The Role of Risks Information, Social Norms Information, and Implementation Intentions on Decreasing Sugar-Sweetened Beverage Consumption Intentions and Behavior.

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Abstract

This experiment examined the effects of risks information, social norms information, and implementation intentions on sugar-sweetened beverage (SSB) consumption intentions and behaviors. Participants were two hundred twenty-four University of California San Diego undergraduates (70% females), aged 18 to 31 years (M = 20.23, SD = 2.00). Participants were randomly assigned to one of eight conditions in a 2 (risks information: control vs SSB risks) x 2 (Social norms information: none vs SSB norms) x 2 (Implementation intentions task: control vs planning how to reduce SSB consumption) between subjects design. Behaviors indicative of preparations to reduce SSB consumption, and actual SSB consumption were assessed via a two-week surprise follow-up phone call. Participants who did not receive either the risks or the normative information expressed lower intentions to reduce SSB consumption relative to those in the other conditions. Those who read about the SSB risks exhibited more preparatory behaviors than those who did not receive this information. In addition, absolutely no participants who received both the SSB risks information and performed the SSB planning task took a coke when offered a free beverage. Further examining the roles of risks information, social norms information, and implementation intentions in altering intentions has potential benefits.

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There is an increasing concern about the health risks of added dietary sugar, particularly when consumed in sugar-sweetened beverages (SSBs) that contain no essential nutrients (e.g., energy drinks, sodas). A strong link has been documented between the consumption of SSBs and increased risks for obesity (Harrington, 2008), Type II diabetes (Malik et al., 2010a), heart disease, and cancer (Larson, Bergkvist, & Wolk, 2006). Thus, interventions that motivate reductions in SSB consumption have the potential for significant public health impact. However, information about health risks and education alone may not be effective in producing health behavior change (Corace & Garber, 2014; Taylor, 2012). To develop interventions that are maximally beneficial, and potentially generalizable to other health domains, it is important that interventions are grounded in theory. One of the most widely applied health behavior theories is the Theory of Planned Behavior (TPB; Azjen,1991). The TPB suggests that the best predictor of actual behavior is a person's intention to perform that behavior. The intention to perform a particular behavior is, in turn, determined by the following three main components: attitudes toward a particular action, subjective norms, and perceived behavioral control.

While there is support for the efficacy of the TPB in health behavior contexts, most of the support is based on correlational studies (Sheeran, Montanaro, Ayishai-Yitshak, Bryan Klein, & Rothman, 2016), which does not allow for causal conclusions. However, a few studies have succeeded in manipulating at least one of the TPB's constructs within health behavior contexts. For example, Crocker, Whitaker, Cooke, and Wardle (2009) evaluated the effects of social norms on intentions to consume fruits and vegetables. They found that normative information influenced the increase of participants' intake of fruits and vegetables (Croker at al., 2009). This

demonstrates that normative information may help people alter behaviors that could lead to a healthier lifestyle. In addition, support has also been found for the efficacy of utilizing the concept of perceived behavioral control. For example, Ames, Wurpts, Pike, Mackinnon, Reynolds, and Stacy (2016) found that a self-regulation intervention designed to reduce SSB consumption for individuals with inhibitory control problems significantly reduced SSB consumption compared to those who did not participate in the intervention.

While these findings do support the efficacy of utilizing the constructs of TPB to motivate health behavior change, the efficacy of the combined constructs were not studied for the mentioned experiments. In fact, Sniehotta (2009) conducted the only experiment in which all the constructs of the TPB were manipulated, which was examined in the context of physical activity. Sniehotta (2009) found that attitudes, subjective norms, and perceived behavioral control predicted intentions to engage in physical activity. However, information designed to increase perceived behavioral control (e.g. costs, time, access, and feelings of discomfort about exercising in public) was the only intervention utilized that changed actual behavior. There currently is no study that has manipulated all three constructs of the TPB in the context of SSB consumption. The present experiment attempted to fill this gap in the literature.

The present experiment investigated the effects of combining an intervention designed to increase awareness of the risks of SSB consumption, an intervention designed to establish low SSB consumption social norms, and an intervention designed to increase perceived behavioral control over reducing SSB consumption on intentions to reduce SSB consumption, preparations to reduce consumption, and actual changes in SSB consumption. It was expected that participants who received all three interventions would report the highest SSB reduction intentions and behaviors.

Method

Participants

Participants were 224 University of California San Diego (UCSD) undergraduates (29.5% male and 70.1% female); age ranged from 18 to 31 years (M = 20.50, SD = 2.08); 37.5% Asian, 1.8% African-American, 20.1% Hispanic, 21% Caucasian, 16% Multi-Ethnic, and 1.8% Other. The participants were given course credit for their participation in the lab. Two weeks after their participation in the lab the participants were contacted for a surprise phone follow-up and were given an additional course credit for their participation.

Design and conditions.

Participants were randomly assigned to one of the 8 conditions in a 2 (Information Intervention: control vs. SSB Risks) x 2 (Social Norms Intervention: No Norms vs. SSB Norms) x 2 (Planning Intervention: Control vs. SSB) between subject design.

Interventions

SSB Risks Information Intervention. This intervention consisted of a laminated booklet containing information about the potential health risks of the consumption of beverages with added sugar (e.g., the role that sugar consumption may play in obesity and diabetes). In order to make the information more salient, participants also performed a task in which they placed 22 sugar cubes (one at a time) in a 24-oz clear Starbucks cup. The control group reviewed messages and images regarding study habits.

Correction of Misperceived Social Norms Intervention. Participants received a personalized normative feedback sheet that compared their perceptions of their peers' SSB consumption habits to the actual reported SSB consumption habits of over 300 college students, which indicated that a large majority of their peers' attempt to limit SSB consumption. For

example, one of the social norms feedback items stated, "you thought that 15% of college students try to avoid consuming sugar sweetened drinks. On average actually 91% of college students try to avoid consuming sugar-sweetened drinks." The control group did not receive any normative information.

Implementation Intentions/Planning Intervention. Participants completed two planning tasks. In the first task they wrote down an action plan regarding healthy beverage consumption (e.g., How they will drink beverages without added sugar in the next two weeks) and in the second task they wrote an if-then plan regarding how they would resist temptations (e.g., when they have a craving for a sugary drink). The control group completed both tasks regarding their study habits.

Procedure

Participants were recruited via the Psychology Department's Human Participation Pool (HPP). The study was identified only by a number to minimize self-selection and to avoid development of biases about the study.

Intervention Session The research study took place at one of the UCSD laboratories. Upon arrival to the laboratory, participants were escorted into a conference room, bedecked as if a graduation party had recently taken place. The room had a "Congratulations Justin" sign on the white board with streamers coming down from the ceiling. There were pizza boxes scattered with napkins and condiments to make it seem as if people left a mess from a party. The experimenter apologized for the mess and gave the participant the consent form to read and sign prior to the beginning of the experiment. After providing informed consent, the participants were escorted into an adjacent room, where they completed demographic information, baseline measures of their beverage consumption, and their estimates of their perceptions of their peer's

SSB consumption.

Following these initial measures, participants received the interventions or the control tasks depending on the conditions to which they were randomly assigned. Participants who were randomly assigned to receive the risks information read the laminated booklet regarding the risks of SSB consumption. After reading the booklet, participants completed the sugar task. Those in the control condition read information related to study habits. Next, participants randomly assigned to the experimental social norms condition received the personalized normative feedback. The control group did not receive this information. Next, for those randomly assigned to the experimental planning condition, participants completed the action planning and if-then planning tasks regarding SSB consumption. Participants assigned to the control condition completed planning tasks related to their study habits. Following the planning tasks, all participants completed the following dependent measures; intentions to reduce SSB consumption, and several manipulation checks.

After completing all tasks, a post-experimental inquiry was conducted to probe for suspicion about the purposes of the study. Participants were then provided a general debrief. Specifically, they were told we were interested in health habits and behaviors of college students and how different kinds of information could lead to healthier beverage consumption. Finally, they were thanked for their participation and a behavioral measure of the intervention efficacy was obtained, in which the experimenter casually offered participants a beverage (ostensibly left over from "the party") and left the participant to choose their choice of beverage. Some of the beverages were sweetened with sugar and others contained no added sugar.

Follow-up. Two weeks following the intervention sessions in the laboratory, a surprise phone follow-up was conducted, during which participants indicated all of the beverages they

had consumed the day prior, as well as completed the measure of preparation to alter SSB consumption. Participants were then fully debriefed. Specifically, participants were told that the goal of the study was to determine what sorts of information might help motivate people to engage in a healthier beverage consumption. A post experimental inquiry was also conducted at the end of phone follow up to probe for suspicion regarding the behavioral measure (e.g., "What did you think about the mess in the lab?" "What did you think when the experimenter offered you a drink on your way out?"). Participants were then thanked for their participation in the study

Measures

Demographic Information and SSB Baseline Participants completed self-report measures of their demographic information (e.g. age, gender, ethnicity). Participants' baseline SSB consumption was assessed using a beverage checklist sheet, in which participants were instructed to report all beverages, and the number of ounces of each beverage, consumed the day prior to participation. The beverage checklist included 24 beverage categories: water, sports drinks, energy drinks, tea drinks, coffee drinks, fruit juices, soft drinks, etc. The checklist sheet is based on a similar checklist by Hendrick et al. (2012), which demonstrated adequate internal consistency (*ps* > .70).

Intentions. An 8-item intention scale was developed to assess the intentions to minimize SSB consumption (e.g., "I plan to avoid consuming sugar-sweetened drinks entirely,"). Participants rated their level agreement with each item on a 7-point scale from 1 (Strongly disagree) to 7 (strongly agree).

Manipulation checks. The manipulation check for planning was four statements that was given to participants where they were instructed to check the box to the extent that they agreed or

disagreed with the statement (e.g., "I have made plans concerning "when" I am going to limit my sugar-sweetened drinks to less than 1 cup each day"). The scale was on a 1-7 rating scale where the 1 would indicate "strongly disagree" and the 7 would indicate "strongly agree." Furthermore, there was three manipulation checks for social norms as well. Participants had to provide their best estimate for the three questions (e.g., "what percentage of college students report that they try to avoid sugar-sweetened drink consumption?"). Lastly, there were 6 questions for the manipulation check for the risk card. This required for participants to recall the information that was provided on the risk card (e.g., "How many cubes of sugar does a Starbucks Frappuccino contain?").

Beverage sample.

As a behavioral measure of the impact of the intervention, participants were invited to select a free beverage while exiting the lab.

Follow-up outcome measures.

SSB Consumption. The same checklist measuring SSB consumption at baseline was also used for the follow-up. Participants were encouraged to close their eyes and try to visualize what they were doing during the day before and what was the first beverage they consumed that day. The researcher guided the participant to recall the beverages consumed in a chronological order such as what they had to drink with lunch, during the afternoon, and during the evening. The participants were also informed that if, later during the interview, they recalled having anything else that day that they could stop the experimenter and let them know what other beverages they recalled having that day.

Preparation to alter behaviors. During the follow-up phone call, participants also responded to an 8-item measure designed to assess the frequency with which they had engaged

in various behaviors that might indicate preparation to alter SSB consumption (e.g., "During the past 2 weeks, how frequently did you browse the diet soda section at a grocery store, or any store?", "Read the labels on the drinks you were considering purchasing to see whether they contained added sugar"). All of these items were rated on a 5-point scale from 0 (not at all) to 4 (very frequently).

Intentions to Reduce SSB Consumption. Intentions were then assessed using the same measurement used to assess intentions during the lab participation two weeks prior. The measurement assessed intentions on a 1-7 rating scale in which 1 indicated strong disagreement with the statement and 7 indicated strong agreement with the statement (e.g., "I plan to try to minimize my sugar sweetened drink consumption").

Results

Preliminary Analyses

Group equivalence. Analyses to determine the initial equivalence of the conditions, demonstrated no significant differences in age, gender, ethnicity, education level, or reported SSB consumption at baseline as a function of condition (*p*s > .11). Thus, it appears that participants were effectively randomized.

Primary Analyses

Intentions to Decrease SSB Consumption A 2 (Information Intervention: Control vs. SSB Risks) x 2 (Social Norms Intervention: No Norms vs. SSB Norms) x 2 (Planning Intervention: Control vs. SSB) analysis of variance (ANOVA) was performed on participants' intentions to decrease their SSB consumption. The results demonstrated a significant main effect for norms condition, $F(1, 216) = 4.67$, $p < .03$. Specifically, those in the social norms condition reported greater intentions to limit their SSB consumption ($M = 42.73$, $SE = .91$) than

did participants who did not receive norms information (M = 40.01, SE= .88). There was also a significant interaction between the risks information and norms condition, F (1, 216) = 7.58, p < .01 (See Fig. 1). Specifically, those participants who did not receive either the risks or the normative information expressed lower intentions to reduce SSB consumption relative to those in the other three conditions. No other main effects or interactions were significant (ps > .10).

Beverage Sample. Recall that, as a behavioral measure of the impact of the intervention, participants were invited to select a free beverage while exiting the lab. For those participants who did choose to take a beverage (n = 120) a 2 (Information Intervention) x 2 (Social Norms Intervention) x 2 (Planning Intervention) analysis of covariance (ANCOVA), controlling for baseline SSB consumption, conducted on participants' likelihood of choosing an SSB demonstrated a marginal main effect of planning condition, F (1, 111) = 3.49, p > .06. Specifically, fewer of the participants in the SSB planning condition (14%), relative to the control planning condition (28%), selected a SSB. No other main effects or interactions were significant (ps >.11). Further, an ANOVA was conducted on whether participants chose to take a sugar-sweetened coke. The results demonstrated that there was a marginal risks condition main effect, F (1, 112) = 2.94, p > .09. However, this main effect was qualified by a marginal risks condition by planning condition interaction effect. Specifically, as can be seen in Figure 2, absolutely no participants who both received the SSB risks information and performed the SSB planning task took a coke, whereas between 6% and 17% of participants in each of the other conditions took a coke when offered a free beverage. No other main effects or interactions were significant (ps > .36).

Preparations to alter behavior. A 2 (Information Intervention) x 2 (Social Norms Intervention) x 2 (Planning Intervention) ANOVA was performed on the measure of behaviors

indicative of preparations to alter SSB consumption. The results demonstrated a significant main effect for information condition, F (1, 191) = 4.34, $p < .04$. That is, the participants who read about the SSB risks exhibited more preparatory behaviors (M = 12.07, SE = .60) than did those who did not receive this information (M = 10.26, SE = .63). No other main effects or interactions were significant ($ps > .36$).

SSB Consumption. Finally, a 2 (Information Intervention) x 2 (Social Norms Intervention) x 2 (Planning Intervention) ANCOVA, controlling for baseline reported SSB consumption, was performed on participants' reports of their SSB consumption the day prior to the follow-up. As one would expect, those who reported consuming more SSBs at baseline continued to report greater SSB consumption at follow-up ($p < .001$). However, reported SSB consumption at follow-up did not differ as a function of condition ($ps > .38$).

Discussion

Although the hypothesis that participants who received all three interventions combined would exhibit the highest SSB reduction intentions and behaviors was not supported, several interesting findings were obtained. Specifically, those participants who did not receive either the risks or the norms information expressed lower intentions to reduce SSB consumption relative to those who received either or both types of information. This demonstrates the potential efficacy of coupling interventions that target attitudes with interventions that target subjective norms. In addition, absolutely none of the participants who completed both the risks and the planning intervention took a sugar-sweetened soda, whereas of those who received either or neither intervention at least 6% took a sugar-sweetened soda. This supports the efficacy of coupling risks information with interventions designed to target one's perceived behavioral control, instead of providing risks information alone.

While there were several strengths to this study, there were some limitations. Unfortunately, because the majority of participants were females, it is difficult to know whether similar findings would be obtained for males. Another limitation to this study is that it primarily utilized self-reported measures, which may create response bias. However, we made efforts to decrease response bias by emphasizing to the participants that we were strongly interested in accuracy over perceived social desirability. In addition, a behavioral measure (e.g. the beverage sample) was also obtained, minimizing the threat that self-report measures potentially pose.

There were also many more strengths in the study that need to be acknowledged. A critical strength to this study was that both random assignment and manipulation was used, making this an experimental study. Manipulation checks were also conducted for the risks information intervention, social norms intervention, and the planning intervention thereby confirming that these variables were adequately operationalized. Another strength to the study was that a cover story was utilized in order to minimize the possibility of demand characteristics when a beverage was offered to participants when exiting out of the lab. In addition, a post-experimental inquiry was conducted in order to probe for suspicion related to both the room's "messy" appearance and the beverage offer.

While the interventions were effective in changing participants' intentions to reduce SSB consumption, there was no support found that suggested actual behavioral change in SSB consumption. A potential reason why change in SSB consumption was not found may be that measuring SSB consumption two weeks after the interventions were conducted might be too long of a period to capture behavioral change. Perhaps the participants were no longer impacted by the interventions by this time, but may have been impacted enough to change behavior prior to the follow-up. Of course, maximally beneficial interventions should be geared toward lasting

behavioral change. To better understand the efficacy in changing short term or long-term behavior, future researchers might benefit by conducting multiple follow-ups at different times. In addition, multiple email reminders of statements or images regarding SSB consumption risks could be sent to participants in order to help increase the possibility of recalling the risks information and potential benefits of reducing SSB consumption. This may possibly lead to lasting behavioral change in SSB.

To the best of our knowledge, this is the first study that experimentally manipulated all of the three constructs of the Theory of Planned Behavior in the context of SSB consumption. The experiment supported the efficacy of designing interventions that target either attitudes, subjective norms, or perceived behavioral control in order to alter a person's intentions to perform a behavior. In addition, implementing such interventions among college students also provides a helpful basis for future research focused on health promotion behaviors. Since college students are generally learning how to make their own decisions and developing habits that may last a lifetime, interventions designed to decrease SSB consumption may have potential long-term health impact. In addition, since the present experiment supports the efficacy of utilizing the TPB on SSB consumption, those at-risk for the potential health risks linked to SSB consumption (e.g. obesity, type II diabetes, heart disease, cancer, etc.) might be best reached and helped by interventions based on the TPB. As a result of the increasing links between SSB consumption and various health problems, interventions that help decrease SSB consumption are needed. Further utilizing the TPB and examining the causal roles its constructs play in altering intentions has potential benefits for those concerned with risky health behaviors.

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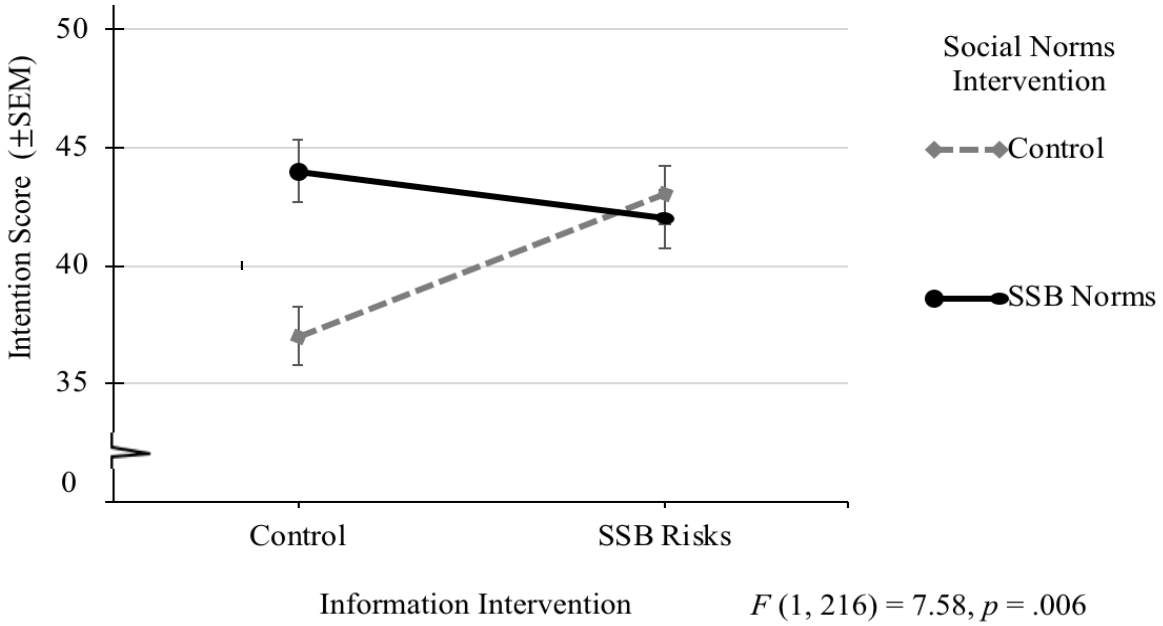

Figure 1. Intentions scores to reduce sugar-sweetened beverage consumption as a function of information intervention and social norms intervention. *Note*. ** $p < .01$. Standard errors are represented by the error bars attached to each line.

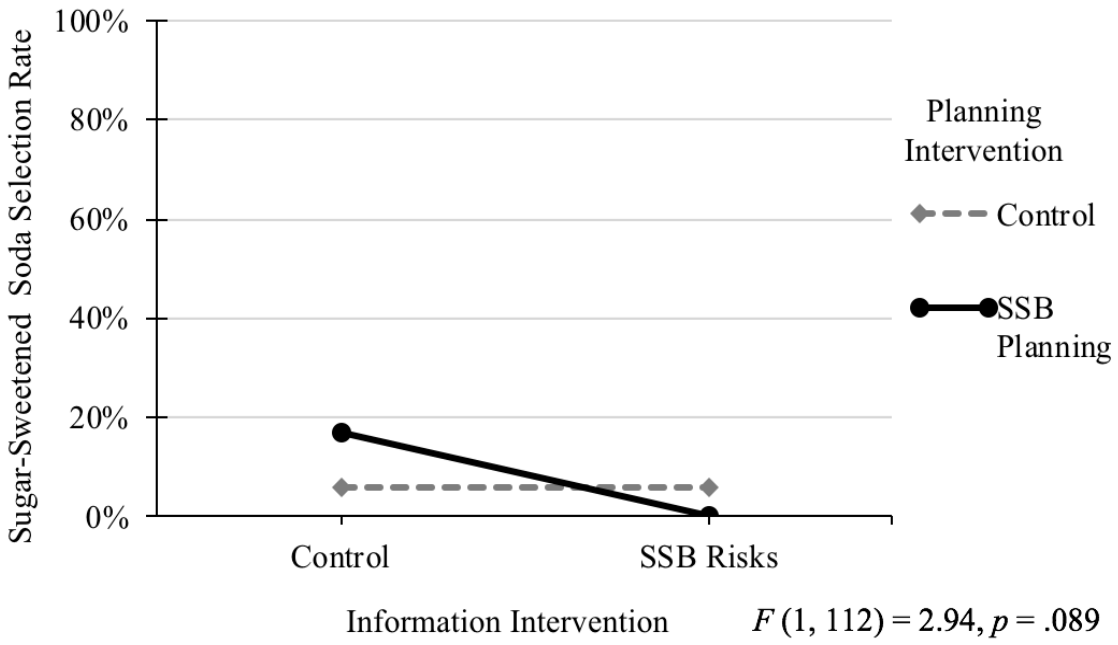

Figure 2. Percentage of participants who selected a sugar sweetened soda, when offered a free beverage, as a function of information conditions.