing self-affirmation as a conformity-reduction strategy

The behaviour of others influences a range of risky health behaviours. We are more likely to consume alcohol and eat unhealthily if we observe or believe that others engage in these behaviours ([Borsari & Carey, 2001](#_ENREF_6); [Robinson, Thomas, Aveyard, & Higgs, 2014](#_ENREF_55)). Consumption of alcohol and unhealthy foods are among the leading causes of ill health worldwide ([Afshin et al., 2019](#_ENREF_1); [Mokdad, Marks, Stroup, & Gerberding, 2004](#_ENREF_43); [World Health Organization, 2018](#_ENREF_65)). Accordingly, research that addresses the social determinants of these behaviours may improve population health. Indeed, there have been long-standing calls for research that attempts to weaken peer influence ([Prentice, 2008](#_ENREF_47)). However, peer-focused interventions have primarily sought to correct misperceptions of peers’ engagement in unhealthy behaviour ([Prestwich et al., 2016](#_ENREF_48)). Although efficacious overall, norm correcting feedback is less efficacious among the riskiest individuals ([Reid & Carey, 2015](#_ENREF_50)). This may reflect that close friends undermine the efficacy of normative feedback. Research is therefore needed on alternative strategies that aim to weaken peer influence.

The present research sought to address this gap in the literature by examining a novel strategy for weakening conformity to peer behaviour. Modelling of peer alcohol and food consumption have been studied extensively ([Cruwys, Bevelander, & Hermans, 2015](#_ENREF_14); [Quigley & Collins, 1999](#_ENREF_49)), making these behaviours ideal for testing conformity-reduction strategies. Attempts to weaken peer influence are more likely to be successful if they address the motivations that underlie conformity. Drawing on these motivations, we examined whether self-affirmation might reduce conformity to others’ alcohol and food consumption.

Theoretical accounts suggest that we conform to and mimic others’ behaviours because doing so facilitates achievement of two distinct goals—social affiliation and accurate decision-making ([Chartrand & Lakin, 2013](#_ENREF_9); [Cialdini & Trost, 1998](#_ENREF_11)). Indeed, we preferentially mimic and conform to those with whom we identify, communicating liking and a desire to affiliate ([Chartrand & Lakin, 2013](#_ENREF_9); [Terry & Hogg, 1996](#_ENREF_60)). However, attending and automatically responding to others’ behaviours also promotes accurate decision-making. For example, automatically conforming when others are running from a predator provides the most accurate response and ensures survival. Ultimately, conforming to achieve these proximal goals serves a third goal of maintaining a positive self-concept ([Cialdini & Goldstein, 2004](#_ENREF_10)). That is, nonconformity is difficult because it raises concerns about belonging and/or accuracy, which threatens positive views of oneself and sense of self-worth.

Empirical research suggests that conformity to others’ alcohol and food consumption reflects both affiliation motives and automaticity. For example, conformity to both behaviours is more pronounced when concerns about affiliation are heightened ([Robinson et al., 2016](#_ENREF_54); [Robinson, Tobias, Shaw, Freeman, & Higgs, 2011](#_ENREF_56)). Likewise, individuals with lower trait and state self-control are more likely to conform, suggesting difficulty in overriding an automatic response ([Larsen, van der Zwaluw, et al., 2010](#_ENREF_36); [Salmon, Fennis, de Ridder, Adriaanse, & de Vet, 2014](#_ENREF_57)). Indeed, researchers have speculated that modelling may be explained by automatic mimicry of peer behaviour ([Cruwys et al., 2015](#_ENREF_14)).

Given the processes that underlie conformity, strategies that enhance feelings of belonging, increase self-regulatory resources, and ultimately reduce the self-threat that accompanies nonconformity, are most likely to weaken peer influence. Specifically, self-affirmation may reduce conformity. Similar to the reasons for conformity, self-affirmation theory contends that we are motivated to see ourselves as good, intelligent, and liked ([Steele, 1988](#_ENREF_59)). When these views are threatened, such as during nonconformity, reflecting on important characteristics and values restores self-worth and counteracts the negative effects of these threats. Importantly, self-affirmation enhances feelings of belonging and connectedness ([Burson, Crocker, & Mischkowski, 2012](#_ENREF_8); [Crocker, Niiya, & Mischkowski, 2008](#_ENREF_13)). Self-affirmation also increases working memory and ability to inhibit an automatic response ([P. S. Harris, Harris, & Miles, 2017](#_ENREF_25); [Legault, Al-Khindi, & Inzlicht, 2012](#_ENREF_37); [Logel & Cohen, 2012](#_ENREF_39)), suggesting greater availability of self-regulatory resources. More directly, self-affirmed individuals are less likely to display attitudinal conformity ([Binning, Brick, Cohen, & Sherman, 2015](#_ENREF_5)). Whether self-affirmation reduces behavioural conformity has not been examined. However, research has demonstrated that reducing behavioural conformity is possible, by focusing on future aspirations or exposing participants to cues about maintaining a healthy weight ([Brunner, 2010](#_ENREF_7); [Florack, Palcu, & Friese, 2013](#_ENREF_19)).

The present research examined whether self-affirmation reduces conformity to unhealthy peer behaviour across two studies. In Study 1, participants interacted with a confederate who modelled heavy versus light alcohol consumption. Participants’ alcohol consumption was recorded and mimicry of the confederate’s behaviour was coded. In Study 2, participants were led to believe that previous participants had consumed a high versus low number of cookies. Participants’ cookie consumption was recorded. Interest in affiliation and self-regulation were measured in both studies.

We expected greater mimicry and alcohol consumption (Study 1) and greater cookie consumption (Study 2) in high relative to low peer modelling conditions. Importantly, we predicted that self-affirmation would moderate these effects, such that the peer modelling effect would be weaker among self-affirmed participants. We also predicted reduced affiliative interest and increased self-regulation among self-affirmed individuals, and that these factors would, in turn, mediate the effects of the affirmation by peer modelling interaction on mimicry and personal consumption.

**Study 1**

**Method**

**Participants.**  Participants were recruited from the [Blinded] campus community for a study on “environment and joint decision-making.” The study took place in a bar laboratory, a research space designed to look like a real bar. Eligible participants were fluent in English, consumed at least 10 UK units of alcohol per week (e.g., 3.5 pints of beer), and were aged 18-25. Individuals were ineligible to participate if they had ever received treatment for alcohol use or were pregnant, breastfeeding, or currently taking any medications. The age range was restricted to ensure similarity to confederates. Drawing on previous research demonstrating a medium-sized effect of self-affirmation on the proposed mediators and conformity ([Binning et al., 2015](#_ENREF_5); [Burson et al., 2012](#_ENREF_8); [P. S. Harris et al., 2017](#_ENREF_25); [Logel & Cohen, 2012](#_ENREF_39)), we sought to recruit at least 128 participants to provide 80% power for detecting a medium-sized effect. We recruited above the target to account for exclusions due to guessing study aims, acquaintance of the confederate, etc. In all, 159 individuals participated. Six participants were excluded because they knew the confederate (*n* = 4) or events disrupted drink consumption (e.g., coughing fit; *n* = 2), resulting in a final sample of 153 participants. Participants received course credit or £10 in exchange for participation.

**Design.** Participants were randomized in a 2 (self-affirmed vs. not) x 2 (heavy vs. light peer modelling) between-subjects design. Confederates were four third-year, female students who acted as normal participants. We did not match participants’ and confederates’ gender due to practical constraints and because conformity is equivalent across mixed versus same sex dyads ([Larsen, Overbeek, Granic, & Engels, 2010](#_ENREF_35)). However, given gender differences in alcohol consumption ([White et al., 2015](#_ENREF_63)), we nonetheless explored gender as an additional factor in analyses.

**Materials and measures.**

***Self-affirmation manipulation.*** We utilised a values affirmation, the most common self-affirmation manipulation ([P. R. Harris & Epton, 2009](#_ENREF_24); [McQueen & Klein, 2006](#_ENREF_42)). Participants ranked 11 characteristics and values (e.g., relationships with friends and family, humour) from most to least important ([Cohen, Garcia, Apfel, & Master, 2006](#_ENREF_12)). Self-affirmed individuals wrote about why their first-ranked value was important to them. Individuals who were not self-affirmed wrote about why their ninth-ranked value might be important to someone else.

***Affiliative interest.*** Desire to affiliate with a stranger was measured with a computer-based assessment of social distance ([Høgh-Olesen, 2008](#_ENREF_27)). Participants viewed an image of a person sitting on a bench, with 13 seats to the right of the individual. Participants indicated which seat they would choose, from closest (1) to furthest away (13). This measure performs similarly to the chair placement measure of social distance in capturing affiliative interest ([S. P. Mackinnon, Jordan, & Wilson, 2011](#_ENREF_41)).

***Inhibitory control.*** Capacity for self-regulation was assessed with the stop-signal task ([Verbruggen, Logan, & Stevens, 2008](#_ENREF_62)). Previous research has demonstrated effects of self-affirmation on other measures of ability to inhibit a dominant response ([P. S. Harris et al., 2017](#_ENREF_25); [Legault et al., 2012](#_ENREF_37)). We sought to extend these effects to the stop-signal task, which uniquely captures the efficiency of the stopping process ([Verbruggen & Logan, 2008](#_ENREF_61)), a presumably important feature of inhibiting motor behaviour. Participants’ goal was to quickly and accurately categorize stimuli (squares and circles) using pre-defined keys on the left and right side of the keyboard. On 25% of trials, the stimulus was followed by an auditory stop-signal, indicating that the response should be inhibited. The initial stop signal delay was set at 250 ms and increased or decreased by 50 ms for correct inhibitions versus errors, respectively. Following a practice phase (not analysed), participants completed three blocks, each consisting of 64 trials (16 stop trials). Stop-signal reaction time was calculated using the integration method ([Logan & Cowan, 1984](#_ENREF_38)). The mean stop-signal delay was subtracted from the nth reaction time, where the nth reaction time was determined by multiplying the total number of go reaction times in the distribution by the overall probability of responding to the stop-signal. Faster stop-signal reaction times reflect better inhibitory control. In all, 18 participants were excluded from stop-signal analyses because they were extreme outliers in stop-signal errors (*M* = 91%; *n* = 7), accuracy on go trials (*M* = 48%; *n* = 10), or both (*n* = 1). By comparison, the remainder of the sample had errors on 45% of stop signal trials and 97% accuracy on go trials.

***Hazardous alcohol consumption.*** Participants completed the 10-item Alcohol Use Disorders Identification Test (AUDIT) to capture hazardous drinking patterns ([Babor, Higgins-Biddle, Saunders, & Monteiro, 2001](#_ENREF_3)). Items included “How many drinks containing alcohol do you have on a typical day when you are drinking?” Response options ranged from 0–4. Scale anchors varied across items (e.g., 0 (*1 or 2 drinks*) to 4 (*10 or more drinks)*). Items were summed (α = .72).

**Procedure.**

Participants were instructed to arrive in a designated waiting area, where the confederate was also waiting. Both were greeted and escorted to the bar laboratory where they provided informed consent and were breathalysed to ensure breath alcohol content of 0%. The researcher explained that participants would complete one study on writing and one on environment and decision-making. Whilst the participant completed demographics (age, gender identity, race/ ethnicity), the self-affirmation task, and measures of affiliative interest and inhibitory control, the confederate was taken elsewhere to ostensibly do the same.

The participant and confederate were reunited in the bar laboratory, seated at a table facing one another, and given five minutes to complete anagrams. A video camera recorded the interaction. Confederates followed a script to describe four pictures. The participant tried to identify the unifying word. Before beginning the task, drinks were provided. The participant received 100 mL diet coke with 25 mL of 37.5% vodka. The confederate appeared to receive the same, but received only diet coke. The confederate was randomly assigned to model high or low consumption. In the high consumption condition, the confederate sipped her drink every 30 seconds and consumed the entire drink during the interaction. In the low consumption condition, the confederate sipped her drink 30 seconds following the start and 30 seconds from the end of the interaction. A timer, ostensibly used to time the task, allowed confederates to monitor their sip timing. After 5 minutes, the researcher returned and collected the drinks. The participant and confederate were separated again. The participant completed the AUDIT and a question probing suspicion and awareness of the study aims. The participant was then breathalysed again, debriefed, and compensated. The researcher measured the amount of the drink left in the participant’s glass, which was converted to mL consumed.

Two research assistants, who were not involved with running the study, coded videos for number of sips taken by the participant and confederate and instances of mimicry (94% inter-rater agreement). Consistent with Koordeman et al. ([2011](#_ENREF_33)), mimicry was defined as the participant taking a sip within 15 seconds of the confederate’s sip. We examined the percent of sips taken by the participant that were mimicked sips (times mimicked/ sips taken\*100). Two research assistants coded the suspicion probe, specifically whether participants believed that the self-affirmation task was intended to affect behaviour during the interaction with the confederate (100% inter-rater agreement). We report inter-rater agreement throughout given known issues with Cohen’s kappa when a category rarely occurs (Feinstein & Cicchetti, 1990), here, affirmative cases in the suspicion probe.

**Results**

**Sample descriptives.** Age, gender, race/ ethnicity, and AUDIT scores across conditions are provided in Table 1. Participants averaged 20.37 years old (*SD* = 1.98), were 69% female, and 82%White. Mean AUDIT scores (13.86, *SD* = 4.99) indicated that most participants exceeded the cut-off score of eight for classification as a hazardous drinker and would benefit from risk-reduction efforts ([Babor et al., 2001](#_ENREF_3)). No participant fully guessed the aims.

With respect to gender, women drank significantly less and had better inhibitory control than men (*F*s > 3.90, *p*s ≤ .05). However, there were no interactions between gender and the conditions for any outcomes (*p*s >.13). Inclusion of gender in analyses did not alter results. Results therefore do not include gender as a factor.

Means and standard errors across conditions for all dependent variables are reported in Table 2. Below, we report ANOVAs estimated in SPSS and Bayes factors (BF10) estimated in JASP using the default priors ([JASP Team, 2018](#_ENREF_29)). Bayes factors between 1/3 and 1/10 or between 3 and 10 indicate substantial support for the null and alternative hypotheses, respectively; scores below 1/10 or above 10 provide strong support ([Jeffreys, 1961](#_ENREF_30)).

**Effects on mimicry and alcohol consumption.** Analyses indicated a large effect of peer modelling on mimicry (*F* (1, 148) = 90.49, *p* < .001, η2= .38; BF10= 17.72) and a medium sized effect on consumption (*F* (1, 149) = 8.12, *p* = .01, η2= .05; BF10= 7.59). When exposed to the heavy drinking model, 80% (*SE* = 3.77) of sips taken by participants mimicked the confederate. With the light drinking confederate, only 29% (*SE* = 3.82) of sips mimicked the confederates’. Likewise, participants exposed to the heavy drinking model (*M*= 44.83 ml, *SE* = 3.61) consumed significantly more of their drink than did those exposed to the light drinking model (*M*= 30.22 ml, *SE* = 3.64).

With respect to mimicry, there was neither a main effect of self-affirmation (*F* (1, 148) = 0.04, *p* = .84, η2= .000; BF10= 0.18) nor a self-affirmation by peer modelling interaction (*F* (1, 148) = 0.41, *p* = .53, η2= .003; BF10= 0.27). In the context of consumption, there was also neither a main effect of self-affirmation (*F* (1, 149) = 0.08, *p* = .78, η2= .001; BF10= 0.19), nor a self-affirmation by peer modelling interaction (*F* (1, 149) = 0.03, *p* = .86, η2= .000; BF10= 0.23). Both self-affirmation by peer modelling interactions yielded Bayes factors below 1/3, indicating substantial support for the null hypothesis. That is, the effect of peer modelling did not depend on self-affirmation.

**Effects on proposed mechanisms.** Informing the null effects of self-affirmation on mimicry and consumption, self-affirmed (*M* = 7.95, *SE* = 0.29) participants did not choose to sit further away from a stranger than participants who were not self-affirmed (*M* = 7.67, *SE* = 0.29; *F* (1, 149) = 0.45, *p* = .50, η2= .003; BF10= 0.22). Self-affirmed participants (*M* = 182.23 ms, *SE* = 5.96) also did not have better inhibitory control than participants who were not self-affirmed (*M* = 190.32 ms, *SE* = 6.11; *F* (1, 131) = 0.83, *p*= .36, η2 = .006; BF10= 0.30). There were no main or interaction effects of peer modelling on the proposed mechanisms (all *F*s < 1.67, *p*s > .20; BF10< 0.43). The Bayes factors again provided substantial support for the null hypothesis, demonstrating that self-affirmation did not alter affiliative interest or inhibitory control.

**Exploratory mediation analysis.**  Although hypothesized ([Cruwys et al., 2015](#_ENREF_14)), whether mimicry drives peer modelling effects has not been tested in previous research. We therefore explored whether mimicry mediated the effect of peer modelling on personal consumption (see Figure 1). A bias-corrected bootstrapped confidence interval ([D. P. MacKinnon, 2008](#_ENREF_40)) was estimated in the PROCESS macro ([Hayes, 2017](#_ENREF_26)) to examine mediation. There was a significant effect of peer modelling on mimicry (*B* = 51.04, *SE* = 5.37, *t* = 9.51, *p* < .001). Whilst controlling for the main and interaction effects of peer modelling and self-affirmation, mimicry predicted consumption (*B* = 0.27, *SE* = 0.08, *t* = 3.49, *p* = .001) and the effect of peer modelling on consumption became non-significant (*B* = 0.71, *SE* = 6.31, *t* = 0.11, *p* = .91). The bias-corrected bootstrapped confidence interval further supported mediation (mediated effect = 13.57; 95% CI [5.75, 22.33]). Mimicry explained 95% of the total effect of peer modelling on consumption.

**Discussion**

Study 1 demonstrated that, relative to a light drinking peer, exposure to a heavy drinking peer led to large increases in mimicry of that individual’s sipping behaviour, which led to moderate increases in drink consumption. However, there were no effects of self-affirmation on mimicry, drink consumption, affiliative interest, or inhibitory control, and Bayes factors for these analyses consistently indicated substantial support for the null hypothesis.

Although previous research has demonstrated effects of self-affirmation on the Stroop and go/no-go tasks ([P. S. Harris et al., 2017](#_ENREF_25); [Legault et al., 2012](#_ENREF_37)), these differ in the facet of inhibitory control captured. Thus, it may be that self-affirmed individuals are better able to inhibit a dominant response, but not because self-affirmation operates directly on the stopping process, the feature uniquely captured in the stop-signal task. Alternatively, self-affirmation may influence inhibitory control by inducing proactive slowing of responses in anticipation of the stop-signal. Measures that capture inhibitory control further upstream from the stopping process may reveal effects of self-affirmation. In addition, the absence of an effect of self-affirmation on conformity is inconsistent with research demonstrating that self-affirmed individuals were less likely to conform to peers’ attitudes ([Binning et al., 2015](#_ENREF_5)). This may reflect that, in Study 1, social pressure occurred in a face-to-face interaction, which likely evokes greater self-presentational concerns and pressure to conform than the written normative information utilized by Binning et al.

Study 2 sought to address these concerns by examining effects of self-affirmation in the context of written normative information. In addition, private self-awareness, a precursor to self-regulation ([Duval & Wicklund, 1972](#_ENREF_17); [Morin, 2011](#_ENREF_44)), was examined as a possible mediator of the effect of self-affirmation. Self-affirmation increases activation in areas of the brain associated with heightened self-focus ([Dutcher et al., 2016](#_ENREF_16)). Likewise, both private self-awareness and its trait extension, private self-consciousness, are associated with increased likelihood of acting in line with personal standards rather than conforming to external pressure ([Froming & Carver, 1981](#_ENREF_20); [Froming, Walker, & Lopyan, 1982](#_ENREF_21)). Private self-awareness may therefore both be affected by self-affirmation and likely to affect conformity.

**Study 2**

**Method**

**Participants.** Participants were recruited from the [Blinded] campus to take part in a study examining “personality, mood, and taste perception.” Eligible participants were female, aged 18-30, fluent in English, and had no food allergies or a history of eating disorders. Only females were used because modelling of eating behaviour appears to be weaker among males ([Cruwys et al., 2015](#_ENREF_14)). We sought to recruit 128 participants to provide 80% power for detecting a medium-sized effect. In all, 122 women participated for course credit or £5. Participants were randomized in a 2 (self-affirmed vs. not) x 2 (heavy vs. light peer modelling) between-subjects design.

**Materials and measures.**

The self-affirmation manipulation and measure of affiliative interest used in Study 1 remained the same in Study 2.

***Private self-awareness.*** Capacity for effortful control over behaviour was assessed with the private self-awareness subscale of the Situational Self-Awareness Scale ([Govern & Marsch, 2001](#_ENREF_22)). The three-item measure captures current awareness of one’s thoughts and feelings (e.g., Right now, I am conscious of my inner feelings). Responses were given 1 (*strongly disagree)* to 7 (*strongly agree*) scale and averaged to form a scale score (α = .86).

***Appetite and mood.*** Participants reported “How \_\_\_\_ do you feel right now?” for hunger and fullness. Responses were given on a 10 cm visual analogue scale with ‘‘not at all’’ and ‘‘extremely’’ as anchors. To corroborate the cover story, participants also responded to eight mood items (e.g., happy, sad, relaxed) using the same 10 cm visual analogue scale.

***Peer modelling.*** Peer modelling was manipulated with a sheet presenting fictitious information on the cookie consumption of four previous participants ([Robinson, Benwell, & Higgs, 2013](#_ENREF_53)). In the high consumption condition, the four previous participants had eaten 8, 9, 9, and 10 cookies; in the low consumption condition, they had eaten 1, 1, 2, and 2 cookies.

***Cookie rating.*** Participants rated the cookies on six dimensions (sweet, salty, nutty, crunchy, moist, tasty) and overall liking using a 1 (*not at all)* to 7 (*extremely/ very much*) scale. The taste test has demonstrated validity as a measure of motivation for food consumption (Robinson et al., 2017).

***Cookies.*** Participants were served 14 Maryland chocolate chip cookies (approximately 11g, 57 kcals per cookie).

**Procedure**

Upon arrival, participants provided informed consent and confirmed eligibility. Demographic information, appetite, and mood were assessed. Participants then completed the self-affirmation task, followed by assessment of affiliative interest and private self-awareness. In the taste perception section of the study, the researcher presented the peer modelling sheet. Participants were asked to fill in their age, gender, and location. They were told not to complete the final column, in which number of cookies had been recorded for previous participants, as this information was only needed from the first few participants for ordering purposes. Leaving the peer modelling sheet present, the researcher delivered the bowl of cookies and the taste rating form to participants. Participants were told to eat as much as they would like, as any remaining cookies would be thrown away. They were given 10 minutes to complete the taste rating. Next, participants reported height and weight for calculation of body mass index (BMI) and completed a suspicion probe. The participant was then debriefed and compensated, and the researcher counted the number of cookies consumed. Two research assistants coded the suspicion probe, specifically whether participants believed the self-affirmation task was intended to affect their response to others’ cookie consumption (89% inter-rater agreement).

**Results and Discussion**

**Sample descriptives and equivalence of conditions.**

On average, participants were 21.36 years old (*SD*=3.42), identified as White (76%), fell within the normal BMI range (*M*=22.87, *SD*=4.07), and had moderate levels of hunger (*M*=3.90, *SD*=2.37) and fullness (*M*=3.82, *SD*=2.95). Data on these variables across conditions are provided in Table 1. One participant came close to guessing the study aims. As removal of her data did not alter results, we retained her data in the analyses below. Means and standard errors across conditions for all dependent variables are reported in Table 3.

**Effects on cookie consumption.** Because cookie consumption is a count variable, negative binomial regression models were initially examined. As results remained the same, ANOVAs are reported for ease of interpretation. Similar to Study 1, there was a large effect of peer modelling (*F* (1, 118) = 19.86, *p* < .001, η2 = .14; BF10= 912.72). Participants exposed to the high consumption model ate more cookies than those exposed to the low consumption model. However, there were no main or interaction effects involving self-affirmation (*F*s < 1.52, *p*s> .22; BF10<0.31). As in Study 1, the Bayes factor below 1/3 indicated substantial support that self-affirmation did not moderate the effect of peer modelling.

**Effects on proposed mechanisms.** Consistent with Study 1, self-affirmed individuals (*M* = 8.10, *SE* = 0.28) did not differ in affiliative interest from those who were not self-affirmed (*M* = 7.66, *SE* = 0.28; *F* (1, 118)= 1.22, *p*= .27, η2= .01; BF10= 0.32), with the Bayes factor providing substantial support for the null hypothesis. However, self-affirmed participants did report higher private self-awareness (*M* = 5.02, *SE* = 0.18) than those who were not self-affirmed (*M* = 4.46, *SE* = 0.18; *F* (1, 118)= 5.04, *p* = .03, η2 = .04; BF10= 2.16), though the Bayes factor indicated only weak support for an effect of self-affirmation. There were no main or interaction effects of peer modelling on either mediator (all *F*s < 3.48, *p*s > .07; BF10 < 1.03).

Given some evidence of heightened self-awareness among self-affirmed participants, we examined whether self-affirmation had an indirect effect, via private self-awareness, in reducing the effect of peer modelling on consumption. However, private self-awareness had neither a main effect nor an interaction with peer modelling on consumption (*F*s < 1.91, *p*s > .17). Thus, self-affirmed individuals demonstrated heightened capacity for self-regulation, as indicated by increased private self-awareness, but this did not alter the strong effect of peer modelling on consumption.

**General Discussion**

Across two studies, peer modelling powerfully affected consumption of alcohol and unhealthy foods. However, in neither study did having participants affirm their self-worth protect against the effect of exposure to a high consumption peer. With respect to potential mechanisms, self-affirmation did not affect interest in affiliation. Although self-affirmed participants evidenced greater self-regulation in the form of increased private self-awareness, this did not reduce effects of peer modelling on cookie consumption.

In both studies, the effects of peer modelling on mimicry and consumption were moderate to large in magnitude. Similarly sized effects have been obtained in recent alcohol and food modelling studies ([Larsen, Overbeek, et al., 2010](#_ENREF_35); [Robinson et al., 2013](#_ENREF_53)). Researchers have likewise demonstrated large effects of peer modelling on cigarette smoking ([Harakeh, Engels, Van Baaren, & Scholte, 2007](#_ENREF_23)) and we would expect similar effects for use of other substances. Peer modelling may also thwart attempts at behaviour change ([Reid, Carey, Merrill, & Carey, 2015](#_ENREF_52)). Indeed, cognitive behaviour therapy and models of relapse for addictive substances recognize the strong influence of interactions with substance-using individuals ([Beck, Wright, Newman, & Liese, 1993](#_ENREF_4); [Witkiewitz & Marlatt, 2004](#_ENREF_64)). It is therefore important that research continue to examine strategies for addressing this powerful contributor to unhealthy behaviours. Given the mediating role of mimicry in conformity during face-to-face interactions, and that recent research has found little role for psychological constructs in mediating effects of peer behaviour on alcohol consumption ([Reid & Carey, 2018](#_ENREF_51)), future research should focus on reducing mimicry as a means for ultimately reducing consumption.

Our failure to replicate the effect of self-affirmation on conformity shown in previous research ([Binning et al., 2015](#_ENREF_5)) is notable and suggests that self-affirmation may not be an effective strategy for reducing conformity to unhealthy peer behaviour. This may be because we measured behavioural conformity, rather than self-reported attitudes. Although self-affirmation has been identified as a strategy for improving health behaviour ([Epton, Harris, Kane, van Koningsbruggen, & Sheeran, 2015](#_ENREF_18)), a growing body of studies have likewise found null effects of self-affirmation with respect to behaviour change ([Kamboj et al., 2016](#_ENREF_31); [Knight & Norman, 2016](#_ENREF_32); [Norman et al., 2018](#_ENREF_45)).

Across both studies, self-affirmation did not reduce interest in affiliating with others. This may reflect that self-affirmation is only useful for balancing affiliative needs in contexts in which these needs have been substantially heightened ([Park & Maner, 2009](#_ENREF_46)). Thus, situations in which, or individuals for whom, the need to be accepted is quite strong may yield more positive effects of affirmation on affiliative interest. Likewise, although self-affirmation affected private self-awareness, this did not translate into reduced conformity. Classic studies demonstrating that heightened self-awareness reduces conformity have manipulated self-awareness by exposing participants to a mirror ([Froming et al., 1982](#_ENREF_21)), suggesting that relatively large shifts in self-awareness may be needed to alter conformity. Further, as the Bayes factor indicated only weak or anecdotal support for the effect of self-affirmation on self-awareness, this finding requires replication in future studies.

Alternative strategies that better target the underlying mechanisms of interest may be more successful in reducing conformity. Writing about social inclusion has been shown to reduce rejection concerns relative to a baseline state ([Shapiro, Baldwin, Williams, & Trawalter, 2011](#_ENREF_58)). Thus, social inclusion has strong potential for targeting social bonding needs, thereby reducing mimicry and conformity. In the context of enhancing self-regulation, techniques that substantially heighten private self-awareness, as well as training to increase self-regulation ([Allom, Mullan, & Hagger, 2016](#_ENREF_2)), may prove more efficacious.

**Limitations**

Our findings should be interpreted in light of the studies’ limitations. In Study 1, participants were paired with a stranger, which potentially heightens self-presentational concerns and increases likelihood of mimicry and conformity. Large effects of peer modelling have been found among acquaintances for both alcohol and food consumption ([Dallas et al., 2014](#_ENREF_15); [Howland, Hunger, & Mann, 2012](#_ENREF_28)). However, whether the accuracy and social bonding mechanisms are equally at play when interacting with strangers versus friends remains an open question. In addition, both studies took place in a laboratory, albeit a semi-naturalistic bar lab in Study 1. The novelty of the environment may have also heightened conformity ([Cialdini & Trost, 1998](#_ENREF_11)). That modelling effects persist in familiar, real-world settings ([Larsen, Overbeek, Granic, & Engels, 2012](#_ENREF_34)) suggests that the laboratory context is appropriate for studying peer modelling. In addition, we powered our study to detect medium-sized effects. Meta-analysis indicates small effects of self-affirmation on behaviour change following exposure to threatening health messages ([Epton et al., 2015](#_ENREF_18)). However, the failure of self-affirmation to reduce social influence was unlikely to be due to statistical power, as Bayesian analyses provided substantial support in favour of the null hypothesis. Finally, there are many self-affirmation instructions available in the literature, and some may yield more pronounced effects on the mechanisms and conformity. However, as Binning et al. ([2015](#_ENREF_5)) demonstrated reduced conformity to others’ attitudes using a similar values-affirmation approach, it seems unlikely that the instruction set was problematic.

**Conclusion**

Given the roles of excessive consumption of alcohol and unhealthy foods in public health ([Mokdad et al., 2004](#_ENREF_43)), examination of strategies that address the determinants of these behaviours continues to be important. The present studies indicated that peer influence strongly affects eating and drinking behaviour. However, self-affirmation was not effective in reducing conformity to unhealthy peer behaviour.

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Table 1

*Participant Means and Standard Deviations or Frequency on Demographics by Condition*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Not self-affirmed | | Self-affirmed | |
|  | Low consumption model | High consumption model | Low consumption model | High consumption model |
| Study 1 | | | | |
| Age (years) | 20.69 (1.89) | 20.02 (2.21) | 20.53 (1.75) | 20.25 (2.05) |
| AUDIT | 14.19 (6.29) | 13.76 (5.41) | 14.15 (3.64) | 13.31 (4.46) |
| Gender | 15M / 21F | 7M / 34F | 9M / 31F | 16M / 20F |
| Ethnicity | 2PC / 34W | 10PC / 31W | 10PC / 30W | 5PC / 31W |
| Study 2 | | | | |
| Age (years) | 22.75 (3.34) | 20.27 (2.97) | 21.64 (3.72) | 21.00 (3.35) |
| BMI | 24.40 (4.64) | 22.24 (3.21) | 21.81 (2.70) | 23.19 (5.07) |
| Hunger  (0-10 cm scale) | 3.60 (2.25) | 4.29 (2.45) | 3.91 (2.59) | 3.72 (2.20) |
| Fullness  (0-10 cm scale) | 4.02 (3.12) | 2.77 (2.45) | 4.41 (3.34) | 4.24 (2.75) |
| Ethnicity | 4PC / 25W | 11PC / 23W | 6 PC / 23W | 8PC / 22W |

*Note. M = Men; F = Women; PC = People of colour; W = White*

Table 2

*Means and Standard Errors for Study 1 Outcomes by Condition*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Not self-affirmed | | Self-affirmed | |
|  | Light drinking peer  (*n* = 36) | Heavy drinking peer  (*n* = 41) | Light drinking peer  (*n* = 40) | Heavy drinking peer  (*n* = 36) |
| Affiliative interest | 7.86 (2.61)a | 7.49 (2.30)a | 8.20 (2.57)a | 7.69 (2.54)a |
| Inhibitory control (ms) | 183.49 (9.02)a | 197.15 (8.24)a | 178.32 (8.12)a | 186.75 (8.74)a |
| Mimicry | 29.81 (30.63)a | 77.43 (30.68)b | 27.48 (37.50)a | 81.94 (32.42)b |
| Beverage consumption (ml) | 31.39 (26.82)a | 45.07 (35.81)b | 29.05 (27.15)a | 44.58 (35.46)b |

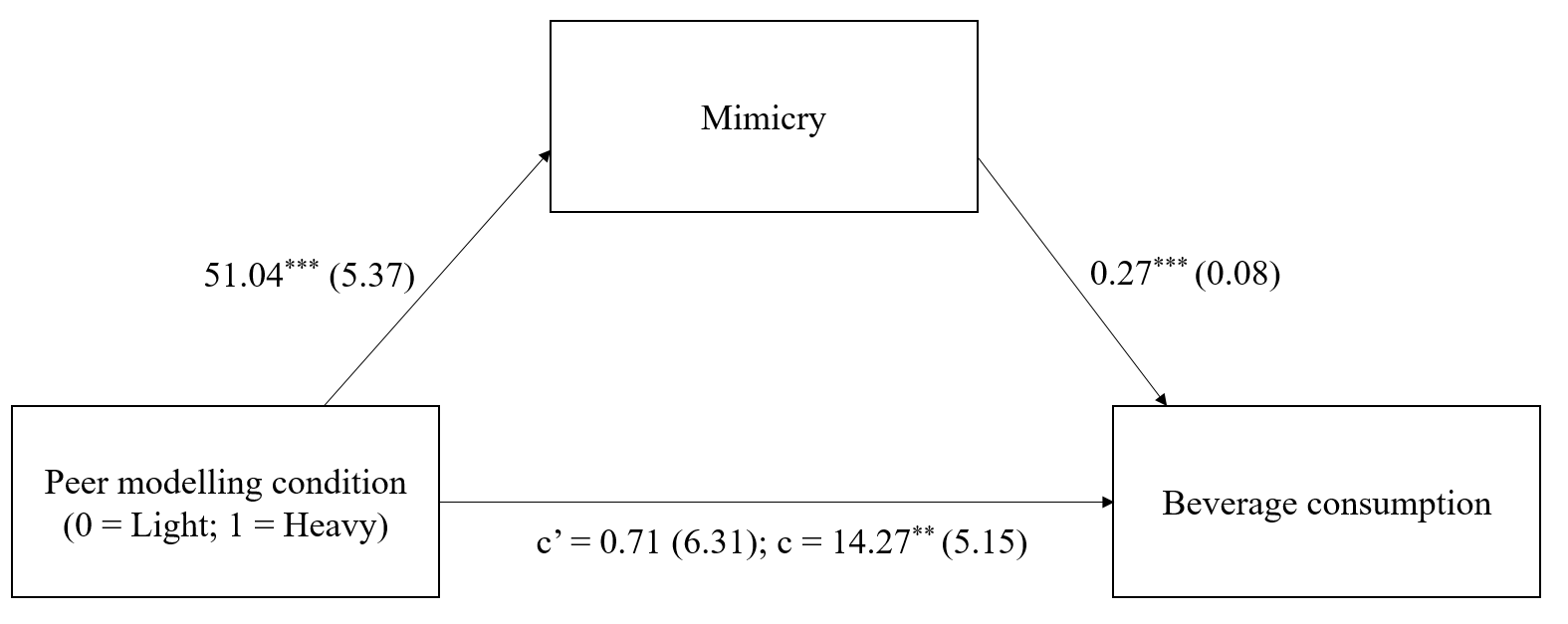
*Note.* Means in the same row with different subscripts are significantly different from one another.

Table 3

*Means and Standard Errors for Study 2 Outcomes by Condition*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Not self-affirmed | | Self-affirmed | |
|  | Low peer model  (*n* = 28) | High peer model  (*n* = 34) | Low peer model  (*n* = 29) | High peer model  (*n* = 30) |
| Affiliative interest | 7.41 (0.40)a | 7.91 (0.37)a | 7.97 (0.40)a | 8.23 (0.40)a |
| Private self-awareness | 4.79 (0.26)a | 4.12 (0.24)a | 5.15 (0.26)b | 4.89 (0.25)b |
| Cookies consumed | 2.72 (0.44)a | 4.77 (0.41)b | 3.38 (0.44)a | 5.17 (0.43)b |

*Note.* Means in the same row with different subscripts are significantly different from one another.



*Figure 1.* Mediation of the effect of peer modelling on beverage consumption by mimicry of the confederate’s sipping behaviour. c' = the direct effect; c = the total effect.