



# Readiness to Change and Gender: Moderators of the Relationship between Social Desirability and College Drinking

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## Abstract

This study evaluates the influence of Readiness to Change (RTC) and gender in the relationship between Social Desirability (SD) and drinking among college students. Need to avoid social disapproval may lead to underreporting of stigmatized behavior and as such, we expected that SD would negatively associate with drinking. Further, we sought to facilitate understanding of mixed findings in the RTC literature by parsing out effects separately for the precontemplation, contemplation, and action stage, as measured via three validated subscales of the RTC questionnaire. Motivational enhancement efforts tend to focus on increasing RTC among drinkers in the precontemplation and contemplation stage as these individuals have not yet begun to engage in behavior change, and as such, we will focus on these two subscales. Based on the mixed literature, we hypothesized that RTC would be differentially associated with drinking for precontemplators and contemplators. Moreover, we considered gender and RTC as moderators of the effect of SD on drinking and expected that moderating effects would be different for precontemplators relative to contemplators. Participants included 676 undergraduate students (M age=22.92, SD=5.43, 82.44% female). Findings supported predictions. RTC was differentially associated with drinking; for precontemplators, RTC negatively predicted drinking, whereas for contemplators RTC positively predicted drinking, and effects were different for each gender. Hierarchical regressions revealed multiple two- and three-way interactions between RTC, SD, and gender in predicting drinking. Implications of results are discussed.

**Keywords:** Bias; Alcohol; Social desirability; Readiness to change

## Faking good

A closer look at readiness to change in the relationship between social desirability and drinking among young adults

## College drinking

Reducing drinking prevalence among undergraduates is a primary public health goal [1-4]. Most undergraduate students are not of legal drinking age (21 in the U.S.), however, problematic drinking is often reported between ages 18-21 [5]. The literature suggests that college students report heavy drinking at higher prevalence rates relative to non-college peers [6]. Additionally, almost 80% of undergraduate students report drinking alcohol [7]. About 44% drink more than five drinks on one occasion and therefore meet heavy drinking criteria [4,8-12]. Undergraduate alcohol users are more likely to experience unwanted problems including problems with authorities (e.g., DUI), psychosocial problems, hangovers, poor general health, depression, injuries, eating disorders, risky sexual behavior, and sexual assault [8,12-20]. Furthermore, although about 20% of undergraduate students meet alcohol abuse or dependence criteria, less than 5% seek counseling or treatment for alcohol-related problems (NIAAA, 2007). Thus, further research is needed in order to better understand factors that might buffer against problematic drinking and associated health problems among college students.

## Social desirability

Social Desirability (SD) is described as the tendency to give overly positive descriptions of one-self [21], and it has been studied in the context of problematic alcohol use [22]. SD can be observed in individuals who seek to present themselves in a socially desirable way that might emphasize or exaggerate desirable traits including honorability and trustworthiness while mitigating undesirable traits including jealousy or anger [1]. Individuals who exhibit high SD might be likely to exaggerate intellectual abilities, social status, egotistical

tendencies, and emotional stability. These individuals may tend to have a narcissistic presentation style and might have unrealistically positive self-perceptions. Further, individuals high in SD might tend to mitigate undesired or deviant aspects of themselves by presenting themselves as highly virtuous. They might also exaggerate their dutifulness, restraint, and moral and ethical strength in order to avoid defacement or negative perceptions from others.

Theoretical perspectives that drive the exploration of SD have suggested that the use of concurrent psychological assessments and clinical interviews might provide evidence for validity of results [21]. Many researchers acknowledge that self-reported measures are susceptible to SD and the validity of data can be subsequently impacted. Computer administration of assessment materials are shown to facilitate mitigation of SD's effects as they are linked with a sense of anonymity and disinhibition which encourages accurate reporting of drinking [23]. Some research also suggests that rather than SD being a response style that is purely situationally determined, SD might represent an underlying personality or individual difference trait [24,25], and if this is the case, SD may not undermine self-report validity.

SD has received considerably little attention in alcohol research. Of the studies that have evaluated SD, many have shown that SD

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considerably affects responses to substance use questions [26-28]. SD and conceptually related constructs have been shown to negatively predict self-reported drinking and drug use [22,29-31]. Establishing that individuals are biased in responses to drinking questions may have little relevance for researchers seeking to better understand how to increase efficacy of alcohol interventions. However, understanding how response biases are affected by an individual's motivation or readiness to engage in behavior change in the prediction of drinking may be important in understanding how to increase intervention efficacy.

## Readiness to change

Readiness to Change (RTC) is described as eagerness or resolve to enter into behavior change [32]. RTC is a central component of the stages of change [33], which are a central construct of the Transtheoretical Model (TTM), a model that considers how individuals change problem behaviors [34]. The RTC and college drinking literature have indicated mixed findings [35]. Cross-sectional studies have evinced positive correlations between RTC and drinking outcomes among college students [36-38]. However, findings from longitudinal studies evaluating RTC as a predictor of college drinking have been mixed. RTC has been shown to negatively associate with intention to drink and drinking outcomes [39] and has also been shown to positively predict longitudinal drinking outcomes [40]. RTC has further been shown to moderate the efficacy of a motivational enhancement intervention such that RTC was negatively associated with drinking among those who received the intervention [41]. A review of three college drinking studies showed a positive link between brief interventions and RTC, however this association did not emerge between RTC and drinking variables after treatment effects were controlled [42].

A potential explanation for these mixed findings relates to individual difference factors that might have an influential role. On the one hand, awareness or realizations that one's drinking is a problem and social stigma associated with heavy alcohol use might cause individuals high in SD to exaggerate their readiness to reduce drinking. On the other hand, these same stigmas might cause individuals high in SD to mitigate or underreport their drinking levels or problems. A recent study [31] evaluated similar concepts and found evidence that SD affected self-reported stage of change and alcohol treatment attendance suggesting that SD might be a source of motivation to continue in treatment [31,43]. The college context is known to be entwined with social pressures for drinking, and these pressures may have differential impact on an individual high in SD who seeks to represent him/herself in the best possible light. This person might engage in drinking in order to forestall negative social repercussions, or they might resist drinking with hopes of seeming moral and upstanding to others. RTC might have some buffering effect against heavy drinking for these individuals, however, it is possible that this protective effect might be more salient among individuals who recognize that their drinking might be a problem (e.g., contemplators) and less so among individuals who are not yet ready to admit that they have a problem (e.g., precontemplators). It stands to reason that a person who is concerned about how others perceive them (high SD) might only drink less if they are high in readiness to reduce drinking. By the same token, it might be the case that an individual who is not as concerned with how others perceive him or her (low SD) might be more sensitive to the experience of readiness or motivation to reduce drinking, and thus may drink less if they are high in RTC. Therefore, an individual's RTC might have differential impact on the relationship between SD and drinking depending on whether the individual is a precontemplator (under aware that they have an alcohol problem, even if it is evident

to friends or family) versus a contemplator (aware that they have an alcohol problem but not yet committed to changing). Thus, readiness to reduce alcohol use might have a more complex role in the relationship between SD and drinking.

## Current study

This study evaluates the influence of RTC in the relationship between SD and drinking among college students. Need to avoid social disapproval may lead to underreporting of stigmatized behavior and as such, we expected that SD, captured via SD questionnaire [1], would negatively associate with drinking. Further, we sought to facilitate understanding of mixed findings in the RTC literature by parsing out effects separately for the precontemplation, contemplation, and action stage, as measured via three validated subscales of the RTC questionnaire [2]. Motivational enhancement efforts tend to focus on increasing RTC among drinkers in the precontemplation and contemplation stage [3] as these individuals have not yet begun to engage in behavior change, and as such, we will focus on these two subscales. Thus, precontemplators and contemplators comprise a high priority population for our efforts and are in greater need of effective interventions relative to individuals who have already begun to make behavior change [44]. Based on the mixed literature, we hypothesized that RTC would be differentially associated with drinking for precontemplators and contemplators. Moreover, we considered RTC as a moderator of the effect of SD on drinking and expected that RTC's moderating effect would be different for precontemplators relative to contemplators.

## Participants and procedure

The current research included 676 participants (M age=22.92, SD=5.43, 82.44% female) from a large southern university (total student body N =39,820 in 2011) who completed study material as part of a larger intervention. Data were evaluated at the baseline assessment of the longitudinal experiment. Participants were recruited via announcements in classrooms and flyers placed around campus. They received extra credit in exchange for participation. Participants self-reported the following races: 34% Caucasian, 19% Black/African American, 20.6% Asian/Pacific Islander, 6% Multi-Ethnic, 0.4% Native American/American Indian, and 20% Other. Additionally, 30% of participants reported as Hispanic/Latino.

## Measures

### Demographics

Participants reported information including age, race, gender, ethnicity, and year in school.

### Alcohol use

Alcohol consumption was measured using the Quantity/Frequency Scale [45,46]. The QF consists of five items that assess the number of drinks and the number of hours spent drinking on a peak drinking event within the previous month. The QF asks participants to report the number of days out of the month where alcohol was consumed (0=I do not drink at all, 1=about once per month, 2=two to three times a month, 3=once or twice per week, 4=three to four times per week, 5=almost every day, or 6=I drink once daily or more). Drinking was also measured using the Daily Drinking Questionnaire [47,48], which assesses the number of standard drinks consumed on each day of the week (Monday-Sunday) within the previous three months. Scores represent the average number of alcoholic beverages consumed each week.

### Alcohol-related problems

The Rutgers Alcohol Problem Index [49] consists of 25-items that assess undesired alcohol-related consequence in the past month. Responses range from Never (0) to 10 times or more (4). Items are rated based on how many times each problem occurred while drinking (e.g., “Went to school high or drunk”) [49].

### Social desirability

Social desirability was measured with the Marlowe Crowne Social Desirability Scale (MCSDS) [1]. The MCSDS is a 33-item questionnaire which uses a True/False response format. Total scores range from zero (low) to 33 (high SD; Cronbach’s α=.98).

### Readiness to change

The Readiness to Change Questionnaire (RTCQ) [2] was used to rate level of agreement with 12 items containing statements about how individuals feel about their current drinking. Participants responded on a 5-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree) to items including “I should cut down on my drinking” and “My drinking is a problem.” Items measure ambivalence, recognition of an alcohol problem, and active attempts to change drinking. The RTCQ consists of three validated scales: precontemplation α=.58, contemplation α=.80 and action α=.81.

## Results

### Descriptive

Means, standard deviations, and correlations for all of the variables are presented in Table 1. SD was negatively correlated with drinking frequency and alcohol problems but was not significantly associated with drinks per week, peak drinking, RTC, or gender. Precontemplation RTC was negatively correlated with all drinking variables but was not linked with gender. Contemplation and action RTC were positively correlated with all drinking variables and gender; however they were negatively correlated with precontemplation RTC. All drinking variables were positively correlated with each other and gender, with the exception of problems, which was marginally and positively associated with gender (Table 1).

### Primary analyses

We conducted multiple hierarchical regressions to evaluate

associations between SD, RTC, and drinking. Regression models included SD and RTC (precontemplation, contemplation, or action) as Independent Variables (IV’s) and drinking outcomes (peak drinks, drinking frequency, drinks per week, and alcohol-related problems) as independent variables. Main effects were evaluated at Step 1. SD negatively predicted drinking frequency and problems when controlling for contemplation RTC, and contemplation RTC positively predicted all drinking variables. Two-way products were evaluated at Step 2. A significant interaction emerged between SD and precontemplation RTC in predicting drinking frequency and between SD and contemplation RTC in predicting problems.

We then re-ran analyses with gender added to the regression model in order to explore whether gender differences existed in these relationships (Tables 2 and 3). Gender was dummy coded such that females received a 0 and males received a 1, therefore positive coefficients indicated that males drank more or had more alcohol problems relative to females. Main effects were evaluated at Step 1, two-way product terms at Step 2, and three-way interactions at Step 3. When precontemplation RTC was entered into the model at Step 1 (along with SD and gender), there were negative main effects for precontemplation RTC on all drinking outcomes. There were also negative effects of SD on drinking outcomes (except for peak drinking). At Step 2, there was a significant interaction between SD and precontemplation RTC in predicting drinking frequency (Figure 1) and marginal interactions predicting drinks per week and problems. At Step 3, a marginal three-way interaction emerged between SD, precontemplation RTC, and gender in predicting drinking frequency.

When contemplation RTC was entered into the model at Step 1 (along with SD and gender), there were positive effects of contemplation RTC on all drinking outcomes. There were also negative effects of SD on drinking frequency and problems but not peak drinks or drinks per week. At Step 2, there were marginally significant interactions between SD and contemplation RTC in predicting drinking frequency and problems. Multiple significant three-way interactions emerged between SD, contemplation RTC, and gender in predicting peak drinks, drinking frequency, and drinks per week (Figure 2). This indicates that gender may play an important role in relationships among RTC, SD, and drinking.

It is worth noting that analyses were re-run to evaluate whether a general RTC score provided better predictive validity than using a

|                 | 1.     | 2.       | 3.      | 4.      | 5.      | 6.      | 7.      | 8.     | 9.   |
|-----------------|--------|----------|---------|---------|---------|---------|---------|--------|------|
| 1.SocDesir      | --     |          |         |         |         |         |         |        |      |
| 2.RTC Pre       | -0.03  | --       |         |         |         |         |         |        |      |
| 3.RTC Con       | -0.03  | -0.29*** | --      |         |         |         |         |        |      |
| 4.RTC Act       | 0.002  | -0.20*** | 0.65*** | --      |         |         |         |        |      |
| 5.Peak Drink    | -0.02  | -0.21*** | 0.39*** | 0.14*** | --      |         |         |        |      |
| 6.Drinking Freq | -0.08* | -0.21*** | 0.36*** | 0.08*   | 0.73*** | --      |         |        |      |
| 7.Drinks per Wk | -0.06  | -0.25*** | 0.41*** | 0.14*** | 0.71*** | 0.67*** | --      |        |      |
| 8.AlcProbs      | -0.08* | -0.19*** | 0.42*** | 0.24*** | 0.40*** | 0.34*** | 0.41*** | --     |      |
| 9.Gender        | 0.03   | -0.05    | 0.12*** | 0.09*   | 0.12**  | 0.08*   | 0.15*** | 0.06†  | --   |
| Mean            | 15.74  | 3.31     | 2.12    | 2.57    | 3.26    | 2.98    | 3.94    | 29.28  | 0.17 |
| Std Dev         | 5.60   | 0.87     | 0.98    | 1.06    | 3.61    | 2.66    | 6.17    | 8.67   | 0.38 |
| Min             | 0.00   | 1.00     | 1.00    | 1.00    | 0.00    | 0.00    | 0.00    | 25.00  | 0.00 |
| Max             | 31.00  | 5.00     | 5.00    | 5.00    | 21.00   | 11.00   | 58.00   | 125.00 | 1.00 |

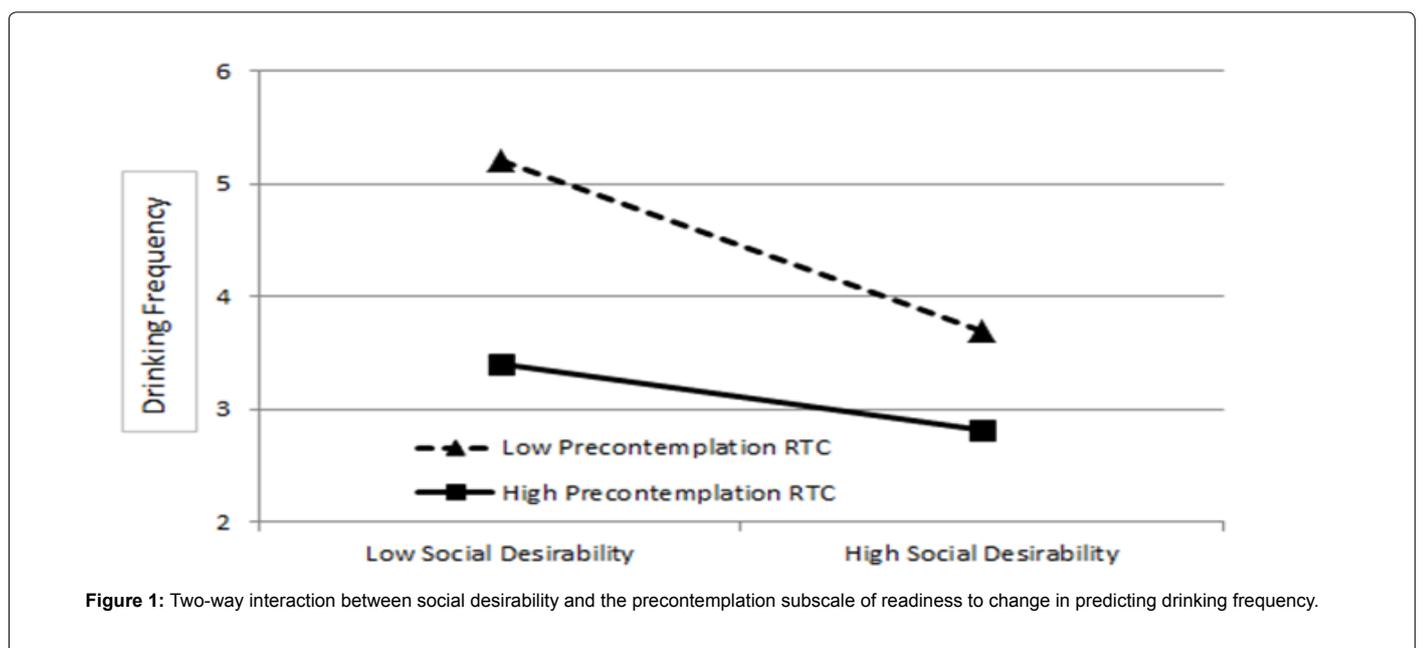
Note: N= 676 \*\*\*p< .001, \*\* p< .01, \* p< .05

Table 1: Means, Standard Deviations, and Correlations among Variables.

|                          |                 | Predictor  | B     | SE B | t     | β        |
|--------------------------|-----------------|------------|-------|------|-------|----------|
| Peak drinks              | Step 1          | SD         | -0.02 | 0.02 | -0.76 | -0.03    |
|                          |                 | PRTC       | -0.88 | 0.15 | -5.76 | -0.21*** |
|                          |                 | SEX        | 1.00  | 0.35 | 2.84  | 0.11**   |
|                          | Step 2          | SD * PRTC  | 0.04  | 0.03 | 1.57  | 0.28     |
|                          |                 | SD * SEX   | 0.07  | 0.07 | 1.09  | 0.13     |
|                          |                 | PRTC * SEX | -1.00 | 0.39 | -2.52 | -0.36*   |
| Step 3                   | SD * PRTC * SEX | 0.08       | 0.07  | 1.21 | 0.48  |          |
|                          |                 |            |       |      |       |          |
|                          |                 |            |       |      |       |          |
| Drinking frequency       | Step 1          | SD         | -0.04 | 0.02 | -2.38 | -0.09*   |
|                          |                 | PRTC       | -0.65 | 0.11 | -5.74 | -0.21*** |
|                          |                 | SEX        | 0.49  | 0.26 | 1.87  | 0.07†    |
|                          | Step 2          | SD * PRTC  | 0.04  | 0.02 | 2.20  | 0.39*    |
|                          |                 | SD * SEX   | 0.03  | 0.05 | 0.62  | 0.07     |
|                          |                 | PRTC * SEX | -0.74 | 0.29 | -2.54 | -0.36*   |
| Step 3                   | SD * PRTC * SEX | 0.09       | 0.05  | 1.78 | 0.71† |          |
|                          |                 |            |       |      |       |          |
|                          |                 |            |       |      |       |          |
| Drinks per week          | Step 1          | SD         | -0.08 | 0.04 | -2.00 | -0.07*   |
|                          |                 | PRTC       | -1.77 | 0.26 | -6.83 | -0.25*** |
|                          |                 | SEX        | 2.19  | 0.59 | 3.68  | 0.14***  |
|                          | Step 2          | SD * PRTC  | 0.08  | 0.05 | 1.67  | 0.29†    |
|                          |                 | SD * SEX   | -0.04 | 0.11 | -0.39 | -0.04    |
|                          |                 | PRTC * SEX | -2.85 | 0.66 | -4.33 | -0.60*** |
| Step 3                   | SD * PRTC * SEX | 0.02       | 0.11  | 0.22 | 0.09  |          |
|                          |                 |            |       |      |       |          |
|                          |                 |            |       |      |       |          |
| Alcohol-related problems | Step 1          | SD         | -0.14 | 0.06 | -2.43 | -0.09*   |
|                          |                 | PRTC       | -1.90 | 0.37 | -5.11 | -0.19*** |
|                          |                 | SEX        | 1.30  | 0.85 | 1.52  | 0.06     |
|                          | Step 2          | SD * PRTC  | 0.12  | 0.07 | 1.88  | 0.34†    |
|                          |                 | SD * SEX   | -0.54 | 0.16 | -3.44 | -0.41*** |
|                          |                 | PRTC * SEX | -0.67 | 0.95 | -0.71 | -0.10    |
| Step 3                   | SD * PRTC * SEX | 0.23       | 0.16  | 1.40 | 0.56  |          |
|                          |                 |            |       |      |       |          |
|                          |                 |            |       |      |       |          |

Note: N= 676\*\*\*  $p < .001$  \*\*  $p < .01$  \*  $p < .05$ . †  $p < .10$

**Table 2:** Hierarchical regression analysis for variables predicting drinking variables from Social Desirability (SD), the “precontemplation” subscale of the Readiness to Change (PRTC), and gender (SEX).



**Figure 1:** Two-way interaction between social desirability and the precontemplation subscale of readiness to change in predicting drinking frequency.

|                          |                 | Predictor  | B     | SE B  | t      | β       |
|--------------------------|-----------------|------------|-------|-------|--------|---------|
| Peak drinks              | Step 1          | SD         | -0.01 | 0.02  | -0.26  | -0.01   |
|                          |                 | CRTC       | 1.40  | 0.13  | 10.62  | 0.38*** |
|                          |                 | SEX        | 0.67  | 0.34  | 1.99   | 0.07*   |
|                          | Step 2          | SD * CRTC  | -0.01 | 0.02  | -0.60  | -0.08   |
|                          |                 | SD * SEX   | 0.14  | 0.06  | 2.25   | 0.25*   |
|                          |                 | CRTC * SEX | 1.17  | 0.32  | 3.67   | 0.33*** |
| Step 3                   | SD * CRTC * SEX | 0.17       | 0.06  | 2.98  | 0.79** |         |
| Drinking frequency       | Step 1          | SD         | -0.03 | 0.02  | -2.00  | -0.07*  |
|                          |                 | CRTC       | 0.95  | 0.10  | 9.72   | 0.35*** |
|                          |                 | SEX        | 0.27  | 0.25  | 1.07   | 0.04    |
|                          | Step 2          | SD * CRTC  | -0.03 | 0.02  | -1.68  | -0.22†  |
|                          |                 | SD * SEX   | 0.09  | 0.05  | 1.84   | 0.21†   |
|                          |                 | CRTC * SEX | 0.55  | 0.25  | 2.29   | 0.21*   |
| Step 3                   | SD * CRTC * SEX | 0.12       | 0.04  | 2.87  | 0.78** |         |
| Drinks per week          | Step 1          | SD         | -0.06 | 0.04  | -1.50  | -0.05   |
|                          |                 | CRTC       | 2.51  | 0.22  | 11.35  | 0.40*** |
|                          |                 | SEX        | 1.61  | 0.57  | 2.82   | 0.10**  |
|                          | Step 2          | SD * CRTC  | 0.04  | 0.04  | -0.88  | -0.11   |
|                          |                 | SD * SEX   | 0.12  | 0.10  | 1.14   | 0.13    |
|                          |                 | CRTC * SEX | 2.29  | 0.54  | 4.26   | 0.38*** |
| Step 3                   | SD * CRTC * SEX | 0.27       | 0.09  | 2.89  | 0.75** |         |
| Alcohol-related problems | Step 1          | SD         | -0.11 | 0.05  | -2.03  | -0.07*  |
|                          |                 | CRTC       | 3.68  | 0.31  | 11.83  | 0.42*** |
|                          |                 | SEX        | 0.35  | 0.80  | 0.43   | 0.02    |
|                          | Step 2          | SD * CRTC  | -0.10 | 0.06  | -1.74  | -0.22†  |
|                          |                 | SD * SEX   | -0.42 | 0.15  | -2.85  | -0.32** |
|                          |                 | CRTC * SEX | 0.01  | 0.76  | 0.01   | 0.001   |
| Step 3                   | SD * CRTC * SEX | -0.02      | 0.13  | -0.22 | -0.06  |         |

Note: N= 676\*\*\* p <.001 \*\* p <.01\* p< .05. † p< .10

**Table 3:** Hierarchical regression analysis for variables predicting drinking variables from Social Desirability (SD), the “contemplation” subscale of the Readiness To Change (CRTC), and gender (SEX).

parsed contemplation or precontemplation score. In doing so, RTC items associated with precontemplation were reverse-coded and added to the contemplation and action scores to create a continuous RTC score. No three-way interaction emerged at Step 3.

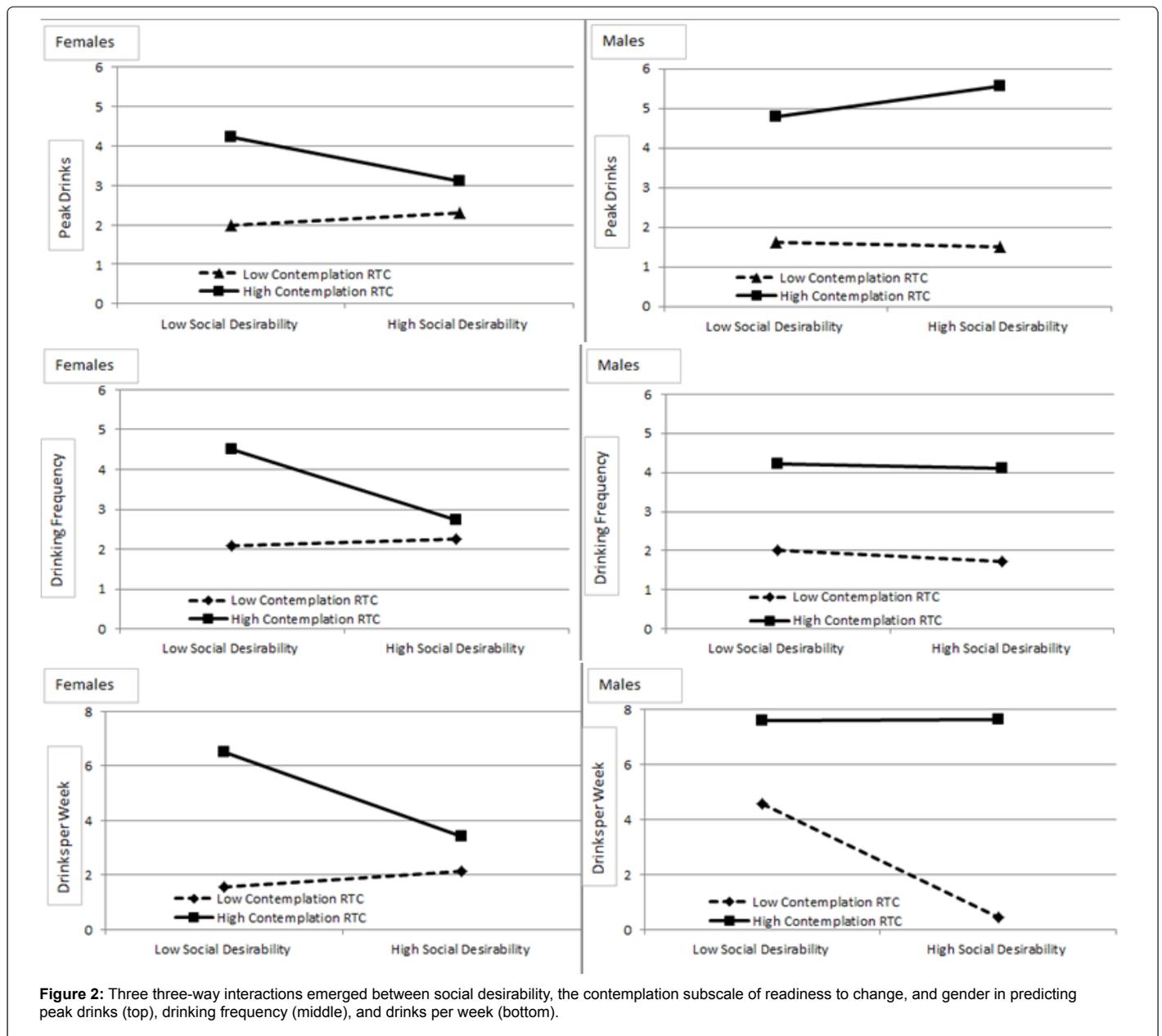
The interactions were graphed using SAS. Parameter estimates from the regression equation were used such that low and high values were specified as one standard deviation below and above their respective means [50].

## Discussion

This study evaluated the differential influence of precontemplation and contemplation RTC in the relationship between SD and drinking among college students. Based on previous research [22,29-31], we expected that SD would negatively associate with drinking. We found support for this expectation in that SD was negatively correlated with drinking frequency and alcohol problems. Further, SD negatively predicted frequency and problems when controlling for contemplation or precontemplation RTC and negatively predicted drinks per week when controlling for the latter. These findings emerged whether gender was included as a covariate or not and suggest that the higher an individual is in SD, the more likely they are to underreport drinking behavior. This provides additional support for the perspective that individuals high in SD may tend to mitigate undesired or deviant

aspects of themselves, and as such, may lead to the downplaying of problematic drinking.

We also sought to better understand sources for mixed findings in the RTC literature [35] by parsing out effects separately for the pre contemplation and contemplation aspects of RTC. Motivational enhancement efforts tend to focus on increasing readiness to reduce problematic alcohol consumption among drinkers in the precontemplation and contemplation stages [3]. We evaluated the RTC subscales separately and found that precontemplation negatively predicted all drinking variables, whereas contemplation positively predicted all drinking variables (Tables 1-3). This is consistent with theoretical suggestions that contemplators are “further along” the stages of change relative to pre contemplators, and therefore they may be able to accurately identify their drinking as problematic. Thus, rather than underreport drinking levels, contemplators might be likely to report more accurate drinking levels based on increased cognizance or awareness of a problem, and decreased denial. In contrast, pre contemplators are described as having no intention to reduce their drinking and can stay in this stage due to under-awareness that their drinking is a problem, or unwillingness to take risk-reducing action [2]. Based on this under-awareness that their drinking is problematic, pre contemplators might underreport their drinking, and it is possible that this stems from a lack of cognizance or misperceptions regarding



problems. Research shows that individuals who are not able to maintain changes in behavior often find it hard to identify risky drinking situations and elicit risk-reduction behavioral strategies within these situations [51]. Simply put, either the precontemplators in our sample were in denial about their drinking and thus under-reported drinking levels, or they genuinely did not have a drinking problem (e.g., light or moderate drinkers may not feel that they need to cut down on drinking). Our findings underscore differences in precontemplators and contemplators with respect to alcohol use and demonstrate differential associations with drinking. This provides some evidence for parsing out RTC into its sub-categories (precontemplation, contemplation, and action) rather than solely evaluating a global RTC score. These findings may facilitate understanding of potential sources for mixed findings in the RTC literature.

Furthermore, we considered RTC as a moderator of the effect of

SD on drinking and expected that RTC's moderating effect would be different for precontemplators relative to contemplators. Consistent with expectations, SD and RTC (particularly, the precontemplation aspect) interacted in predicting drinking frequency. This interaction suggests that SD was negatively associated with drinking frequency, and this negative relationship was stronger among those low in precontemplation (e.g., those who may not be in the precontemplation stage). Regardless of SD level, non-precontemplators (e.g., those low in precontemplation) appeared to be at higher risk for drinking more frequently relative to precontemplators (e.g., those low in precontemplation). Consistent with previously discussed rationale, either precontemplators under-reported drinking levels (e.g., they are in denial), or they genuinely do not have a drinking problem (e.g., light drinkers).

Our expectations regarding the moderating role of RTC were

not supported when evaluating interactions between SD and the contemplation aspect of RTC. We included gender in the model to explore whether differences in the interaction would emerge between males and females and found multiple significant three-way interactions between SD, contemplation RTC, and gender in predicting drinking. Generally, these demonstrate that for both males and females, being high in the contemplation aspect of RTC was associated with higher drinking levels relative to being low in contemplation. Furthermore, the interactions demonstrate that SD was negatively associated with drinking, particularly among females high in contemplation. This indicates that females who are concerned about presenting themselves favorably (i.e., high in SD) and perceive a need for changing their drinking behavior (i.e., high in contemplation) might be motivated to drink less relative to female contemplators who are not concerned about mitigating potentially stigmatizing behavior such as alcohol use. SD appeared to be more influential among females relative to males indicating that females might be more likely to modify responses to be more in line with perceptions of accepted social mores. These findings provide support for considering gender differences in motivational factors leading to drinking. Previous research investigating gender effects indicate that males may be more influenced relative to females by variations in survey conditions (e.g., interviewer gender, wording) [52] and suggest that a sense of anonymity of disinhibition created by computerized survey settings might impact males to a greater extent than females [23]. Females high in SD and contemplation might be more cognizant of social stigma associated with heavy drinking and may be unwilling to be perceived as irresponsible or defensive about having a “partier” reputation. Thus, these females might either strive to reduce drinking levels or might underreport their drinking. This relationship was not evinced among males, which might suggest that males are either less aware of social stigma associated with heavy drinking or are less impacted by awareness of it. Therefore, males may drink more (or report more drinks) believing that alcohol might enhance their social image [53]. This would be consistent with the self-presentation perspective [54,55] and deviance regulation theory which suggests that individuals are more likely to engage in behaviors that will “stick” to their identity in favorable ways and avoid behaviors that might stick in unfavorable ways. Based on social stigma related to heavy drinking, it is possible that alcohol use might be differentially categorized by genders as a favorable or unfavorable behavior that sticks to the identity.

It is worth noting that we re-ran analyses to evaluate whether a general RTC score provided better predictive validity than using parsed contemplation or precontemplation scores separately [56,57]. We created a continuous RTC score which combined the precontemplation, contemplation, and action subscales into one composite score representing RTC. Results using this general RTC score revealed no significant three-way interactions between RTC, SD, and gender. This further highlights the importance of considering RTC aspects separately rather than collapsing them into one global RTC score. The present study’s unique contribution to the motivational literature is to demonstrate that evaluating separate aspects of RTC and gender in the relationship between SD and drinking adds layers of complexity worth considering in interventions targeting problem drinking.

## Limitations and future directions

The strengths of this study should be considered in light of the weaknesses. Using cross-sectional samples has limitations related to causal inferences, and as such, we are inhibited in abilities to deduce whether increased SD leads to decreased drinking or whether RTC

temporally predicts drinking. Relatedly, our conclusions related to gender differences should be considered in light of the high proportion of females relative to males in the sample [58,59]. Future studies might consider incorporating longitudinal assessments to address causal implications. Moreover, we did not exclude abstainers, light, or moderate drinkers from this study, and therefore, our sample includes drinkers at every level. It is possible that potentially significant associations were mitigated by the presence of abstainers and light drinkers and those findings would emerge in samples comprised of heavy drinkers. The present research explored associations between individual factors involved in drinking. We expected that SD would negatively associate with drinking and results supported our expectation. Future research is needed to better understand potential key reasons that may explain this association. One avenue for future research is to explore the role of stress or depression in this relationship, and whether potential mediators exist.

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