



## Sex differences in the effects of disinhibition, perceived peer drinking, and delay discounting on drinking among Japanese college students

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### ARTICLE INFO

#### Article history:

Received 13 February 2013  
Received in revised form 2 June 2013  
Accepted 12 June 2013  
Available online 8 July 2013

#### Keywords:

Sensation seeking  
Peer influence  
Delay discounting rate  
Alcohol consumption

### ABSTRACT

Disinhibition, perceived peer drinking, and delay discounting are considered significant predictors of drinking in young adults. This study examined whether perceived peer drinking and delay discounting mediate the association between disinhibition and drinking for young men and women. In this study, 258 Japanese college students (109 men and 149 women, mean age 19.17 (SD = 1.20) years old) completed a self-administered questionnaire that included four measures—the disinhibition subscale of the Sensation Seeking Scale for Japanese Adolescents, the proportion of friends who drink as an index of perceived peer drinking behaviors, the Monetary Choice Questionnaire, and participants' own drinking behavior. In the multiple mediator models analyzed using structural equation modeling, for both sexes, perceived peer drinking had the largest direct effect on participants' drinking, followed by disinhibition and delay discounting. However, the results of mediation analyses indicated that perceived peer drinking mediated the association between disinhibition and drinking for only women. The results of this study imply that it is important to consider sex differences in the association between personality traits and peer influence to develop programs aiming to reduce drinking among young adults in Japan.

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### 1. Introduction

Young people often find drinking enjoyable for social reasons such as the lively conversations with peers that often occur in situations when alcohol is present. Although non-white people consume less alcohol than do white people (Kahler, Read, Wood, & Palfai, 2003), as in the United States, young adults, especially men, in Japan typically consume larger amounts of alcohol than do other age groups (Ministry of Health, Labour and Welfare, 2006). Because drinking can cause serious health and social problems (e.g., Harrison & Fillmore, 2011; Kinjo et al., 1998), understanding the factors that lead to heavy drinking in young adults is an urgent issue in Japan. Recently, researchers examining drinking behaviors among young adults have focused on three significant predictors of drinking: disinhibition (a subscale of sensation seeking), perceived peer drinking, and delay discounting (e.g., Daugherty & Brase, 2010; Glazer, Smith, Atkin, & Hamel, 2010; Hittner & Swickert, 2006). Although the results of these studies are useful for developing drinking prevention programs for young adults in general, we do not yet know how these predictors relate to drinking behaviors in Japanese young adults. Therefore, this study examined the interrelationships among these

predictors and their effects on the drinking behaviors of young Japanese men and women.

#### 1.1. Sensation seeking

Sensation seeking is a known predictor of drinking. Sensation seeking, a personality trait related to individual differences in the optimal level of arousal, is defined as “the seeking of varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience” (Zuckerman, 2007, p. 49). Most previous research has used the General Sensation Seeking Scale (GSS), a total score of the sensation seeking scale, to examine the association between sensation seeking and drinking. Disinhibition is one of the subscale of the sensation seeking scale and is defined as “the desire for social and sexual disinhibition as expressed in social drinking, partying, and variety in sexual partners” (Zuckerman, Eysenck, & Eysenck, 1978, p. 140). Zuckerman (2007) excluded items related to drinking from subscale scores when examining the relationship between disinhibition and drinking and reported that disinhibition also has a strong relationship to other risk-taking behaviors including drinking. Previous studies have suggested that high disinhibition scores (Clapper, Martin, & Clifford, 1994) and high GSS scores (Romer, Duckworth, Sznitman, & Park, 2010) are related to heavier drinking among college students. Recently, however, the

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effect of disinhibition on drinking has received particular attention since Hittner and Swickert (2006) reported that disinhibition had a stronger relationship to drinking than did GSS scores. The significance of disinhibition as a predictor of drinking has been reported by researchers using behavioral measures of disinhibition (Murphy & Garavan, 2011; Reed, Levin, & Evans, 2012). In addition, it was found that men had larger disinhibition scores than women did (Shibata, 2008; Zuckerman et al., 1978), and that the effect of GSS on drinking was larger for men than for women (Ham & Hope, 2003).

### 1.2. Perceived peer drinking

It is widely acknowledged that the attitudes and behaviors of the group explicitly and implicitly influence individuals' behaviors (Cialdini & Trost, 1998). Peers are typically the most important reference group for young adults (Perkins, 2002); young adults regard their peers' attitudes and drinking behaviors as normative. Research has shown, for example, that college students with peers who drink heavily tend to drink more heavily compared to students with fewer peers who drink heavily (Glazer et al., 2010; Yanovitzky, 2006). It was found that men typically had more friends who drink than women did (Ando, 2010; Page, Ihasz, Hantiu, Simonek, & Klarova, 2008), and that the effect of perceived peer drinking on drinking was larger for women than for men (Dick et al., 2007).

### 1.3. Delay discounting

Delay discounting is often utilized to examine the association between health-related risk-taking behaviors and impulsivity (Daugherty & Brase, 2010; Kirby, Petry, & Bickel, 1999). Delay discounting refers to the extent to which the subjective value of rewards changes with delay to their delivery. Higher delay discounting rates indicate that delay shifts preference toward smaller, immediate rewards rather than larger, delayed rewards (i.e., an impulsive choice pattern; Kirby et al., 1999). Daugherty and Brase (2010) have shown that college students with higher delay discounting rates often drink more heavily than do those with lower levels of delay discounting. In addition, Kirby and Maraković (1996) reported that men had higher delay discounting rate measured by the Monetary Choice Questionnaire than women did, and that the effect of delay discounting on drinking was larger for men than for women (Romer et al., 2010).

### 1.4. Interrelationships among predictors of drinking

Throughout the literature, disinhibition, perceived peer drinking, and delay discounting are commonly identified as significant predictors of drinking among young adults. Previous studies have revealed that perceived peer drinking has a greater effect on drinking behavior than GSS scores (Glazer et al., 2010; Horvath & Zuckerman, 1993), and that the effect of GSS on health-related risk-taking behaviors (including drinking, smoking, and illegal drug use) is larger than the effect of delay discounting (Romer et al., 2010). These findings suggest that perceived peer drinking has the largest effect on drinking behavior, followed by disinhibition and delay discounting, and further suggest that disinhibition indirectly influences drinking through perceived peer drinking and delay discounting. It has been proposed that individuals are not only affected by peers, but also that they select their peers (Donohew, Clayton, Skinner, & Colon, 1999; Kahler et al., 2003). Kahler et al. (2003) found that the effect of impulsive sensation seeking (a subscale of sensation seeking) on drinking was partially mediated by perceived peer drinking. This result suggests that individuals with high impulsive sensation seeking scores tend to

have friends who accept heavy drinking, and that individuals drink more heavily due to the perceived norms of their peer groups.

On the other hand, it is uncertain whether delay discounting mediates the association between disinhibition and drinking. Murphy and Garavan (2011) reported a significant correlation between behavioral disinhibition and delay discounting but Wilson and Daly (2006) reported a non-significant correlation between the GSS and delay discounting. In addition, sex differences in the mediation effect of delay discounting may exist. Although the significance of the indirect effect was not tested, Romer et al. (2010) reported that delay discounting mediated the relationship between GSS and health-related risk-taking behaviors (including drinking, smoking, and illegal drug use) for only men.

## 2. Goals of the current study

This study aimed to understand the interrelations among disinhibition, perceived peer drinking, delay discounting, and drinking among Japanese young adults, with a particular focus on whether disinhibition indirectly influences drinking through perceived peer drinking and delay discounting. Because very little research has simultaneously examined the effects of disinhibition, perceived peer drinking, and delay discounting on drinking, this study examined sex differences in the interrelations among these variables in Japanese young adults in an exploratory manner.

## 3. Materials and methods

### 3.1. Participants and procedure

Participants were college students in Japan recruited from introductory classes from the majors of psychology, sociology, and foreign languages. Participants were told that the survey included questions about alcohol consumption and that they could refuse to participate. Only the students who agreed with the survey completed the anonymous, self-administered questionnaire in their classrooms. All incomplete questionnaires were excluded from the analyses. The current study is based on the data obtained from 258 participants (109 men and 149 women; mean age 19.17 years (SD = 1.20; range: 18–25). The participants included 173 minors (67 men and 106 women) whose drinking was prohibited by law.

### 3.2. Measures

#### 3.2.1. Disinhibition

This study used the disinhibition (Dis) subscale of the Sensation Seeking Scale for Japanese Adolescents (SSS-JA; Shibata, 2008), a scale with demonstrated reliability and validity. The SSS-JA was based on the Sensation Seeking Scale, Form V (Zuckerman et al., 1978). The Dis subscale was used because it has been shown to have a stronger relationship with drinking than the other subscales or GSS scores of the Sensation Seeking Scale (Hittner & Swickert, 2006). The Dis subscale is composed of five items that measure social inhibition by asking about topics such as sexual behavior and did not include items about drinking. For the Dis subscale of the SSS-JA, participants are asked to rate each item on a four-point scale ranging from 1 "strongly disagree" to 4 "strongly agree." Following Shibata (2008), the Dis score was calculated by dividing the sum of item scores by the number of the items. Cronbach's alpha for Dis in this study was .68.

#### 3.2.2. Perceived peer drinking behaviors

Perceived peer drinking was measured by asking participants to estimate the prevalence of alcohol use among their friends (Ando,

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