Virginia Commonwealth University
VCU Scholars Compass

Theses and Dissertations | Graduate School

2019

CONSTRUCTION AND VALIDATION OF A NON-MEDICAL USE OF PRESCRIPTION OPIOIDS OUTCOME EXPECTANCIES SCALE AMONG COLLEGE STUDENTS IN CHINA

Cheuk Chi Tam

Follow this and additional works at: https://scholarscompass.vcu.edu/etd

 Part of the Behavior and Behavior Mechanisms Commons, Health Psychology Commons, and the Public Health Commons

© The Author

Downloaded from
https://scholarscompass.vcu.edu/etd/6009

This Dissertation is brought to you for free and open access by the Graduate School at VCU Scholars Compass. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of VCU Scholars Compass. For more information, please contact libcompass@vcu.edu.

CONSTRUCTION AND VALIDATION OF A NON-MEDICAL USE OF PRESCRIPTION OPIOIDS OUTCOME EXPECTANCIES SCALE AMONG COLLEGE STUDENTS IN CHINA

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

By: CHEUK CHI TAM
M.S. in Health Psychology
Virginia Commonwealth University, 2017

M.A. in Developmental Psychology
Beijing Normal University, 2012

Director: Eric G. Benotsch, Ph.D.
Associate Professor of Psychology
Department of Psychology

Acknowledgements

I have been very fortunate to receive a great deal of support during the process of completing this dissertation. First, I would like to say thank you to my advisor, Dr. Benotsch, for his advice, support, encouragement, knowledge, and professional guidance throughout my doctoral program. It is really my honor to be, and I am very proud of being, Dr. Benotsch's student. This dissertation study would never be succeeded without Dr. Benotsch's whole-hearted devotion and help. In addition, I would like to thank my other dissertation committee members, Dr. Paul Perrin, Dr. Ananda Amstatder, Dr. Caroline Cobb, and Dr. Dace Svikis for their insightful advice in the development of my dissertation study. I also would like to especially thank my Chinese colleagues, including Dr. Danhua Lin and Ms. Xiaolei Wang in Beijing Normal University, as well as Dr. Hongfei Du and Dr. Peilian Chi in University of Macau. I appreciate their assistance and guidance on the data collection. Without their great contributions, I would not have been able to successfully conduct this international research and collect data with high quality. Finally, I would like to thank my wife, Wei Wang, who always provides her unlimited support and her understanding throughout the study project. Wei is always my great companion and the most important source of love.

Table of Contents

Page

List of Tables

Page

List of Figures

Page

Abstract

CONSTRUCTION AND VALIDATION OF A NON-MEDICAL USE OF PRESCRIPTION OPIOIDS OUTCOME EXPECTANCIES SCALE AMONG COLLEGE STUDENTS IN CHINA

By Cheuk Chi Tam, M.S., M.A.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2019.

Major Director: Eric G. Benotsch, Ph.D.
Associate Professor of Psychology
Department of Psychology

Background: Non-medical use of prescription opioids (NMUPO) has become a clear threat to public health. Young adults (aged 18 to 25) have a high risk of NMUPO. My prior work on Chinese undergraduates indicates a high prevalence of lifetime NMUPO (49.2%). Health behavior theories propose that outcome expectancies are robust psychosocial determinants of substance use. Literature has identified the influence of outcome expectancies on alcohol and drug use. However, the role of outcome expectancies in NMUPO in China is unknown, and a scarcity of a valid measures for NMUPO outcome expectancies may be a barrier. Our previous research also found an association of cultural orientation with NMUPD in Chinese college students, implying that cultural orientation may affect NMUPD-related perceptions, such as outcome expectancies. The purposes of this study were to (1) conduct initial work to develop and

validate an NMUPO outcome expectancies scale (NMUPOES) for Chinese college students; (2) examine the association of cultural orientation with factors identified in NMUPOES. **Method:** Partial data (n = 202) derived from a bigger online dataset collected from 849 undergraduates (average age = 19.65) at two universities in Beijing and Macau in Jan-April 2017 was used in this study. Participants completed the NMUPOES and reported their past-3-month NMUPO and cultural orientation. Exploratory factor analysis, confirmatory factor analysis, and structural equation modeling were employed to test the study hypotheses. **Results:** Findings suggested four subscales in the 50-item NMUPOES (i.e., social enhancement and tension reduction, academic enhancement, physiological discomfort, and guilt and dependence) and two higher-order factors (i.e., positive expectancies and negative expectancies). All subscales were positively correlated and had good internal consistency. The negative expectancies scale was negatively associated with past-3-month NMUPO. No significant association was found between cultural orientation and the two expectancy factors. **Conclusion:** NMUPOES is a psychometrically appropriate measure of NMUPO expectancies for Chinese college students. Future research may validate the NMUPOES using a large sample size in both clinical and non-clinical populations in China. An intervention program tailored to outcome expectancies may be beneficial to reduce the risk of NMUPO in Chinese college students.

Construction and validation of non-medical use of prescription opioids outcome expectancies scale among college students in China

Introduction and background

Non-medical use of prescription drugs (NMUPD) occurs when people take prescription drugs that are traditionally utilized for managing pain or treating mental health symptoms but without approval from a physician (McCabe, Boyd, & Teter, 2009). The commonly misused prescription drugs can be divided into four classes, including opioids (e.g., OxyContin), sedatives (e.g., Ambien), anxiolytics (e.g., Ativan), and stimulants (e.g., Ritalin). NMUPD has become a global concern in the fields of public health and health science (Martins & Ghandour, 2017). International data indicates 26 to 36 million people worldwide engage in NMUPD (UNODC, 2012). NMUPD can lead to detrimental consequences, such as physical symptoms (e.g., irregular heart rate, hypertension, stroke, and respiratory suppression) (Martins & Ghandour, 2017; Upadhyaya et al., 2010). Non-medical use of prescription opioids (NMUPO) could induce additional risks to health. Comparing with other class of prescription drugs, opioids are more likely to lead to abuse and dependence (Colliver, Kroutil, Dai, & Gfroerer, 2006). NMUPO has been found to lead to heroin initiation (Muhuri, Gfroerer, & Davies, 2013). Existing literature also shows increased worldwide rates of fatalities due to overdoses of prescription opioids and overdose-related hospitalization (Martins, Sampson, Cerdá, & Galea, 2015).

Growing attention has been paid to NMUPO among young adults (aged 18 to 25). The United States (US) national data has indicated that young adults have a higher prevalence of NMUPO (7.1%) compared to other age groups (3.5%, younger aged individuals and 3.9% among adults 26 and over) (Substance Abuse and Mental Health Services Administration, 2017).

In addition, the trend of NMUPO among young adults has maintained a high level, with only a slightly decrease from 9.5% in 2013 to 7.1% in 2016 (Substance Abuse and Mental Health Services Administration, 2014, 2017). China has also been suffering from a threat of NMUPO, but only a handful of studies have addressed this issue in Chinese young adults. Data on Chinese high school students reveals that 7.5% to 11.3% of youths report lifetime NMUPO (Guo et al., 2015; Juan et al., 2015). Our prior work on Chinese college students found high rates of lifetime NMUPD in Beijing (62.9%) and Macau (35.9%), with opioids accounting for the vast majority of NMUPD (62.9% in Beijing, 35.5% in Macau) (Tam et al., 2018). In addition to high rates, the US and Chinese literature show young adults engaging in NMUPO were vulnerable to numerous negative outcomes such as college dropout, poor academic performance, poor employment outcomes following graduation, and health-jeopardizing behaviors (e.g., unprotected sex, driving under the influence, poly-substance use) and suicidal ideation and attempts (Arria et al., 2013; Benotsch, Koester, Luckman, Martin, & Cejka, 2011a; Benotsch et al., 2015; Juan et al., 2015). Hence, NMUPO among college students has become a clear threat to public health, and it is important to determine reasons and factors underlying NMUPO among college students in China.

Health behavior theories may provide valuable insights into psychosocial constructs associated with NMUPD in college students. The theory of planned behavior (TPB) proposes that an individual's expectation (or attitude) towards outcomes of behavior is one of the crucial determinants for shaping behavioral intentions and behaviors (Ajzen, 1991). Expectation towards behavior refers to an individual's beliefs about the consequences of a particular behavior, and it is based on the subjective belief of the behavior which would generate expected outcomes (Ajzen, 1991; Bandura, 1971). Following the concept of outcome expectancy, a large body of

literature has discussed the expected consequences of substance consumption and individuals' manner of consuming the substances that were believed to generate expected effects even though these expectancies may be inaccurate (Ilgen et al., 2011; Barry T. Jones, Corbin, & Fromme, 2001). Alcohol use research has found two general dimensions of outcome expectancies: positive and negative outcomes expectancies (Brown, Goldman, & Christiansen, 1985; Fromme & D'Amico, 2000; Nicolai, Moshagen, & Demmel, 2012; Oei & Morawska, 2004). Positive outcomes expectancies were found to be positively associated with frequency and quantity of alcohol consumption, while negative expectancies predicted abstinence and resistance to drinking (Brown et al., 1985; Jones & McMahon, 1996). Positive expectancies include social assertiveness (e.g., I am more relaxed socially), positive affect (e.g., I feel more happy), tension reduction (e.g., I am not tensed up anymore), cognitive enhancement (e.g., My thoughts would be able to stay on track better), and physical rewards (e.g., I can feel better physically), while negative expectancies include physical discomfort (e.g., I feel sick to my stomach) and cognitive impairment (e.g., I have difficulty concentrating) (Nicolai, Demmel, & Moshagen, 2010). Prior work on illicit drug use expectancy has identified additional negative expectancies related to guilt (e.g., I am disappointed in myself when smoking cannabis) (Aarons, Brown, Stice, & Coe, 2001). Research on expectancies has been applied to intervention studies which show effects in decreasing substance use behaviors among college students. For example, Lau-Barraco & Dunn (2008) developed an alcohol reduction intervention in line with an approach relevant to challenge positive expectancy on alcohol use. This intervention was found to effectively reduce the level of positive outcome expectancies and alcohol consumption among college students. These findings reveal the important role of outcome expectancy in substance use, implying that it

is worth determining the outcome expectancies specific to other substance use behavior, such as NMUPD.

Although only a handful of studies have addressed outcome expectancy on NMUPD, an initial effort has been made to explore motives associated with NMUPD in college students. According to Cooper (1994), the motivations for drinking can be generally divided into four dimensions, including social enhancement, cognitive enhancement, emotional improvement, and conformity. The US literature on NMUPD in college students has identified similar patterns of motivation to those of alcohol use, such as cognitive enhancement (e.g., help improve concentration), emotional enhancement motives (e.g., to get high and reduce school-related anxiety), and an additional motive of physical rewards (e.g., pain relief) (Parks et al., 2017). Similarly, our prior study found that common motives of NMUPD in Chinese college students were “pain relief”, “to help me sleep”, “concentration”, and “help me to decrease anxiety” (Tam et al., 2018). However, these motivation studies on NMUPO have two missing pieces. First, other motives specific to NMUPO may be missed by these studies, such as social enhancement. Existing literature has identified an expectancy of social enhancement (e.g., to be more humorous) for misusing prescription opioids among adults with substance use disorders (Ilgen et al., 2011), stating that people expect to relieve social stress and facilitate their social functioning after taking opioids. In addition, these motivation studies only addressed expected benefits of NMUPO (i.e., positive expectancies) but did not assess beliefs about negative consequences (i.e., negative expectancies). As mentioned above, outcome expectancy studies emphasized that individuals would develop two dimensions of expectancies, one focusing on perceived benefits and another one focusing on risk (e.g., Brown et al., 1985). To effectively assess outcome

expectancy and its influence on NMUPO in China, a valid measure of outcome expectancy for Chinese college students would be essential.

Studies on prescription drugs have developed and validated three measures of outcome expectancy associated with NMUPD in college students, but these measures primarily focus on stimulants and were developed in the US. Bavarian and colleagues (2013) developed a measure of expectancies related to illicit use of prescription stimulants, which is a subscale in a bigger questionnaire "Behaviors, Expectancies, Attitudes, and College Health Questionnaires" (BEACH-Q) for assessing intrapersonal, social, and environmental factors associated with nonmedical use of prescription stimulants in American college students. The expectancy measure in Bavarian et al. (2013) has 12 items and specifies two types of expectancies, including positive expectancies and negative expectancies. Positive expectancies involve motives about cognitive enhancement (e.g., concentrate/focus better; I stay awake for long time), academic performance (e.g., get better grades), and physical rewards (e.g., lose weight). Negative expectancies focus on physical discomfort (e.g., my heart would race) and emotional distress (e.g., feel anxious). These two expectancies measures (positive and negative) had good internal consistencies (αs > .79), but inadequate factorial validation according to confirmatory factor analysis (e.g., Comparative Fit Index [CFI] = .85 to .91; Root mean square error of approximation [RMSEA] = .19 to .23; suggested cut-off values for CFI > .90 and RMSEA < .05; Meyers et al., 2017). Consistent with the findings from alcohol studies (e.g., Brown et al., 1985; Jones & Mcmahon, 1994), positive expectancies were positively associated with nonmedical use of prescription stimulants and negative expectancies were negatively associated with nonmedical use of prescription stimulants.

The Stimulant Medication Outcome Expectancy Questionnaire (SMOEQ) is another measure developed for assessing expectancy of nonmedical use of prescription stimulants in US

college students (Labbe & Maisto, 2010). Similar to BEACH-Q, the 16-item SMOEQ measures expectancy in terms of cognitive enhancement, academic performance, and physiological discomfort. Items in this scale load into a three-factorial structure (i.e., academic factor, recreational factor, and physiological factor). Labbe and Maitso (2010) reported good internal consistencies on academic and recreational factors (αs > .81) but fair consistency on the physiological factor (α = .74). Confirmatory factor analysis suggested a modest structural validity of the SMOEQ (CFI = .91, Tucker-Lewis index [TLI] = .89, standardized root mean square residual [SRMSR] = .10; suggested cut-off for TLI > .90 and SRMSR < .05) (Meyers, Gamst, & Guarino, 2016). However, inconsistent with Bavarian et al. (2013), no association was found between these factors and nonmedical use of stimulants.

The third scale to assess stimulant-related expectancies in college students was developed by Looby & Earleywine (2010). The Prescription Stimulant Expectancy Questionnaire (PSEQ) has 46 items and involves expectancies about cognitive enhancement (e.g., my focus is crystal clear), anxiety and arousal (e.g., I get nervous and edgy), social enhancement (e.g., I feel more relaxed in social situations), and guilt and dependence (e.g., I worry about I'm addicted to it). Looby and Earleywine (2010) found a general good internal consistency for four factors (αs = .77 to .95). The PSEQ was found to differentiate among different stimulant misusers (i.e., nonusers, recreational users, and medical users). However, the PSEQ has not been tested for structural validity.

In addition to these measures of outcome expectancies for stimulant use developed in college students, NMUPD researchers have made attempts to assess NMUPO outcome expectancies using clinical samples in the US. Ilgen et al. (2011) developed a 40-item Pain Medication Expectancy Questionnaire (PMEQ) among adults treated for substance use disorders.

The PMEQ identified three domains of expectancies, including pleasure/social enhancement (e.g., want to be more humorous), pain reduction (e.g., want to feel less pain), and negative experience reduction (e.g., feel less frustrated). Ilgen and his colleagues found strong internal consistencies for three factors (αs > .90). Three factors were found to be positively correlated with NMUPO and mental health symptoms. However, this scale does not assess negative expectancies associated with opioid use (e.g., addiction/dependence). In addition, similarly with PSEQ, PMEQ has not been examined for structural validity.

In line with these studies in outcome expectancies, prior work has revealed some expectancy constructs existing for NMUPD (positive expectancies, e.g., academic enhancement; negative expectancies, e.g., guilt and dependence) and these expectancies appear to be associated with misuse of prescription drugs in the US. However, comparing to the knowledge of outcome expectancies in the US, the expectancies related to NMUPD in Chinese college students has not been determined. In addition, most NMUPD expectancies measure (e.g., PSEQ and PMEQ) have not been examined for structural validation (or have a poor structural validation; e.g., BEACH-Q and SMOEQ). Given most measures are developed for non-medical use of stimulants, the extent to which these expectancies domains also apply to Chinese college students engaging in NMUPO is unknown. Therefore, to facilitate knowledge of expectancies and its influences on NMUPO in China, it is essential to develop and validate a measure of NMUPO expectancies specific to Chinese college students. Expectancies of substance use in young adults can be an important target for interventions (e.g., Lau-Barraco & Dunn, 2008), and a validated measure of NMPUPO expectancies could facilitate future intervention practices or policies for preventing opioid misuse in college students.

Literature on outcome expectancies in the US has also discussed that the level of expectancies may differ as the function of demographic variables, such as age and gender (Jones et al., 2001). However, findings have been inconsistent. For example, Miller, Smith, and Goldman (1990) examined expectancies of drinking among American youths and found that positive expectancies increased as age increased, while negative expectancies decreased with age. However, a study on alcohol expectancies among college students in the US revealed that drinking expectancies became stable in adulthood (Sher, Wood, Wood, & Raskin, 1996). In terms of gender differences, some studies find that men report a higher level of positive expectancies than women (Mooney, Fromme, Kivlahan, & Marlatt, 1987; Sher et al., 1996). In contrast, Carey (1995) found that alcohol expectancies did not differ between male and female college students in the US. Gender differences have been found in terms of NMUPO expectancies. One study indicated that females were more likely to engage in NMUPO with the reasons of social or emotional enhancement than males among addictions treatment patients in the US (Bohnert et al., 2013). Given that no study has examined NMUPO expectancies in China, the differences of expectancies across age and genders in Chinese college students is unclear. Accordingly, a comparison of NMUPO expectancies with demographics may be beneficial to further understand the NMUPO issue among young adults in China.

Culture-related factors (e.g., cultural orientation; individualism versus collectivism) also play a role in the mechanism of outcome expectancies on NMUPO in college students. Our prior work on NMUPD revealed a positive relationship of individualism with NMUPD in Chinese college students (Tam et al., 2018), and this finding may imply that culture could also influence NMUPD-related perceptions, such as expectancies. Cultural orientation could affect attitudes towards substance use in young adults (Arnett, 1997; Nelson, Badger, & Wu, 2004). Given the

emphasis of autonomy and independence, people with an individualistic perspective would view adulthood as a period for exploring identity but without concern for responsibility, leading to a favorable attitude towards substance use (e.g., positive outcome expectancies) (Nelson et al., 2004). In contrast, because of the emphasis on social obligation and relationships, individuals with a collectivistic perspective would have a negative attitude towards risk behaviors, leading to the perception of potential shame and embarrassment for outcomes related to substance use (Nelson et al., 2004). Indeed, the scores of outcome expectancies dimensions differ across young people with different cultural orientations. For example, a study on alcohol use in Chinese adolescents found that Western cultural orientation (individualism) was positively associated with positive alcohol expectancies while Asian cultural orientation (collectivism) was negatively associated with positive alcohol expectancies (Shell, Newman, & Fang, 2010). In addition, within the domains of positive alcohol expectancies, college students from a collectivistic culture (e.g., Korea) reported a higher score in the social enhancement domain, while students from an individualistic culture (e.g., US) reported a higher emotion enhancement domain (Ahn, 2012). Similar to these findings in alcohol use, it seems plausible that domains in NMUPO expectancies would also differ as a function of cultural orientation. To further understand psychosocial mechanisms on NMUPO, it is valuable to examine cultural orientation and its influence on outcome expectancies in Chinese college students.

The present study

Accordingly, the primary aim of the present study was to conduct initial work to develop a NMUPO outcome expectancies scales (NMUPOES) for Chinese college students. The NMUPOES was developed consistent with previous research on NMUPD expectancies (e.g., Ilgen et al., 2011; Alison Looby & Earleywine, 2010) and alcohol expectancies (e.g., Nicolai et

al., 2010). The NMUPOES assesses two general dimensions of expectancies (positive and negative), and each dimension includes items assessing multiple domains of expectancies. Positive expectancies include pain reduction, tension reduction, academic performance, emotion enhancement, and social enhancement, while negative expectancies are comprised of guilt and dependence, cognitive impairment, and physiological discomfort. As suggested by Clark & Watson (1995), the current study validated the NMUPOES by (1) identifying the factorial structure of NMUPOES for Chinese college students with lifetime experience of NMUPO; (2) examining internal consistency of each subscale (domains); (3) examining its construct validity, in particular, including structural validity (model fit of the factorial structure) and criterion validity (association with NMUPO in past three months). In addition, the current study also compared expectancy factors in NMUPOES with demographic variables (i.e., age, gender, ethnicity, and income). Below are the study hypotheses:

Hypothesis 1: It is hypothesized that positive expectancies would be negatively correlated with negative expectancies, consistent with work reported by Bavarian (2013).

Hypothesis 2a-b: It is hypothesized that positive expectancies would be positively associated with past-three-month NMUPO (Hypothesis 2a), while negative expectancies would be negatively associated with past-three-month NMUPO (Hypothesis 2b).

The second aim of the present study was to examine the influence of cultural orientation (individualism versus collectivism) on NMUPO outcome expectancies in Chinese college students. Consistent with findings from Shell et al. (2010) and Ahn (2012), the current study hypothesized that:

Hypothesis 3a-d: Individualism would be positively associated with the factor of positive expectancies (Hypothesis 3a), while collectivism would be negatively associated with

the factor of positive expectancies (Hypothesis 3b). In contrast, individualism would be negatively associated with negative expectancies (Hypothesis 3c) and collectivism would be positively associated with negative expectancies (Hypothesis 3d).

Method

Sample and procedure

The present study utilized web-based data collected from two large universities in China: Beijing Normal University (BNU) and University of Macau (UM). Convenience sampling was employed for recruitment at the universities. All data were collected via SONA system technology, a web-based computer program allowing participants to take part in an online study and earn extra course credit. The SONA system has been widely used in psychological research (e.g., Nadorff, Nazem, & Fiske, 2011). Students were invited to the study through an advertisement posted in the SONA system. Recruitment was executed in accordance with the following criteria: (a) all participants were current undergraduate students at the corresponding school; (b) all participants were 18 to 25 years of age; (c) all participants were able to independently complete the survey online. The current study only used data from participants who reported lifetime experience of NMUPO.

Data with a sample size of 849 were collected from January to April 2017 among undergraduates in BNU (N = 299) and UM (N = 550). BNU and UM share similar characteristics: both universities are among the largest in China and enroll students from all provinces of the country. BNU enrolls 24,700 students of whom 10,260 are undergraduates. UM enrolls 9,992 students and 6,682 of them are undergraduates. As shown in Table 1, demographic characteristics (age, monthly income, gender, college year, and ethnicity) are comparable between two samples in the current study. No identifiers (e.g., name) were collected in the

surveys. Upon completion, participants at UM were awarded one course credit, while participants at BNU were provided with RMB 10 (equivalent to USD 1.48), and every 10th participant was provided with additional RMB 100 (equivalent to USD 14.80). A total of 895 participants took part in the study and 46 participants (5%) were eliminated for completing less than half of the survey. Only a minority of students (n = 22) with lifetime NMUPO also misused other classes of prescription drugs (e.g., sedatives). Given that the purpose of the current study only focused on opioids misusers, these students with poly-use of prescription drugs were excluded from data analyses. A sample size of 202 (77 from BNU and 125 from UM) from participants who reported lifetime NMUPO (without non-medical use of other classes of drugs; e.g., stimulants) and completed more than half of the NMUPOES was used for data analyses.. All study procedures and materials were approved by the institutional review boards at BNU and UM.

Table 1.
Sample demongrahic characteristics.

Characteristics	*Mean* (*SD*) / *n* (*%*)		
	Overall	Beijing	Macau
N (%)	849 (100.0%)	299 (35.2%)	550 (64.8%)
Age, *Mean* (*SD*)	20.07 (1.86)	21.40 (2.00)	19.35 (1.30)
Disposable monthly income (RMB)	2498.74 (2880.91)	1851.97 (998.38)	2854.59 (3459.70)
Gender			
Male	82 (27.4%)	195 (35.5%)	277 (32.7%)
Female	216 (72.2%)	353 (64.3%)	569 (67.1%)
Transgender	1 (0.3%)	0 (0.0%)	1 (0.1%)
Other	0 (0.0%)	1 (0.2%)	1 (0.1%)
College year			
Freshmen	385 (45.5%)	54 (18.1%)	331 (60.4%)
Sophomore	143 (16.9%)	38 (12.7%)	105 (19.2%)
Junior	152 (17.9%)	64 (21.4%)	88 (16.1%)
Senior	122 (14.4%)	98 (32.8%)	24 (4.4%)
Ethnicity			
Han	810 (95.9%)	276 (92.3%)	534 (97.8%)

Non-Han	35 (4.1%)	23 (7.7%)	12 (2.2%)

SD = Standard deviation

Survey development

In a first step of the current study, the non-medical use of prescription opioids outcome expectancies scales (NMUPOES) was developed by pulling items from existing alcohol use expectancies questionnaires, including the Comprehension Alcohol Expectancies Questionnaire (CAEQ) (Nicolai et al., 2010), and prescription drugs use expectancies questionnaires, including BEACH-Q, SMOEQ, PSEQ, and PMEQ (Bavarian, Flay, Ketcham, & Smit, 2013; Ilgen et al., 2011; Labbe & Maisto, 2010; Alison Looby & Earleywine, 2010). Based on these expectancies measures, the author first identified the domains (e.g., social enhancement) of outcome expectancies and then selected all probable items under its corresponding domains. For those items with similar meaning, only one of those was retained and the rest were removed from the scale. The items from prescription drugs use expectancies measures had a priority for the selection decision. For example, eleven items in the CAEQ, four items in the SMOEQ, and nine items in the PSEQ were related to social enhancement. In particular, the CAEQ (e.g., "I am more relaxed and more at ease easily"), the SMOEQ (e.g., "help people have a more enjoyable time"), and the PSEQ (e.g., "I feel more relaxed in the social situation") all included an item related to relaxation in a social environment. Given the item in the CAEQ provided a clear statement, this item was selected and the items from the other three scales were removed. Following this rationale, in the social enhancement domain, eight items were selected from the CAEQ, two items were selected from the SMOEQ, and four items were selected from the PSEQ.

As a result, the original NMUPOES has 71 items related to eight domains, including pain reduction (e.g., I can feel less pain), tension reduction (e.g., I no longer feel so rushed or under

time pressure), academic performance (e.g., I would get better grades), social enhancement (e.g., It's easier for me to approach other people), emotional enhancement (e.g., I feel more happy), guilt and dependence (e.g., I worry I'm addicted to it), cognitive impairment (e.g., I have difficulty concentrating), and physiological discomfort (e.g., I feel sick to my stomach). Participants were asked to respond to items according to their expectancies on the prescription medication that they used the most without a prescription. All items were initially developed in English and translated into Chinese using the back-translation procedure (Brislin, 1970). The author of the current study translated all 71 items into Chinese and his colleagues in Beijing and Macau translated the Chinese version back to English. The author identified that all items were comparable across original and back-translated versions. Participants who have ever used prescription drugs without a doctor's prescription were asked to respond to this scale. They rated each item by indicating the extent to which they would expect to have each consequence after using prescription drugs. Responses were scored on a five-point Likert-type scale ranging from 1 (Not at all) to 5 (Very often or always) with higher sum scores standing for the greater level of expectancies.

Measures

In addition to NMUPOES, participants were asked to answer questionnaires assessing demographic information, NMUPD, and cultural orientation.

Demographics. Participants were asked to provide demographic information including age, gender, ethnicity (Han or non-Han), college year (i.e., freshman, sophomore, junior, and senior), and monthly income (in RMB).

Non-medical use of prescription drugs. The Chinese version of NMUPD scale was adapted from previous American studies (Benotsch et al., 2011a; McCabe, Teter, & Boyd, 2006).

To identify prescription drugs in the Chinese market, we consulted with local pharmacists and identified brand names of prescription drugs specifically available in China. The total consisted of 40 items assessing NMUPD, divided into 4 classes: analgesics (e.g., OxyContin), sedatives (e.g., Halcion), anxiolytics (e.g., Xanax), and stimulants (e.g., Ritalin). These prescription medications included both medications that are used in other parts of the world (e.g., OxyContin) and prescription medications that are more specific to China (e.g., compound liquorice tablets), consistent with other research examining NMUPD in China (Guo et al., 2015; Juan et al., 2015). Participants were asked to report the number of times they had used the medication without a physician's prescription in their lifetime and in the past three months. Responses were collapsed across all specific prescription drugs, within classes, to determine if participants had used that class of drugs. For data analysis, responses for each class of drugs were dichotomized into 0 (never) and 1(yes) to indicate whether the participant has engaged in lifetime (or past-3-month) NMUPD. In the current study, the answers about prescription opioids (lifetime and past three month) were used for data analysis.

Cultural orientation. The individualism and collectivism scale (INDCOL) (Triandis & Gelfand, 1998) was used to assess college students' cultural orientation of individualism and collectivism. The INDCOL has 16 items with four dimensions: (1) vertical collectivism, meaning the extent to which a person sees the self as a parts of a collective with a preference to accept hierarchy and inequality within that collective (e.g., "It is important to me that I respect the decisions made by my groups"); (2) horizontal collectivism, meaning the extent to which a person sees the self as a part of a collective with a preference to perceive all members equally within that collective (e.g., "I feel good when I cooperate with others"); (3) vertical individualism, meaning the extent to which a person sees the self as completely autonomous with

recognizing that inequality will exist among individuals and accepting this inequality (e.g., "It is important that I do my job better than others"); (4) horizontal individualism, meaning the extent to which a person sees the self as completely autonomous but with belief of equality among individuals (e.g., "I'd rather depend on myself than others"). This scale has been translated into Chinese by Huang, Yao, and Zou (2006). Participants were asked to rate items on a five-point-Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores in collectivism (i.e., vertical and horizontal) indicating a greater preference for collectivism, while higher score in individualism (vertical and horizontal) indicating a greater preference for individualism. The Cronbach's alphas for individualism and collectivism subscales were .79 and .86, respectively.

Statistical analytic plan

Data screening and cleaning. Given the statistical approaches (e.g., exploratory factor analysis) are sensitive to missing data and outliers (Yuan, Marshall, & Bentler, 2002), the data screening and cleaning in terms of missing data, univariate outliers, and normality were implemented among NMUPOES items before the data analyses. The Little's MCAR test was employed to determine whether the missing data are missing randomly and all values in the measure were converted to z-scores to determine the univariate outliners. The missing rates for each item were low (< 5%). The Little's MCAR test revealed a non-significant *Chi-square* coefficient (χ = 2055.54, *df* = 2040, *p* = .40), suggesting that missing data were missing at random. Although univariate outliers were found in some items (z > +3.00), no further data treatment was executed because of low percentages of outliers (< 2%) (Cohen et al., 2003). Normality was tested among all items in NMUPOES using skewness and kurtosis. With a cutoff of < + 3.0 (George & Mallery, 2010), the coefficients of skewness (0.82 to 1.90) and kurtosis

(0.07 to 2.98) suggested an appropriate normality for all items. Missing data were imputed using Expectation Maximization (EM) (Dempster, Laird, & Rubin, 1977).

According to the study purposes, different data analyses were employed in three phases, including (Phase 1) the identification of the factorial structures of the NMUPOES for Chinese college students; (Phase 2) the validation of the factorial structure of the NMUPDOES; (Phase 3) the examination of the association of cultural orientation with factors in the NMUPOES.

Phase 1: factorial structures of NMUPOES.

(1) The samples for factorial validation. To explore the factorial structure in NMUPOES, the current study randomly selected two partial samples from the complete sample of Chinese college students (BNU and UM). Exploratory factor analysis (EFA) was employed to identify factorial structures of the expectancy measure in one subsample. The remaining data was used for analyses in Phase 2.

The sample size for EFA was determined according to Mundfrom, Shaw, and Ke (2005), suggesting that the minimum sample size should be determined by the number of factors, the number of variables per factors, and the level of communality. Given that we expect maximum eight factors (eight domains of expectancies; e.g., pain reduction) in the measure (a total of 71 items), so that the ratio of variables (items) to factors would be 71/8 = 8.88 at least. According to Mundfrom et al. (2005), it is suggested a minimum sample size of 100 for the case in which the ratio of variables and factors is seven or more, if there are less than 15 factors with moderate communality. Thus, I randomly selected 100 individuals (BNU and UM) for EFA.

(2) Exploratory factor analysis. To identify the factorial structure of NMUPOES, an EFA was employed. In terms of rotation selection, as suggested by Meyers et al. (2016), oblique promax solution should be performed. If the results suggest that factors are correlated at .15 –.30

or higher, the factor structure should be determined based on oblique promax. Several indexes were used to determine the factor structure. A scree plot with the cutoff eigenvalue of 1 was utilized to identify the number of factors (Cattell, 1966; Kaiser, 1960). Factor loading estimates of all items on factors were also utilized to determine the simple structure. According to Worthington and Whittaker (2006), it is suggested that item cross-loadings being at least .15 less than item's highest factor loading to achieve simple structure. Items were retained when the highest loading eigenvalue exceed .40 with at least .15 larger than cross-loadings. Then EFA was rerun using retained items until the final factorial structure was identified.

(3) Pearson's product-moment correlation and Cronbach's alpha test. In order to examine the internal consistency, Pearson's product-moment correlation and Cronbach's alpha tests were employed. Pearson's correlation test was performed among all retained items based on the results of exploratory factor analysis (Hypothesis 1). Cronbach's alpha test was run for subscales (factors).

The *t*-test was then employed to examine the difference of the factors identified in the NMUPOES between years of age (< 20 vs. > 20 years), gender (male vs. female), ethnicity (Han vs. non-Han), and income (< 2000 vs. > 2000 RMB) using the whole sample (n = 202).

All data analyses in this phase were employed using SPSS version 25 (IBM Corp, 2017).

Phase 2: Validation of factorial structures of NMUPOES. Two multivariate methods, including confirmatory factor analysis (CFA) and structural equation modeling (SEM) were employed to examine construct validity (i.e., structure and criterion validity).

(1) Confirmatory factor analysis. In order to examine the structural validity and convergent validity, a CFA was employed. The second partition of the sample (n = 102) was

used. According to Tinsley and Tinsley (1987), a minimum sample size of 100 was suggested for CFA.

The factorial structure in the CFA was generated based on the results in phase 1. In the CFA model, all items were manifest variables. Items were specified to load onto its latent factor (domain). All domains were hypothesized to be correlated (Hypothesis 1). Standardized factor loadings and correlation coefficients were estimated. The goodness of model fit was determined using a number of indices including the root mean square of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and standardized root mean square of residual (SRMR). According to Meyers et al. (2016), the suggested cutoff values of these indices are .95 for CFI, .95 for TLI, .05 for RMSEA, and .08 for SRMR. The higher CFI and TLI and the lower RMSEA and SRMR indicate a greater fit of the model. A good model fit and significant factor loadings indicate good structural validity of the measure. The CFA was run using Mplus Version 8 (Muthén & Muthén, 2017).

(2) Structural equation modeling. A SEM was then employed to test the criterion validity of NMUPOES. In this analysis, the whole sample of Chinese students (n = 202) was entered into the models. The hypothesized model for SEM is shown in *Figure 1*. In this model, the sum score of items in the particular domain (e.g., social enhancement) was entered as manifest factors, and these manifest factors loaded onto its higher-order latent variable (i.e., positive expectancies and negative expectancies). Two latent variables were hypothesized to be associated with past-three-month NMUPO (Hypothesis 2a-b).

As suggested by Anderson and Gerbing (1988), the SEM analysis included a two-step approach. First, a measurement model was employed using CFA to examine relationships between the latent constructs and their corresponding manifest indicator variables. Standardized

factor loadings were estimated for each indicator variable. Then, SEM was employed to examine the hypothesized model. Given that the endogenous variables (NMUPO) are dichotomous (e.g., never/ever non-medical use of prescription opioids in the past 3 months), the SEM analyses were tested using weighted least squares estimation as suggested by Muthén and Muthén (2017). The standardized regression coefficients for all paths between latent variables were calculated. The goodness of model fit was determined using a number of indices including the root mean square of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the weight root-mean-square residual (WRMR). According to Yu (2002), for SEM using weighted least squares estimation, the suggested cutoff values of these indices were .95 for CFI, .95 for TLI, .05 for RMSEA, and 1.00 for WRMR. Among these indices, the higher CFI, TLI, and WRMR and the lower RMSEA indicate a greater fit of the model. The SEM was run using Mplus Version 8 (Muthén & Muthén, 2017). A good model fit and significant regression coefficients from latent variables (i.e., positive and negative expectancies) indicate a good criterion validity of the measure.

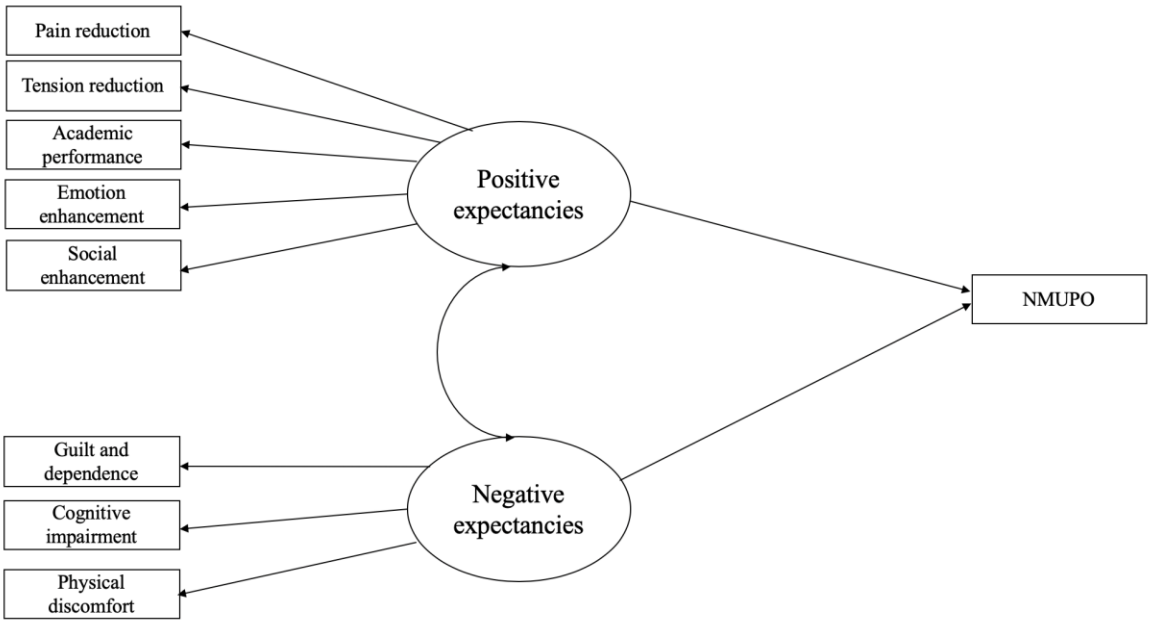


Figure 1. Hypothesized structural model among NMUPOES domains, higher-order factors, and past-three-month NMUPO among college students in China

Phase 3: Examining the association of cultural orientation with NMUPO outcome expectancies

(1) Structural equation modeling. In order to examine the influence of cultural orientation (i.e., individualism and collectivism) on higher-order factors (positive and negative) in NMUPOES, a SEM was employed using the whole sample of Chinese college students (n = 202) (Hypothesis 3a-d).

The hypothesized model is shown in *Figure 2*. In this model, two latent factor variables were generated for cultural orientation, including individualism and collectivism. For each latent factor (e.g., individualism), two subscales (e.g., vertical individualism and horizontal individualism) were entered as manifest indicator variables. The factorial structure of the NMUPOES outcome expectancies was identical to the hypothesized model in phase 2. Four regression paths between latent variables were specified. Cultural orientation latent factors

(individualism and collectivism) were hypothesized to be associated with latent factors in NMUPOES (positive and negative expectancies) (Hypothesis 3a-d). The criteria and procedure of the examination of the hypothesized model were identical to SEM analysis in phase 2. A good model fit and significant regression coefficients indicate an association between cultural orientation and NMUPO outcome expectancies among college students in China.

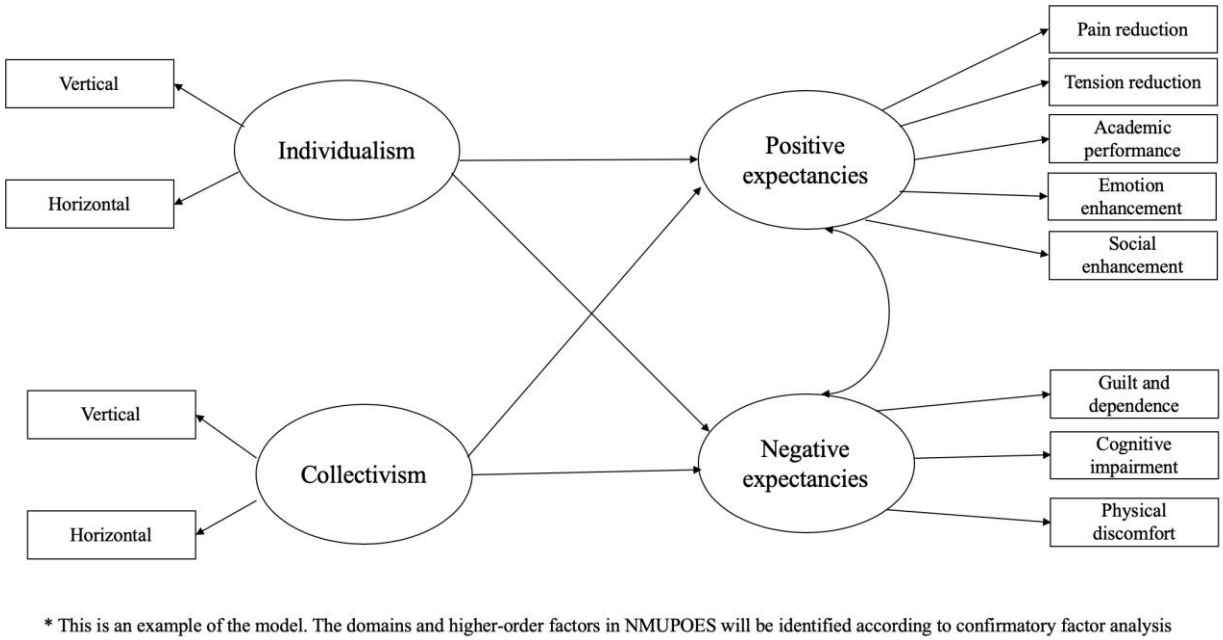


Figure 2. Hypothesized structural model among cultural orientation and NMUPO outcome expectancies among college students in China.

Results

Descriptive statistics of measures

Among 849 students, 41.2% of the sample reported NMUPD in their lifetime. Specifically, the most commonly used class of medicines was opioids (43.6% lifetime use, 21.9% past-three-months use). Only a minority of students reported engaging in non-medical use of sedatives (1.8% lifetime, 0.8% past 3 months), non-medical use of anxiolytics (0.9% lifetime, 0.3% past three months) or non-medical use of stimulants (0.2% lifetime, 0% past three months).

In terms of the cultural orientation scale, the *means* and *standard deviations* (*SD*) were also calculated for four subscales. The average scores were 3.64 (*SD* = 0.69) for the horizontal individualism subscale, 3.34 (*SD* = 0.66) for the vertical individualism subscale, 3.64 (*SD* = 0.62) for the horizontal collectivism subscale, and 3.74 (*SD* = 0.69) for the vertical collectivism subscale.

Phase 1: Identification of factorial structure of NMUPOES

Exploratory factor analysis (EFA) for NMUPOES. An EFA was employed to identify the factorial structure among the 71 items in the initial NMUPOEPS using the first partition of the sample (*n* = 100). As mentioned in the data analysis section, several EFAs were run and the items with high cross-loadings on two factors (or more) were removed to determine the final structure. Four EFAs were employed and a total of 50 items were retained in the final EFA. A scree plot suggested a pronounced inflection point at the fourth-highest eigenvalue (> 1.00), revealing a four-factor structure for the NMUPOES. Given a high intercorrelation (*rs* > .40; see details in Table 2) among the four factors, an oblique promax rotation was used for calculating the factor loadings (Meyers et al., 2016). Factor loadings onto each factor are shown in Table 2. The four-factorial pattern accounted for 87.0% of cumulative variance with eigenvalues ranging from 1.05 (the fourth factor) to 38.41 (the first factor). The first factor consisted of 34 items which were mainly about the enhancement of social abilities (e.g., “I can be more outgoing” and “it is easier for me to approach other people”) and the reduction of tension and negative affect (e.g., “I can feel less frustrated” and “I am more relax and more at ease socially”). This factor was labeled “Social enhancement and tension reduction”. The second factor included seven items representing academic working efficiency (e.g., “I would be able to be more productive”) and was labeled “Academic enhancement”. The third factor consisted of five items focusing on

the feelings of physiological discomfort (e.g., “I feel sick to my stomach”) and was labeled “Physiological discomfort”. The fourth factor contained four items showing feelings of guilt and dependence (e.g., “I feel guilty for taking it”) and was labeled “Guilt and dependence”.

Table 2.
Results of the exploratory factor analysis for NMUPOES, n = 100

	Factor			
	1	2	3	4
Factor loadings				
(8) It does not matter as much anymore what people think of me	**1.051**	-.079	-.046	.030
(10) I can be more outgoing	**1.051**	-.091	-.009	-.005
(11) I can be more humorous	**1.006**	-.057	.036	-.028
(12) I am more assertive	**.999**	.000	-.034	-.062
(13) Somehow I think everything is funnier-at any rate, I laugh more	**.998**	-.019	.030	-.048
(7) I start making myself the center of attention	**.992**	-.077	-.038	.094
(16) I am less self-conscious	**.975**	-.092	.047	.000
(20) I feel as though everything is right in the world	**.972**	.006	.018	-.042
(2) I am not so shy anymore	**.969**	-.056	.065	.019
(5) I can open up to express myself	**.965**	-.032	-.026	.071
(14) My self-confidence increases	**.956**	-.005	.034	.003
(6) I can get to know people more easily	**.949**	-.040	.071	.022
(15) I am more likely to come out of my shell	**.946**	.043	-.079	.050
(3) It is easier for me to approach other people	**.941**	.021	.012	.015
(4) I am more daring	**.931**	-.022	-.020	.119
(31) I can feel less guilt	**.907**	-.012	.107	-.057
(32) I can feel less frustrated	**.855**	.082	.066	-.019
(26) I can forget about my problems and worries	**.840**	.092	.091	-.004
(29) I no longer feel so rushed or under time pressure	**.826**	.102	.126	-.054
(9) I can enjoy parties more	**.816**	.160	-.034	.041
(21) I feel more brave	**.802**	.136	.019	.028
(1) I am more relaxed and more at ease socially	**.799**	.079	.070	-.003
(24) I can switch my mind off better	**.769**	.133	.015	.103
(22) I feel less lonely	**.767**	.191	.008	.041
(17) I am more prepared to take risks	**.759**	.139	.142	-.038
(52) I can feel less hungry	**.698**	.210	.139	-.077
(25) I am not so tensed up anymore	**.697**	.220	.085	-.045
(19) I feel more happy	**.687**	.217	-.126	.113
(27) I am more tranquil	**.683**	.097	.109	.083

(43) I will not end up daydreaming	**.675**	.246	.105	-.014
(18) I would find studying more enjoyable	**.658**	.396	-.054	-.045
(46) I feel high	**.657**	.296	.062	.018
(23) I feel more energetic	**.586**	.362	-.234	.100
(47) I would lose weight	**.550**	.223	.175	-.013
(36) I can learn/work efficiently	-.249	**.981**	.111	.089
(45) I would be able to more productive	.076	**.825**	-.028	.047
(34) I would be able to concentrate/focus better	.150	**.818**	-.184	.125
(49) I can feel better physically	-.116	**.739**	.157	.082
(44) I am able to sit still	.234	**.720**	.052	-.141
(39) My mind will not wander	.417	**.664**	.017	-.198
(35) I would be able to stay awake for a long time	.346	**.662**	-.018	-.074
(62) I feel sick to my stomach	-.018	.120	**.929**	-.059
(63) My heart would race	-.103	.097	**.858**	.134
(65) I will feel like I crash after taking it	.121	-.008	**.830**	.052
(64) I would get headaches	.250	-.078	**.800**	.007
(66) I will fell jittery and shaky	.226	-.130	**.759**	.114
(68) I have come to see it as a crutch	-.110	.265	-.038	**.874**
(69) I feel guilty for taking it	.181	-.105	.086	**.798**
(67) I worry that I am addicted to it	-.066	-.073	.162	**.797**
(70) I feel like I cannot get through the day without it	.291	.055	.010	**.664**
Explained variance (%)	76.82	4.87	3.22	2.09
Eigenvalues	38.41	2.44	1.61	1.05

Factor 1 = Social enhancement and tension reduction; Factor 2 = Academic enhancement; Factor 3 = Physiological discomfort; Factor 4 = Guilt and dependence.
Items 30, 33, 37, 38, 40, 41, 42, 50, 51, and 71 were removed in prior to this analysis.

Pearson's product-moment correlation and Cronbach's alpha test. Correlations among the four factors are presented in Table 3. The Social enhancement and tension reduction factor was positively and significantly correlated with the Academic enhancement factor (r = .75, p <.001), the Physiological discomfort factor (r = .71, p < .001), and the Guilt and dependence factor (r = .62, p < .001). The Academic enhancement factor was positively and significantly correlated with the Physiological discomfort factor (r = .48, p < .001) and the Guilt and dependence factor (r = .50, p < .001). The Physiological discomfort factor was positively and

significantly correlated with the Guilt and dependence (r = .60, p < .001). Results suggested a good convergent validity of a four-factorial structure for NMUPOES.

As shown in Table 3, the internal consistency for all four factors was good. Cronbach's alphas were .99 for the Social enhancement and tension reduction factor, .94 for the Academic enhancement factor, .97 for the Physiological discomfort factor, and .93 for the Guilt and dependence factor.

Table 3.
Correlations and internal consistency of four factors in NMUPOES

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1			
Factor 2	.75***	1		
Factor 3	.71***	.48***	1	
Factor 4	.62***	.50***	.60***	1
Cronbach's alpha	.99	.94	.97	.92

***p < .001
Factor 1 = Social enhancement and tension reduction; Factor 2 = Academic enhancement; Factor 3 = Physiological discomfort; Factor 4 = Guilt and dependence.

Phase 2: Validation of the factorial structure of the NMUPOES

Confirmatory factor analysis (CFA). The four-factorial structure of NMUPOES with 50 items was validated using CFA with data from the second partition of the sample (n = 102). The standardized estimates of factor loadings in each latent factor and correlation coefficients are shown in *Figure 3*. The CFA suggested all 50 items were substantially and significantly loaded onto their corresponding latent factors (ps < .001). Results also suggested positive correlations among the four latent factors. The Social enhancement and tension reduction factor was positively and significantly correlated with the Academic enhancement factor (r = .85, p < .001), the Physiological discomfort factor (r = .77, p < .001), and the Guilt and dependence factor (r = .89, p < .001). The Academic enhancement factor was significantly correlated with the

Physiological discomfort factor (r = .68, p < .001) and the Guilt and dependence factor (r = .77, p < .001). The Physiological discomfort factor was significantly correlated with the Guilt and dependence factor (r = .86, p < .001).

The model-fit indicators of the CFA are .75 for CFI, .75 for TLI, .13 for RMSEA, and .05 for SRMR. Comparing to the cut-offs representing an adequate model fit (.90 for CFI and TLI, 0.10 for RMSER, and .80 for SRMR), our results of model-fit indicators suggest an inadequate model fit to the data (Meyer et al., 2016). These results show that latent variables were significantly intercorrelated but the overall model did not reach an adequate fit.

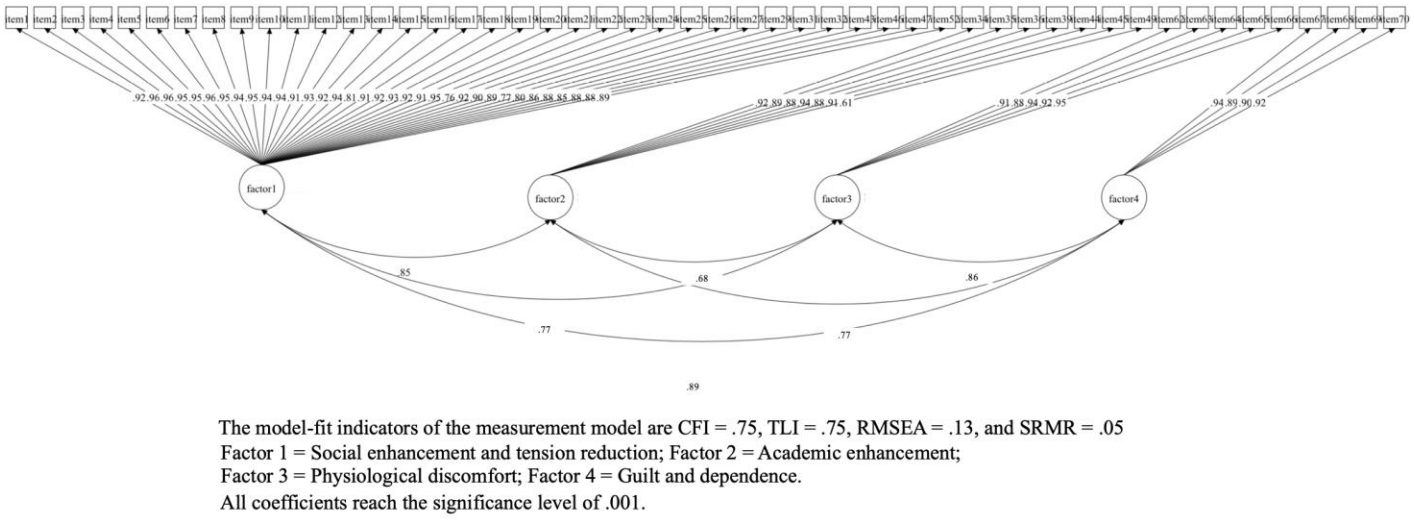


Figure 3. The Confirmatory factor analysis among a four-factorial structure of NMUPOES (n = 102)

Outcome expectancy factors and demographics variables. Differences in outcome expectancies across groups in terms of age, gender, ethnicity, income, and study sites were examined using *t*-tests using the whole sample (n = 202). As shown in Table 4, no significant differences were found for the four factors in terms of age, gender, ethnicity, and income. However, *t*-test suggested a significant difference on the Physiological discomforts factor

between study sites, indicating that students in Macau reported a higher level of physiological discomforts expectancy than students in Beijing (t = 3.33, df = 196, p = .001).

Table 4.
Outcome expectancy factors and demographics characteristics (n = 202)

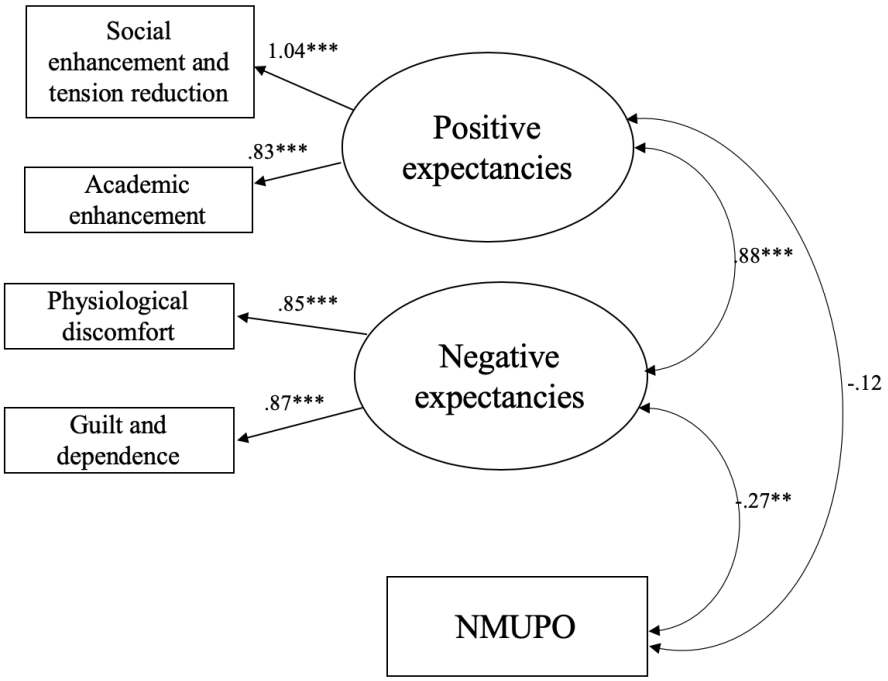
	Social enhancement and tension reduction	Academic enhancement	Physiological discomforts	Guilt and dependence
Mean (*SD*)	1.97 (1.14)	2.09 (1.06)	1.98 (1.10)	1.79 (0.99)
Year of age				
< 20 years	1.98 (1.04)	2.11 (1.00)	2.02 (1.02)	1.81 (0.92)
> 20 years	1.90 (1.30)	2.04 (1.18)	1.89 (1.23)	1.70 (1.11)
t-value	0.48	0.48	0.78	0.68
p-value	.63	.63	.40	.47
Gender				
Male	1.88 (1.14)	2.02 (1.08)	1.96 (1.13)	1.73 (0.99)
Female	2.14 (1.09)	2.26 (1.00)	2.03 (1.00)	1.95 (0.99)
t-value	-1.54	-1.48	-0.37	-1.40
p-value	.13	.14	.71	.16
Ethnicity				
Han	1.97 (1.12)	2.07 (1.05)	1.98 (1.08)	1.80 (0.98)
Non-Han	1.97 (1.46)	2.47 (1.27)	1.96 (1.42)	1.60 (1.24)
t-value	-0.02	-1.22	0.06	0.61
p-value	.98	.23	.95	.54
Income				
< 2000 RMB	2.02 (1.26)	2.15 (1.16)	1.95 (1.17)	1.81 (1.09)
> 2001 RMB	1.88 (0.95)	2.00 (0.90)	2.03 (0.99)	1.76 (0.83)
t-value	0.92	1.02	-0.51	0.35
p-value	.36	.31	.61	.73
Study site				
Macau	2.01 (0.93)	2.17 (0.94)	2.17 (0.98)	1.88 (0.86)
Beijing	1.89 (1.42)	1.96 (1.23)	1.65 (1.21)	1.63 (1.16)
t-value	0.73	1.36	3.33	1.77
p-value	.47	.17	.001**	.08

**p < .01.

The criterion validity of NMUPOES: Structural equation modeling

Measurement model using CFA. A SEM was employed to examine the hypothesized association between the four factors of the NMUPOES with past-three-month NMUPO in

Chinese college students (n = 202). As mentioned in the data analysis section, a measurement model was employed using CFA before the SEM analysis. According to previous studies (e.g., Looby & Earleywine, 2010), the Social enhancement and tension reduction factor and the academic enhancement can be viewed as positive expectancies, while the Physiological discomfort factor and the Guilt and dependence factors can be viewed as negative expectancies. Hence, in the measurement model, the mean scores for each factor in the NMUPOES were generated and the first two factors were entered as manifest indicator variables for a latent construct of positive expectancies, and the last two factors were set as manifest indicator variables for a latent construct of negative expectancies. The standardized factor loadings in the measurement model are presented in *Figure 4.* All factor loadings of each manifest variable on corresponding latent factors were substantial and statistically significant ($p < .001$). Results indicate a significant and negative correlation of negative expectancies with NMUPO in past three months (r = -.27, p = .004). Negative expectancies was also significantly and positively correlated with positive expectancies (r = .88, $p < .001$). Positive expectancies was negatively correlated with NMUPO in past three months (r = -.12); however, the correlation coefficient did not reach statistical significance (p = .16). The model-fit indicators of the measurement model are .98 for CFI, .97 for TLI, .03 for RMSEA, and .64 for WRMR, suggesting a good fit to data (Yu, 2002). These results suggest appropriate latent constructs and data were appropriate for the SEM analysis.



The model-fit indicators of the measurement model are CFI = .98, TLI = .97, RMSEA = .03, and WRMR = .64

Figure 4. The two-factor measurement model among positive expectancies, negative expectancies and non-medical use of prescription opioids in past three months. *n* = 202

Comparing the one-factor and the two-factor measurement models. Given the high correlation between the positive expectancies latent factor and the negative expectancies latent factor, a one-factor measurement model with one latent variable operationalized by four expectancies manifest factors was also generated (see *Figure 5*). The Chi-square difference test was employed to examine the difference between a one-factor model and a two-factor model (with two positive expectancies and negative expectancies; see *Figure 4*). The one-factor model was set as the null model and the two-factor model was set as the alternative model. A significant Chi-square indicated that the alternative model has a significantly greater model fit than the null

model. Results of a Chi-square test suggested a significant Chi-square value of 8.01 with a degree of freedom of 2 (p = .02), indicating that the two-factor model had a significantly greater model fit than the one-factor model. The model-fit indicators of the one-factor model were .96 for CFI, .95 for TLI, .03 for RMSEA, and .70 for WRMR (see Table 5). These estimates suggested a generally lower model fit than that of the two-factor model. Accordingly, the current study used the two-factor model for running SEM analysis to examine the relationship between outcome expectancies and NMUPO in past three months.

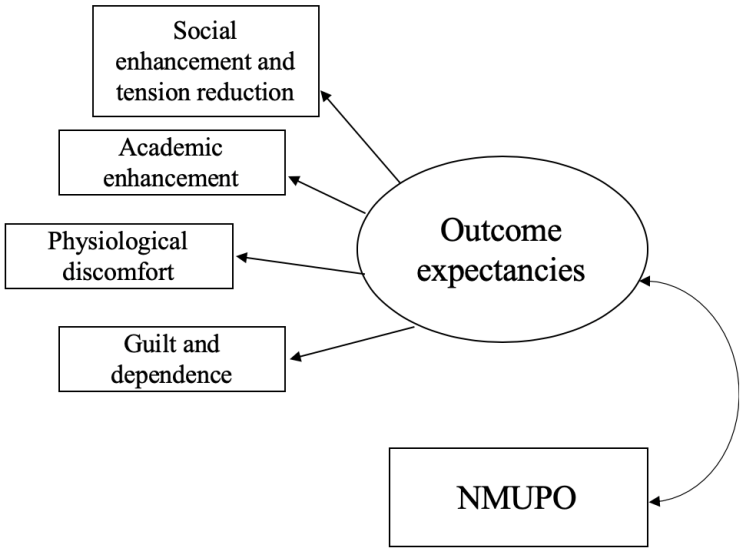


Figure 5. The one-factor measurement model among outcome expectancies and non-medical use of prescription opioids in past three months

Table 5.
The Chi-square difference test between the one factor and two-factor model

Model-fit indicators	The one-factor model (the null model)	The two-factor model (the alternative model)
CFI	.96	.98
TLI	.95	.97
RMSEA	.03	.03
WRMR	.70	.64
Chi-square difference test	8.01*	
df	2	

*p < .05.

Structural equation modeling (SEM). A structural equation model was run among positive expectancies, negative expectancies, and NMUPO in the past three months, while controlling for demographic factors (i.e., age, gender, and ethnicity). The standardized path coefficients of the SEM are presented in Figure 6. The model explained 14.4% variance in NMUPO. Results suggested that negative expectancies had a negative direct link with NMUPO (β = -.73, p = .03), with a higher level of negative expectancies associated with a lower NMUPO in past three months. The association of positive expectancies with NMUPO was positive (β = .49), but the regression coefficient did not reach the significance level (p = .15). The model-fit indicators of SEM were .97 for CFI, .95 for TLI, .03 for RMSEA, and .65 for WRMR, suggesting a good model fit to data. These findings revealed that Chinese college students who had a higher level of negative expectancies had a lower likelihood of engaging in NMUPO in the past three months, showing evidence for the criterion validity of the negative expectancies factor in the NMUPOES.

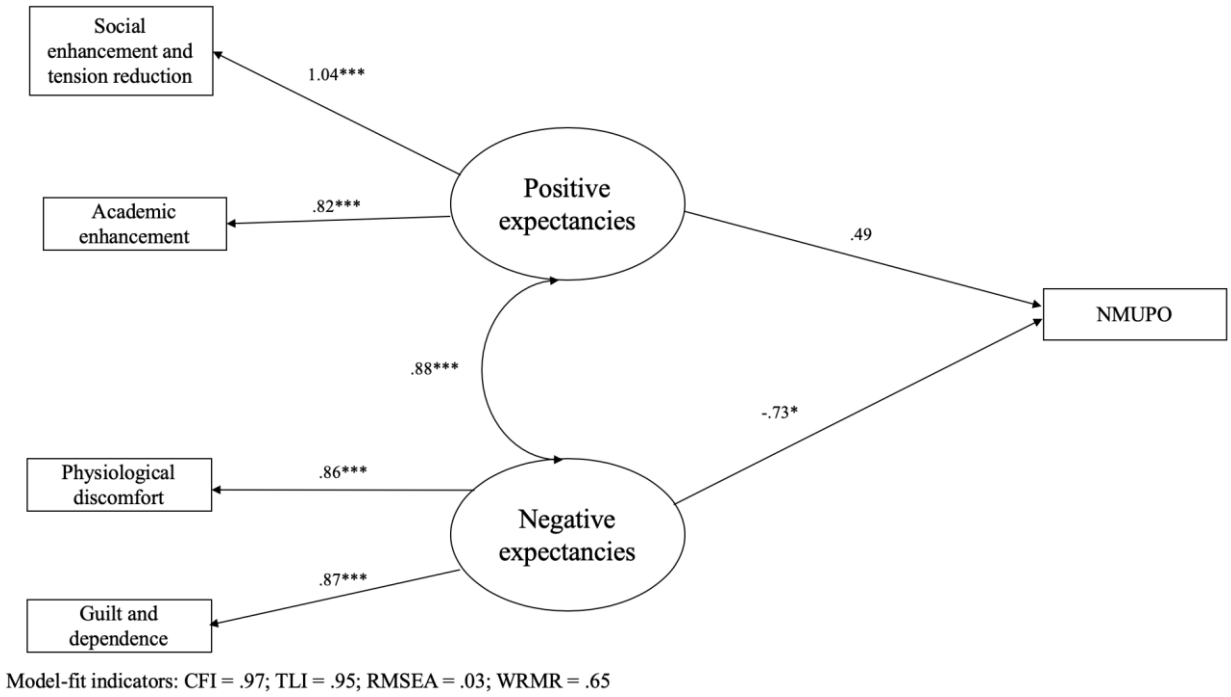


Figure 6. The structural equation modeling of the relationship between outcome expectancies and non-medical use of prescription opioids in past three months among Chinese college students, controlling for age, gender, and ethnicity. *n* = 202.

Phase 3: examining the association between cultural orientation and outcome expectancies

Measurement model among cultural orientation and outcome expectancies. Before the SEM analysis, a measurement model was employed to examine the latent constructs (i.e., individualism, collectivism, positive expectancies, and negative expectancies) and their intercorrelations. The standardized estimates are presented in Figure 7. Results showed that all manifest indicators were significantly and substantially loaded on their latent variables (ps < .01). Consistent with our previous findings, the two outcome expectancies factors were significantly correlated (r = .90, p < .001). Individualism was positively correlated with positive expectancies (r = .06) and negatively correlated with negative expectancies (r = -.002). Collectivism was negatively correlated with positive expectancies (r = -.13) and negative

expectancies (r = -.13). However, these correlation coefficients did not reach the significance level (p > .05). The model-fit indicators were 1.00 for CFI, 1.00 for TLI, .00 for RMSEA, and .04 for SRMR, suggesting a good fit to data.

Because of the nonsignificant correlations between outcome expectancies and cultural orientation, no SEM analysis was employed.

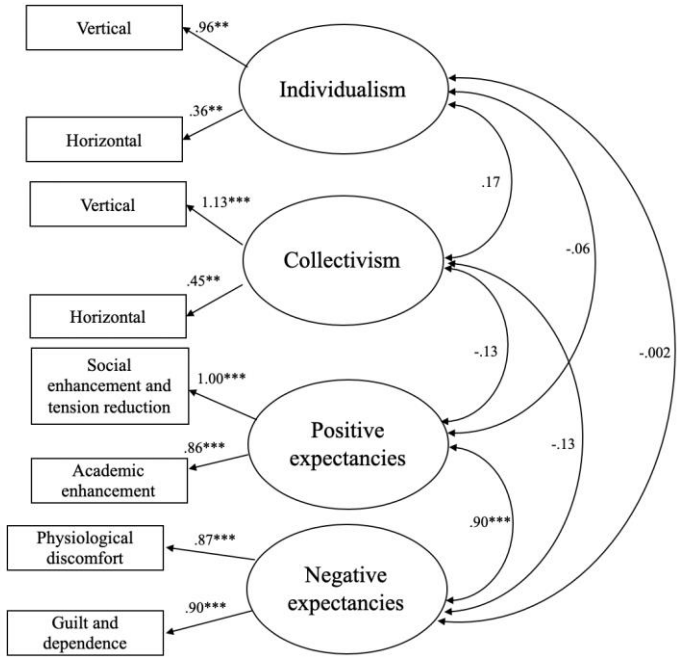


Figure 7. The measurement model among cultural orientation and outcome expectancies. *n* = 202

Discussion

The current study developed and validated a Chinese version of an NMUPO outcome expectancies measure (NMUPOES) for college-aged and attending opioid misusers in China. In particular, this study examined the factorial validity, internal consistency, convergent validity, and criterion validity of the NMUPOES. With an exploratory purpose, the current study also examined the relationship between cultural orientation and NMUPO outcome expectancies. The

preliminary results generally revealed that the NMUPOES is a psychometrically appropriate measure for assessing outcome expectancies (positive and negative) of NMUPO. Results also suggested an association of negative expectancies with current NMUPO (past-three-month) in Chinese college students. Although this is a preliminary study, the findings of the current study offer additional insights into my previous research (Tam et al., 2018) and facilitate a further understanding about the psychosocial reasons associated with NMUPO in Chinese college students. To my knowledge, this is the first attempt to assess outcome expectancies for NMUPO and its association with NMUPO in China.

The first aim of the current study was to use EFA and CFA to identify the factorial structure of the NMUPOES. Results suggested a four-factorial structure in the NMUPOES and this structure accounted for 87.0% of the variance. The four factors were related to the expectancy domains about social enhancement and tension reduction, academic enhancement, physiological discomfort, and guilt and dependence. These four factors had good internal consistency and demonstrated good convergent validity. These four expectancy factors are comparable to the findings in previous literature in the US (e.g., Ilgen et al., 2011), showing that individuals with NMUPO had positive expectancies about the enhancement of social and cognitive functioning, the reduction of anxiety, and also negative expectancies about physiological maladaptation. In addition, the findings of expectancies are also consistent with my previous Chinese study (Tam et al., 2018), which found that the motives for NMUPD in college students were relevant to academic enhancement (e.g., “concentration”) and tension reduction (e.g., “to help me to decrease anxiety”). These dimensions indicate that opioid misusers in China had a similar pattern of outcome expectancies with those in the US.

Specifically, the current study identified a factor that captures social enhancement and tension reduction expectations. This factor included the greatest number of items (34 items) and explained a large proportion (76.8%) of the variance in NMUPOES. Although this factor was mainly composed of two expectancy domains, these two domains are conceptually related. For example, a number of items about tension reduction are socially related, such as "I feel less lonely", "I am not so tense up anymore", and "I feel more brave". This finding suggests that Chinese college students engaging in NMUPO had a strong belief that opioids can enhance their social functioning. This finding is comparable to previous studies on NMUPD in college students. A clinical study in the US documented that college students asked for prescription drugs in health centers mostly for managing social anxiety (Kadison, 2005). Lord, Brevard, and Budman (2011) examined the motives for NMUPO among American college students on social networking websites and found the major motives were social- or tension-related including engaging in NMUPO to "relax" and "have fun". Similar findings have also been documented in the literature on alcohol use. In a number of studies on alcohol use expectancies, college students in the US report a social enhancement motivation (e.g., increased social interaction and social confidence). These social enhancement experiences are strongly associated with future level of drinking and binge drinking (Dunne & Katz, 2015; LaBrie et al., 2015; McBride, Barrett, Moore, & Schonfeld, 2014). Furthermore, an international study revealed a higher level of social enhancement expectancy of alcohol use in Asian college students than found in American college students (Ahn, 2012). The expectancy in social enhancement may also partially be reflected in the literature about the link between NMUPD and social-related outcomes, such as sexual behaviors. Benotsch, Koester, Luckman, Martin, and Cejka (2011) found that college students with NMUPD were more likely to engage in sexual risk behaviors (e.g., multiple sex

partners, having sex after using drugs, and unprotected sex). Taken together, it seems that social enhancement expectancy for NMUPO is an essential domain in college students, and it may be relatively important for students in China.

However, the current study also found a very high internal consistency for the social enhancement and tension reduction factor (α = .99), implying a high overlap across some items in this domain. This result may be related to a small sample for EFA and CFA (n < 200), resulting in limited power for differentiating between the overlapping items. Using a larger simple size, this subscale might divide into two shorter subscales, one with social enhancement items and a second with tension reduction items. Future research with a larger sample should investigate this possibility.

Inconsistent with previous literature on opioid expectancies (Ilgen et al., 2011), we did not find that pain reduction was a significant contributor to outcome expectancies in the NMUPOES. However, our initial pool of items only included a single item assessing a specific form of pain ("I can feel less headache"). This item was not retained in the final scale because it cross-loaded onto multiple factors. It is worth noting that this item may be limited by only asking a single type of pain. To further understand the role of pain relief in NMUPO expectancies in Chinese college students, future research may benefit from including a general pain-relief-item or more items related to different types of pain.

The results of the two-factor measurement model suggest four expectancy domains which can be loaded onto two higher-order factors, including positive expectancies (i.e., social enhancement and tension reduction, academic enhancement) and negative expectancies (i.e., physiological discomfort and guilt and dependence). This two-higher-order-factorial structure of the NMUPOES is consistent with alcohol outcome expectancies theory which proposes that

individuals would have beliefs not only about positive outcomes but also negative outcomes (Brown et al., 1985; Jones & McMahon, 1996). There are advantages to examining both positive and negative expectancies. First, these two types of expectancies may have different effects on substance use. Research has found that positive expectancies are associated with beginning alcohol use, but negative expectancies are associated with reductions in consumption (Lee, Greely, & Oei, 1999). Second, the two higher-order constructs may offer better statistical power for examining the association between expectancies and substance use outcomes. For example, Leigh and Stacy (1991) found that the domains in alcohol outcome expectancies measures were highly dependent and these expectancy domains should be viewed as joint predictors for drinking. They found that the specific expectancies subscales were not consistently associated with drinking behaviors, but the global positive and negative expectancies consistently predict drinking behaviors. Third, two types of expectancies may influence substance use outcomes through different mechanisms. Anthenien, Lembo, and Neighbors (2017) documented that two expectancy factors mediated the association between personality (e.g., negative urgency) and drinking behaviors among American college students. However, the mediation model suggested that the link between negative urgency and positive expectancies was mediated by emotional coping motive, but negative urgency was directly associated with negative expectancies, implying that positive expectancies influence drinking through a coping-related mechanism but negative expectancies do not. Accordingly, the two higher-order structure of the NMUPOES supports the outcome expectancy theory and potentially provides a sound measure to further examine the dual mechanism of positive and negative expectancies on future NMUPO in Chinese college students.

The current study found that positive expectancies were positively correlated with negative expectancies, which is opposite to the study hypothesis. However, previous studies on alcohol use have documented similar findings. Pedersen, Myers, Browne, and Norman (2014) and Stacy, Widaman, and Marlatt (1990) found that the positive expectancy factor was positively correlated with the negative expectancy factor among individuals engaging in alcohol use. Similarly, Nicolai et al. (2010) found that all alcohol expectancy domains (e.g., social enhancement, tension reduction, and physical discomfort) were positively correlated in their clinical sample and college student sample. This positive relationship between the two expectancy factors may be because the study participants all have NMUPO experience. According to the social learning theoretical framework, outcome expectancies are developed based on information stored in the long-term memory (Darkes & Goldman, 1993). Unlike nonusers who may establish their expectancies based on indirect experiences (e.g., information shared by others), substance users shape their outcome expectancies by accessing memories from their direct experiences not only about the social and emotional benefits but also the physiological effects of substance use (Pedroso, Oliveira, Araujo, Castro, & Melo, 2006). As a result, individuals with experience with substance use may have higher positive expectancies and may have higher negative expectancies at the same time. The results of the current study imply that Chinese college students engaging in NMUPO would be highly aware of both the benefits and the costs associated with opioids misuse.

Results of the SEM in the current study suggest a significant negative association between the negative expectancies factor with past-three-month NMUPO, revealing that Chinese college students who had more awareness about negative effects of opioids were less likely to engage in recent NMUPO. However, the model did not suggest a significant relationship

between positive expectancies and past-three-month NMUPO. This discrepancy may be due to a power issue. The current SEM found that positive expectancies was highly correlated with negative expectancies, leading to a multicollinearity problem. Such a multicollinearity between two latent factors may limit the power for a SEM (Grewal, Cote, & Baumgartner, 2004). It is worth noting that the multicollinearity may be associated with the small sample size. Hence, a SEM with a larger sample size may remedy the multicollinearity but could also have different results from the findings from the current study. In addition to the statistical issue, the difference may be related to the inconsistent effects of positive and negative expectancies by different users. The US literature on alcohol use has shown that negative expectancies are associated with reduction and cessation in alcohol consumption for both non-clinical and clinical samples (e.g., Lee et al., 1999; McMahon & Jones, 1994); however, positive expectancies are more likely to influence the consumption among clinical samples (e.g., Nicolai et al., 2010; Pedersen et al., 2014). Although there are no available clinical data in China, a Chinese study has documented that, among adolescents, negative expectancies were associated with reduction in alcohol consumption for both casual and heavy drinkers, while positive expectancies were only associated with increased drinking for heavy drinkers (Shell et al., 2010). Such discrepancies may be related to different levels of self-control across different users. Compared with light users, heavy users may have a lower level of self-control, leading to a focus on proximal benefits (positive expectancies; e.g., social enhancement); in contrast, the light users would have a higher self-control, would be more likely to be concerned about distal effects, and would make decisions based on detrimental effects (negative expectancies; e.g., guilt and dependence) (O'Donoghue & Rabin, 1999). Given that the sample in the current study were light users (80% of opioids misusers in this study reported a frequency of 15 NMUPO or lower in their lifetime

and a frequency of 2 NMUPO or lower in the past three months), negative expectancies would be more influential to their current NMUPO than positive expectancies. Future research should examine positive expectancies and negative expectancies and their associations with NMUPO among both clinical and non-clinical samples in China.

Another possible reason for the nonsignificant result of positive expectancies may be related to the measure of NMUPO. The alcohol use literature indicates that positive expectancies were consistently and strongly associated with quantity of drinking in college students (Carey, 1995; Mooney et al., 1987). The current study measured the frequency of NMUPO; however, the current study did not assess opioid dosage (e.g., number of opioid pills or strength of the specific pills used). Without data about the amount of opioids consumed, the current study may not able to find an association of positive expectancies with NMUPO. It would be worth assessing the dosage of NMUPO and examine its relationship with positive expectancies in Chinese college students in the future.

The current study also did an exploratory examination of the relationship between cultural orientation (individualism and collectivism) and outcome expectancy constructs in Chinese college students. However, results of the SEM did not suggest significant associations, revealing that NMUPO outcome expectancies among Chinese college students did not differ based on their individualistic and collectivistic perspectives. Although our findings did not show a direct association, cultural orientation may involve a moderation effect. For example, the ecological system theory suggests that individuals' maladaptive behaviors (e.g., NMUPO) are determined by factors from multiple levels (i.e., microsystem, mesosystem, exosystem, and macrosystem) (Bronfenbrenner, 1994). Instead of directly influencing the maladaptive behaviors, the factor in the distal system (macrosystem) would be associated with maladaptive behaviors

through an interaction with the factor from the proximal system (microsystem). Following this multi-level framework, cultural orientation, as a distal factor, may influence NMUPO through interaction with outcome expectancies, as a proximal factor. Given that a large sample size (N = 500 or more) is required for SEM with moderated latent variables (Harring, Weiss, & Li, 2015), the current study did not examine the interaction effect of cultural orientation in the relationship of positive and negative expectancies with NMUPO. Future research may benefit from exploring a moderation mechanism of cultural orientation between outcome expectancies and NMUPO among a larger sample of college students in China.

There are several methodological limitations in the current study. The first limitation is the small sample size for the factorial validation examination (EFA and CFA). As mentioned above, the small sample size may have limited the statistical power to differentiate between the related items. In addition, although results of CFA showed significant factor loadings of each item on the corresponding latent expectancy factor, the overall model fit was poor. This poor model-fit result is obviously associated with the small sample size, especially for indicators such as RMSEA and SRMR, which are very sensitive to sample size (Meyers et al., 2016). Although the sample size of 102 reached the minimum requirement (Anderson & Gerbing, 1988; Tinsley & Tinsley, 1987), statistical literature suggests that a sample size of 200 or more can provide moderate to good power for a CFA or SEM with 20 or more variables (Kline, 2010). The second limitation related to the measure validation is about the sample used for CFA. The current study randomly assigned the whole sample into two partitions for employing EFA and CFA. However, such an approach may induce a threat to internal validity because two samples are from the same dataset. Instead of using partitional samples from the same dataset, the literature suggests that CFA should be employed among new samples (Clark & Watson, 1995). Accordingly, future

studies should collect data with a larger sample size. It is also worth employing a new CFA to examine the factorial validation of the revised NMUPOES.

In addition, it is important to note that the current study used convenience sampling in two universities. The findings in this study are not representative of all college students in China. Although existing evidence has shown that web-based questionnaires can facilitate the candid reporting of risk behaviors (Cook, Heath, & Thompson, 2000), such methodology is limited by only reaching college students who have access to the SONA system and who are familiar with online surveys. Moreover, all analyses were employed based on cross-sectional data, making it impossible to determine causality. The cultural differences (e.g., different pharmaceutical management, different level of academic strain, and different prescription education/prevention) between the two universities may cause additional sample bias, leading to confounding effects and increasing the threats to validity. Future studies should be conducted in additional universities across diverse Chinese cities with a longitudinal study design.

Despite these methodological limitations, as the first attempt to develop and validate a measure of outcome expectancies for NMUPO in Chinese college students, the current preliminary study has several compelling implications. From a theoretical perspective, this study developed an NMUPOES based on outcome expectancy theory for Chinese college students and found a number of domains of outcome expectancies (as well as two higher-order constructs; positive and negative expectancies) comparable to US studies. These findings also support the theory of rational addiction, which states that individuals decide to engage in addictive goods (e.g., opioids) depending on their previous consumption and unobservable cognitive constructs developed from their previous experiences (or called capital stock), such as perceived effects of addictive substances (Becker & Murphy, 2002). Hence, to better understand NMUPO among

Chinese college students, it is worth assessing cognitive processes in which individuals develop their beliefs about benefits and risks associated with NMUPO. From a practice perspective, the current study found that negative expectancies were a protective factor for current NMUPO in Chinese college students. Given the success of the expectancy challenge intervention for drinking reduction (e.g., Lau-Barraco & Dunn, 2008), future NMUPO intervention programs for Chinese college students may benefit from concentrating on outcome expectancies and utilizing cognitive challenging strategies, such as the Activating-event-Belief-Consequence (ABC) model in cognitive behavioral therapy (Ellis, 1957). Although illicit drug use is usually assessed in mental health settings, the use of prescription drugs (e.g., NMUPO) is not often assessed. Given that some expectancy domains identified in the current study may be associated with psychological distress (e.g., tension reduction), the evaluation of NMUPO may be warranted for young adults receiving mental health treatment.

The purpose of the current preliminary study was to develop a psychometrically appropriate and theory-guided measure of outcome expectancies for college students who engaged in NMUPO in China. The current study identified four subscales of expectancies (i.e., social enhancement and tension reduction, academic enhancement, physiological discomfort, and guilt and dependence) and a two-higher-order-factorial structure (i.e., positive expectancies and negative expectancies). The current study also found that negative expectancies appear to be a protective factor for current NMUPO in Chinese college students. The findings of the current study highlight the role of cognitive constructs in NMUPO in Chinese young adults and provide implications for opioid intervention prevention. Future research should validate the NMUPOES using a large sample size and determine outcome expectancies and their associations with NMUPO in both clinical and non-clinical samples in China.

List of References

Aarons, G. A., Brown, S. A., Stice, E., & Coe, M. T. (2001). Psychometric evaluation of the marijuana and stimulant effect expectancy questionnaires for adolescents. *Addictive Behaviors*. https://doi.org/10.1016/S0306-4603(00)00103-9

Ahn, S. (2012). Exploring Alcohol Expectancies in Korea and America Using the Holism Theory.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. https://doi.org/10.1016/0749-5978(91)90020-T

Anderson, J. C., & Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach. *Psychological Bulletin*. https://doi.org/10.1037/0033-2909.103.3.411

Anthenien, A. M., Lembo, J., & Neighbors, C. (2017). Drinking motives and alcohol outcome expectancies as mediators of the association between negative urgency and alcohol consumption. *Addictive Behaviors*. https://doi.org/10.1016/j.addbeh.2016.11.009

Arnett, J. J. (1997). Young people's conceptions of the transition to adulthood. *Youth and Society*, *29*(1), 3–23. https://doi.org/10.1177/0044118X97029001001

Arria, A. M., Wilcox, H. C., Caldeira, K. M., Vincent, K. B., Garnier-Dykstra, L. M., & O'Grady, K. E. (2013). Dispelling the myth of "smart drugs": Cannabis and alcohol use problems predict nonmedical use of prescription stimulants for studying. *Addictive Behaviors*, *38*(3), 1643–1650. https://doi.org/10.1016/j.addbeh.2012.10.002

Bandura, A. (1971). Social learning theory. *Social Learning Theory*. https://doi.org/10.1111/j.1460-2466.1978.tb01621.x

Bavarian, N. (2013). The illicit use of prescription stimulants on college campuses: A theoretical examination. *Dissertation Abstracts International: Section B: The Sciences and Engineering*.

Bavarian, N., Flay, B. R., Ketcham, P. L., & Smit, E. (2013). Illicit use of prescription stimulants in a college student sample: A theory-guided analysis. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2013.04.024

Becker, G. S., & Murphy, K. M. (2002). A Theory of Rational Addiction. *Journal of Political Economy*. https://doi.org/10.1086/261558

Benotsch, E. G., Koester, S., Luckman, D., Martin, A. M., & Cejka, A. (2011a). Non-medical use of prescription drugs and sexual risk behavior in young adults. *Addictive Behaviors*. https://doi.org/10.1016/j.addbeh.2010.08.027

Benotsch, E. G., Koester, S., Luckman, D., Martin, A. M., & Cejka, A. (2011b). Non-medical use of prescription drugs and sexual risk behavior in young adults. *Addictive Behaviors*,

36(1–2), 152–155. https://doi.org/10.1016/j.addbeh.2010.08.027

Benotsch, E. G., Martin, A. M., Koester, S., Mason, M. J., Jeffers, A. J., & Snipes, D. J. (2015). Driving under the influence of prescription drugs used nonmedically: Associations in a young adult sample. *Substance Abuse*, *36*(1), 99–105. https://doi.org/10.1080/08897077.2013.854287

Bohnert, A. S. B., Eisenberg, A., Whiteside, L., Price, A., McCabe, S. E., & Ilgen, M. A. (2013). Prescription opioid use among addictions treatment patients: Nonmedical use for pain relief vs. other forms of nonmedical use. *Addictive Behaviors*. https://doi.org/10.1016/j.addbeh.2012.11.005

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*. https://doi.org/10.1177/135910457000100301

Bronfenbrenner, U. (1994). Ecological models of human development. *Readings on the Development of Children. International Ensyclopedia of Education.*

Brown, S. A., Goldman, M. S., & Christiansen, B. A. (1985). Do Alcohol Expectancies Mediate Drinking Patterns of Adults? *Journal of Consulting and Clinical Psychology*. https://doi.org/10.1037/0022-006X.53.4.512

Carey, K. B. (1995). Alcohol-related expectancies predict quantity and frequency of heavy drinking among college students. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/0893-164X.9.4.236

Cattell, R. B. (1966). The Scree Test For The Number Of Factors. *Multivariate Behavioral Research*. https://doi.org/10.1207/s15327906mbr0102_10

Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*. https://doi.org/10.1037/1040-3590.7.3.309

Colliver, J. D., Kroutil, L. A., Dai, L., & Gfroerer, J. C. (2006). Misuse of prescription drugs: Data from the 2002, 2003, and 2004 National Surveys on Drug Use and Health. *Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies*.

Cook, C., Heath, F., & Thompson, R. (2000). A meta-analysis of response rates in web-or internet-based surveys. *Educational and Psychological Measurement*, *60*(6), 821–836. https://doi.org/10.1177/00131640021970934

Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment*. https://doi.org/10.1037/1040-3590.6.2.117

Corp, I. B. M. (2017). IBM SPSS Statistics: Version 24. IBM Corporation Chicago, IL.

Darkes, J., & Goldman, M. S. (1993). Expectancy Challenge and Drinking Reduction:

Experimental Evidence for a Mediational Process. *Journal of Consulting and Clinical Psychology*. https://doi.org/10.1037/0022-006X.61.2.344

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum Likelihood from Incomplete Data Via the EM Algorithm . *Journal of the Royal Statistical Society: Series B (Methodological)*. https://doi.org/10.1111/j.2517-6161.1977.tb01600.x

Dunne, E. M., & Katz, E. C. (2015). Alcohol outcome expectancies and regrettable drinking-related social behaviors. *Alcohol and Alcoholism*. https://doi.org/10.1093/alcalc/agv026

Ellis, A. (1957). Outcome of employing three techniques of psychotherapy. *Journal of Clinical Psychology*. https://doi.org/10.1002/1097-4679(195710)13:4<344::AID-JCLP2270130407>3.0.CO;2-9

Fromme, K., & D'Amico, E. J. (2000). Measuring adolescent alcohol outcome expectancies. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/0893-164X.14.2.206

George, D., & Mallery, P. (2010). SPSS for Windows step by step. A simple study guide and reference (10. Baskı). Boston, MA: Pearson Education, Inc.

Grewal, R., Cote, J. A., & Baumgartner, H. (2004). Multicollinearity and Measurement Error in Structural Equation Models: Implications for Theory Testing. *Marketing Science*. https://doi.org/10.1287/mksc.1040.0070

Guo, L., Xu, Y., Deng, J., He, Y., Gao, X., Li, P., … Lu, C. (2015). Non-medical use of prescription pain relievers among high school students in China: a multilevel analysis. *BMJ Open*, *5*(7), e007569.

Harring, J. R., Weiss, B. A., & Li, M. (2015). Assessing Spurious Interaction Effects in Structural Equation Modeling: A Cautionary Note. *Educational and Psychological Measurement*. https://doi.org/10.1177/0013164414565007

Huang, R.-Z., Yao, S.-Q., & Zou, T. (2006). Reliability and Validity of Individualism and Collectivism Scale in Chinese Students. *Chinese Journal of Clinical Psychology*, *14*(6), 564–565. Retrieved from http://www.airitilibrary.com/Publication/Index/10053611-200612-14-6-564-565-a

Ilgen, M. A., Roeder, K. M., Webster, L., Mowbray, O. P., Perron, B. E., Chermack, S. T., & Bohnert, A. S. B. (2011). Measuring pain medication expectancies in adults treated for substance use disorders. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2010.10.007

Jones, Barry T., Corbin, W., & Fromme, K. (2001). A review of expectancy theory and alcohol consumption. *Addiction*. https://doi.org/10.1046/j.1360-0443.2001.961575.x

Jones, Barry T., & McMahon, J. (1996). Changes in alcohol expectancies during treatment relate to subsequent abstinence survivorship. *British Journal of Clinical Psychology*. https://doi.org/10.1111/j.2044-8260.1996.tb01178.x

Jones, BARRY T., & Mcmahon, J. (1994). Negative alcohol expectancy predicts post-treatment abstinence survivorship: the whether, when and why of relapse to a first drink. *Addiction*. https://doi.org/10.1111/j.1360-0443.1994.tb03766.x

Juan, W., Jian-Xiong, D., Lan, G., Yuan, H., Xue, G., Jing-Hui, H., … Ci-Yong, L. (2015). Non-medical use of psychoactive drugs in relation to suicide tendencies among Chinese adolescents. *Addictive Behaviors*, *51*, 31–37. https://doi.org/10.1016/j.addbeh.2015.07.003

Kadison, R. (2005). Getting an edge—use of stimulants and antidepressants in college. *New England Journal of Medicine*, *353*(11), 1089–1091.

Kaiser, H. F. (1960). The Application of Electronic Computers to Factor Analysis. *Educational and Psychological Measurement*. https://doi.org/10.1177/001316446002000116

Kline, R. (2010). *Principles and practice of structural equation modeling*. *Structural Equation Modeling*. https://doi.org/10.1038/156278a0

Krischler, M., & Glock, S. (2015). Alcohol warning labels formulated as questions change alcohol-related outcome expectancies: A pilot study. *Addiction Research and Theory*. https://doi.org/10.3109/16066359.2015.1009829

Labbe, A. K., & Maisto, S. A. (2010). Development of the Stimulant Medication Outcome Expectancies Questionnaire for College Students. *Addictive Behaviors*. https://doi.org/10.1017/S1742170516000430

LaBrie, J. W., Huchting, K. K., Lac, A., Tawalbeh, S., Thompson, A. D., & Larimer, M. E. (2015). Preventing Risky Drinking in First-Year College Women: Further Validation of a Female-Specific Motivational-Enhancement Group Intervention. *Journal of Studies on Alcohol and Drugs, Supplement*. https://doi.org/10.15288/jsads.2009.s16.77

Lau-Barraco, C., & Dunn, M. E. (2008). Evaluation of a Single-Session Expectancy Challenge Intervention to Reduce Alcohol Use Among College Students. *Psychology of Addictive Behaviors*. https://doi.org/10.1037/0893-164X.22.2.168

Lee, N. K., Greely, J., & Oei, T. P. S. (1999). The relationship of positive and negative alcohol expectancies to patterns of consumption of alcohol in social drinkers. *Addictive Behaviors*. https://doi.org/10.1016/S0306-4603(98)00091-4

Leigh, B. C., & Stacy, A. W. (1991). On the Scope of Alcohol Expectancy Research: Remaining Issues of Measurement and Meaning. *Psychological Bulletin*. https://doi.org/10.1037/0033-2909.110.1.147

Looby, A., De Young, K. P., & Earleywine, M. (2013). Challenging expectancies to prevent nonmedical prescription stimulant use: A randomized, controlled trial. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2013.03.003 LK - http://limo.libis.be/resolver?&sid=EMBASE&issn=03768716&id=doi:10.1016%2Fj.drugalcdep.2013.03.003&atitle=Challenging+expectancies+to+prevent+nonmedical+prescript

ion+stimulant+use%3A+A+randomized%2C+controlled+trial&stitle=Drug+Alcohol+Depend.&title=Drug+and+Alcohol+Dependence&volume=132&issue=1-2&spage=362&epage=368&aulast=Looby&aufirst=Alison&auinit=A.&aufull=Looby+A.&coden=DADED&isbn=&pages=362-368&date=2013&auinit1=A&auinitm=

Looby, Alison, & Earleywine, M. (2010). Psychometric evaluation of a prescription stimulant expectancy questionnaire. *Experimental and Clinical Psychopharmacology*. https://doi.org/10.1037/a0019347

Lord, S., Brevard, J., & Budman, S. (2011). Connecting to young adults: An online social network survey of beliefs and attitudes associated with prescription opioid misuse among college students. *Substance Use and Misuse*. https://doi.org/10.3109/10826084.2011.521371

Martins, S. S., & Ghandour, L. A. (2017). Nonmedical use of prescription drugs in adolescents and young adults: not just a Western phenomenon. *World Psychiatry*. https://doi.org/10.1002/wps.20350

Martins, S. S., Sampson, L., Cerdá, M., & Galea, S. (2015). Worldwide prevalence and trends in unintentional drug overdose: a systematic review of the literature. *American Journal of Public Health, 105*(11), e29–e49.

McBride, N. M., Barrett, B., Moore, K. A., & Schonfeld, L. (2014). The role of positive alcohol expectancies in underage binge drinking among college students. *Journal of American College Health*. https://doi.org/10.1080/07448481.2014.907297

McCabe, S. E., Boyd, C. J., & Teter, C. J. (2009). Subtypes of nonmedical prescription drug misuse. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2009.01.007

McCabe, S. E., Teter, C. J., & Boyd, C. J. (2006). Medical use, illicit use and diversion of prescription stimulant medication. *Journal of Psychoactive Drugs, 38*(1), 43–56. https://doi.org/10.1080/02791072.2006.10399827

McMahon, J., & Jones, B. T. (1994). SOCIAL DRINKERS'NEGATIVE ALCOHOL EXPECTANCY RELATES TO THEIR SATISFACTION WITH CURRENT CONSUMPTION: MEASURING MOTIVATION FOR CHANGE WITH THE NAEQ. *Alcohol and Alcoholism, 29*(6), 687–690.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2016). *Applied multivariate research: Design and interpretation*. Sage publications.

Miller, P. M., Smith, G. T., & Goldman, M. S. (1990). Emergence of alcohol expectancies in childhood: a possible critical period. *Journal of Studies on Alcohol*.

Mooney, D. K., Fromme, K., Kivlahan, D. R., & Marlatt, G. A. (1987). Correlates of alcohol consumption: Sex, age, and expectancies relate differentially to quantity and frequency. *Addictive Behaviors*. https://doi.org/10.1016/0306-4603(87)90033-5

Muhuri, P. K., Gfroerer, J. C., & Davies, M. C. (2013). CBHSQ Data Review. *Center for Behavioral Health Statistics and Quality, SAMHSA*.

Mundfrom, D. J., Shaw, D. G., & Ke, T. L. (2005). Minimum Sample Size Recommendations for Conducting Factor Analyses. *International Journal of Testing*. https://doi.org/10.1207/s15327574ijt0502_4

Muthén, L., & Muthén, B. (2017). *Mplus user's guide (8th ed.)*. *Los Angeles: Author*. https://doi.org/10.13155/29825

Nadorff, M. R., Nazem, S., & Fiske, A. (2011). Insomnia symptoms, nightmares, and suicidal ideation in a college student sample. *Sleep*, *34*(1), 93–98. https://doi.org/10.1093/sleep/34.1.93

Nelson, L., Badger, S., & Wu, B. (2004). The influence of culture in emerging adulthood: Perspectives of Chinese college students. *International Journal of Behavioral Development*, *28*(1), 26–36. https://doi.org/10.1080/01650250344000244

Nicolai, J., Demmel, R., & Moshagen, M. (2010). The Comprehensive Alcohol Expectancy Questionnaire: Confirmatory factor analysis, scale refinement, and further validation. *Journal of Personality Assessment*. https://doi.org/10.1080/00223891.2010.497396

Nicolai, J., Moshagen, M., & Demmel, R. (2012). Patterns of alcohol expectancies and alcohol use across age and gender. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2012.05.040

O'Donoghue, T., & Rabin, M. (1999). Addiction and self-control. *Addiction: Entries and Exits*, *169206*.

Oei, T. P. S., & Morawska, A. (2004). A cognitive model of binge drinking: The influence of alcohol expectancies and drinking refusal self-efficacy. *Addictive Behaviors*. https://doi.org/10.1016/S0306-4603(03)00076-5

Parks, K. A., Levonyan-Radloff, K., Przybyla, S. M., Darrow, S., Muraven, M., & Hequembourg, A. (2017). University student perceptions about the motives for and consequences of nonmedical use of prescription drugs (NMUPD). *Journal of American College Health*. https://doi.org/10.1080/07448481.2017.1341895

Pedersen, E. R., Myers, U. S., Browne, K. C., & Norman, S. B. (2014). The Role of Alcohol Expectancies in Drinking Behavior among Women with Alcohol Use Disorder and Comorbid Posttraumatic Stress Disorder. *Journal of Psychoactive Drugs*. https://doi.org/10.1080/02791072.2014.917750

Pedroso, R. S., Oliveira, M. da S., Araujo, R. B., Castro, M. da G., & Melo, W. V. (2006). Outcome expectancy considering the use of alcohol, cannabis and tobacco. *Revista de Psiquiatria Do Rio Grande Do Sul*, *28*(2), 198–206.

Scutti, S., & Jimison, R. (2018). Surgeon general urges more Americans to carry opioid

antidote naloxone. Retrieved from https://www.cnn.com/2018/04/05/health/ surgeon-general-naloxone/index.html.

Shell, D. F., Newman, I. M., & Fang, X. (2010). The influence of cultural orientation, alcohol expectancies and self-efficacy on adolescent drinking behavior in Beijing. *Addiction*. https://doi.org/10.1111/j.1360-0443.2010.03006.x

Sher, K. J., Wood, M. D., Wood, P. K., & Raskin, G. (1996). Alcohol outcome expectancies and alcohol use: A latent variable cross- lagged panel study. *Journal of Abnormal Psychology*. https://doi.org/10.1037/0021-843X.105.4.561

Shesgreen, D. (2016). Doctor wants overdose antidote in every medicine cabinet. Retrieved from https://www.usatoday.com/story/news/health/2016/03/04/doctor-wants-overdose-antidote-every-medicine-cabinet/81291850/

Stacy, A. W., Widaman, K. F., & Marlatt, G. A. (1990). Expectancy Models of Alcohol Use. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/0022-3514.58.5.918

Substance Abuse and Mental Health Services Administration. (2014). Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings. *NSDUH Series H-48, HHS Publication No. (SMA) 14-4863. Rockville, MD: Substance Abuse and Mental Health Services Administration*. https://doi.org/NSDUH Series H-41, HHS Publication No. (SMA) 11-4658

Substance Abuse and Mental Health Services Administration. (2017). *Results from the 2016 National Survey on Drug Use and Health: Detailed Tables. Center for Behavioral Statistics and Quality*. https://doi.org/10.1111/j.1463-1326.2009.01151.x

Tam, C. C., Benotsch, E. G., Wang, X., Lin, D., Du, H., & Chi, P. (2018). Non-medical use of prescription drugs and cultural orientation among college students in China. *Drug and Alcohol Dependence*. https://doi.org/10.1016/j.drugalcdep.2018.08.012

Tinsley, H. E. A., & Tinsley, D. J. (1987). Uses of Factor Analysis in Counseling Psychology Research. *Journal of Counseling Psychology*. https://doi.org/10.1037/0022-0167.34.4.414

Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology*, *74*(1), 118–128. https://doi.org/10.1037/0022-3514.74.1.118

Unodc. (2012). United Nations Office on Drugs and Crime. *World Drug Report*, (October 2012), 1–2. https://doi.org/10.1163/15718085-12341263

Upadhyaya, H. P., Kroutil, L. A., Deas, D., Durell, T. M., Van Brunt, D. L., & Novak, S. P. (2010). Stimulant Formulation and Motivation for Nonmedical Use of Prescription Attention-Deficit/Hyperactivity Disorder Medications in a College-Aged Population. *The American Journal on Addictions*, *19*(6), 569–577.

Worthington, R. L., & Whittaker, T. A. (2006). Scale Development Research: A Content Analysis and Recommendations for Best Practices. *The Counseling Psychologist*. https://doi.org/10.1177/0011000006288127

Yuan, K. H., Marshall, L. L., & Bentler, P. M. (2002). A unified approach to exploratory factor analysis with missing data, nonnormal data, and in the presence of outliers. *Psychometrika*. https://doi.org/10.1007/BF02294711

Appendices

Appendix 1: QUESTIONNAIRE (ENGLISH VERSION)

A. Background

1. Age _____
2. What is your gender?
   ①Male ② Female ③ Transgender ④ Other:_____

3. What is your Ethnicity/race?
   ①Han ② other: _____

4. What is your college year?
   ①Freshmen ② Sophomore ③ Junior ④ Senior ⑤ Other_____

5. How much money on average do you receive per month (from sources such as financial supports from family, scholarship, employment, and any financial source available for college life)

   _____(RMB)_

B. Non-medical use of Prescription drug

1. In your lifetime, have you ever used a prescription medication (e.g., OxyContin, Robitussin A-C) ***WITHOUT a doctor's prescription***?
   ①Yes ② NO

2. The following questions ask on how many occasions in your lifetime or in the past 3 months you have used the following types of prescription medications ***without a doctor's prescription***. **Please fill in the blanks. If you've never taken a medication without a doctor's prescription, please enter a 0 in the space provided.**

	Lifetime	Past 3 months
	Number of times	**Number of times**
(1) Tylenol with codeine		
(2) Empirin with codeine		
(3) Demerol		
(4) Actiq/ Duragesic/ Sublimaze		
(5) OxyContin		
(6) Percocet		
(7) Tramadol		
(8) Compound aminopyrine phenacetin tablets		
(9) Scattered analgesics		
(10) Robitussin A-C		
(11) Percodan		

(12) Dilaudid		
(13) Tylox		
(14) Compound liquorice tablets		
(15) Compound codeine phosphate oral solution		
(16) Dimotil/Lomotil		
(17) Other opioids or pain meds List: _____		
(18) Halcion		
(19) Ambien/Stilnox		
(20) Phenobarbital and scopolamine		
(21) Rohypnol		
(22) Dormicum		
(23) Other sedatives List: _____		
(24) Xanax		
(25) Valium		
(26) Librium		
(27) Ativan/Loran		
(28) Klonopin/Rivotril		
(29) Amytal		
(30) Nembutal		
(31) Seconal		
(32) Estazolam		
(33) Mogadon		
(34) Other anxiolytics List: _____		
(35) Ritalin		
(36) Concerta		
(37) Biphetamine/Adderall		
(38) Dexedrine		
(39) Mephedrone		
(40) Other stimulants List: _____		

C. Nonmedical use of prescription drug expectancies

To what extent do you agree with the following items when you're using the prescription medication you use the MOST without a prescription?

	Not at all				**Definitely**
(1) I am more relaxed and more at ease socially	1	2	3	4	5
(2) I am not so shy anymore	1	2	3	4	5

	Not at all				Definitely
(3) It's easier for me to approach other people	1	2	3	4	5
(4) I am more daring	1	2	3	4	5
(5) I can open up to express myself	1	2	3	4	5
(6) I can get to know people more easily	1	2	3	4	5
(7) I start making myself the center of attention	1	2	3	4	5
(8) It doesn't matter as much anymore what people think of me	1	2	3	4	5
(9) I can enjoy parties more	1	2	3	4	5
(10) I can be more outgoing	1	2	3	4	5
(11) I can be more humorous	1	2	3	4	5
(12) I am more assertive	1	2	3	4	5
(13) Somehow I think everything is funnier-at any rate, I laugh more	1	2	3	4	5
(14) My self-confidence increases	1	2	3	4	5
(15) I am more likely to come out of my shell	1	2	3	4	5
(16) I am less self-conscious	1	2	3	4	5
(17) I am more prepared to take risks	1	2	3	4	5
(18) I would find studying more enjoyable	1	2	3	4	5
(19) I feel more happy	1	2	3	4	5
(20) I feel as though everything is right in the world	1	2	3	4	5
(21) I feel more brave	1	2	3	4	5
(22) I feel less lonely	1	2	3	4	5
(23) I feel more energetic	1	2	3	4	5
(24) I can switch my mind off better	1	2	3	4	5
(25) I am not so tensed up anymore	1	2	3	4	5
(26) I can forget about my problems and worries	1	2	3	4	5
(27) I am more tranquil	1	2	3	4	5
(28) I can fall asleep better	1	2	3	4	5
(29) I no longer feel so rushed or under time pressure	1	2	3	4	5
(30) I can cool off faster when I'm angry	1	2	3	4	5
(31) I can feel less guilt	1	2	3	4	5
(32) I can feel less frustrated	1	2	3	4	5
(33) I would get better grades	1	2	3	4	5
(34) I would be able to concentrate/focus better	1	2	3	4	5
(35) I would be able to stay awake for a long time	1	2	3	4	5
(36) I can learn/work efficiently	1	2	3	4	5
(37) My thoughts would be able to stay on track better	1	2	3	4	5
(38) My mind will be razor sharp	1	2	3	4	5
(39) My mind will not wander	1	2	3	4	5
(40) I can study for hours	1	2	3	4	5
(41) My memory is better	1	2	3	4	5
(42) Distractions disappear	1	2	3	4	5
(43) I will not end up daydreaming	1	2	3	4	5
(44) I am able to sit still	1	2	3	4	5
(45) I would be able to more productive	1	2	3	4	5

	Not at all				Definitely
(46) I feel high	1	2	3	4	5
(47) I would lose weight	1	2	3	4	5
(48) I can feel less pain	1	2	3	4	5
(49) I can feel better physically	1	2	3	4	5
(50) I am able to feel better after physical activity	1	2	3	4	5
(51) I can feel less headache	1	2	3	4	5
(52) I can feel less hungry	1	2	3	4	5
(53) I have difficulty concentrating	1	2	3	4	5
(54) I can no longer follow a conversation very well	1	2	3	4	5
(55) I become sluggish	1	2	3	4	5
(56) I can't think clearly anymore	1	2	3	4	5
(57) I get tired	1	2	3	4	5
(58) I feel listless	1	2	3	4	5
(59) I have difficulty judging situations correctly	1	2	3	4	5
(60) I am less productive	1	2	3	4	5
(61) I would feel dizzy/lightheaded	1	2	3	4	5
(62) I feel sick to my stomach	1	2	3	4	5
(63) My heart would race	1	2	3	4	5
(64) I would get headaches	1	2	3	4	5
(65) I will feel like I "crash" after taking it	1	2	3	4	5
(66) I will fell jittery and shaky	1	2	3	4	5
(67) I worry that I'm addicted to it	1	2	3	4	5
(68) I've come to see it as a crutch	1	2	3	4	5
(69) I feel guilty for taking it	1	2	3	4	5
(70) I feel like I can't get through the day without it	1	2	3	4	5
(71) I feel like I'm cutting corners to do well	1	2	3	4	5

D. Cultural orientation

Please indicate how much you agree with each statement using the 5-point scale indicated below

	Strongly disagree				Strongly agree
1. I'd rather depend on myself than others.	1	2	3	4	5
2. I rely on myself most of the time; I rarely rely on others.	1	2	3	4	5
3. I often do "my own thing."	1	2	3	4	5
4. My personal identity, independent of others, is very important to me.	1	2	3	4	5
5. It is important that I do my job better than others.	1	2	3	4	5
6. Winning is everything.	1	2	3	4	5
7. Competition is the law of nature.	1	2	3	4	5
8. When another person does better than I do, I get tense and aroused.	1	2	3	4	5
9. If a coworker gets a prize, I would feel proud.	1	2	3	4	5
10. The well-being of my coworkers is important to me.	1	2	3	4	5
11. To me, pleasure is spending time with others.	1	2	3	4	5

12. I feel good when I cooperate with others.	1	2	3	4	5
13. Parents and children must stay together as much as possible.	1	2	3	4	5
14. It is my duty to take care of my family, even when 1 have to sacrifice what I want.	1	2	3	4	5
15. Family members should stick together, no matter what sacrifices are required.	1	2	3	4	5
16. It is important to me that I respect the decisions made by my groups.	1	2	3	4	5

Appendix 2: QUESTIONNAIRE (CHINESE VERSION)

問卷

A. 背景資料

1. 年齡 _____
2. 您的性別是?
   ①男　　② 女　③ 跨性別人士　④ 其他:_____

3. 您的民族是?
   ①漢族　　③ 其他：_____

4. 您現在是大學第幾年?
   ①第一年 ② 第二年　　③ 第三年　④ 第四年　⑤ 其他_____

5. 你每個月有多少收入（包括所有經濟來源如家庭支持、獎學金、職業收入）?
   _____（人民幣）

B. 處方藥的非醫療使用

1. 到目前為止，你有沒有曾經在**沒有得到醫生處方情況下**使用處方藥（如止咳水或速眠安)？
   ①Yes　② NO

2. 以下表中是一些處方藥物的名稱。在沒有獲得醫生處方的情況下，你分別在到目前為止以及過去 3 個月中，服用過以下藥物多少次？ 請在相對應的表格中填上次數。如果你從來沒有服用過該藥物，請在對應的表格中填上 “0”。

	到目前為止	**在過去 3 個月**
	次數	**次數**
(1) Tylenol with codeine 泰諾可待因 / 氨酚待因片		
(2) Empirin with codeine 阿司匹林可待因片/ 阿司匹林及可待因		
(3) Demerol 配西汀 / 哌替啶 / 度冷丁		
(4) Actiq/ Duragesic/ sublimaze 芬太尼 /多瑞吉		
(5) OxyContin 奥施康定/可待因酮/土海洛英 / 羟考酮/氧可酮		
(6) Percocet 泰勒宁		
(7) Tramadol 曲馬朵/麦道马隆/舒敏		

	到目前為止	在過去 3 個月
	次數	次數
(8) Compound aminopyrine phenacetin tablets 去痛片 / 复方氨基比林及非那西丁片		
(9) Scattered analgesics 解熱止痛散 / 止痛散		
(10) 其他止痛藥 List:_____		
(11) Robitussin A-C 飲 B / 諾比舒咳 AC / 惠菲宁 AC / 樂必治 AC / 愈创罂粟待因、克斯林、奥亭、欧博士		
(12) Percodan (阿司匹林及羟考酮)		
(13) Dilaudid 氫嗎啡酮 / 銳寧		
(14) Tylox 对乙酰氨基酚及羟考酮		
(15) Compound liquorice tablets 複方甘草片		
(16) Compound codeine phosphate oral solution 聯邦止咳露/佩夫人止咳露/克傷風感冒液/泰诺奇 / 复方磷酸可待因口服溶液)		
(17) Dimotil/lomotil 立消樂錠 / 苯乙呱啶 / 止瀉寧 / 地芬諾酯 / 复方地芬诺酯片		
(18) 其他鴉片類藥物 List: _____		
(19) Xanax 贊安諾 / 阿普唑侖/阿普唑侖		
(20) Valium / 煩寧 / 安定 / 羅 氏 五 號 / 羅 氏 十 號 / 為你安 / 地西泮 / 二氮平		
(21) Halcoin 酣樂欣 / 海樂神 / 三唑侖片 / 白瓜子 / 藍精靈 / 三唑侖		
(22) Librium 利彼鎮 / 綠豆仔 / 利 眠 寧 / 氯氮䓬		
(23) Ativan/Loran 安定文 / 勞拉西泮 / 奥善 / 罗拉		
(24) Klonopin/Rivotril 氯硝西泮 / 氯硝安定 / 十字架		
(25) Amytal 巴比妥酸鹽 / 巴比士酸鹽 / 青發 / 异戊巴比妥		

	到目前為止	在過去 3 個月
	次數	次數
(26) Nembutal 戊巴比妥／安寧藥丸（peaceful pill）		
(27) Seconal 速可眠 / 司可巴比妥／司可巴比妥钠／ 莉莉四十		
(28) Ambein/Stilnox 瑞樂時 / 唑吡坦／思諾施／酒石酸唑吡坦		
(29) Phenobarbital and scopolamine 腸賴泰錠劑 / 苯巴比特魯 / 苯巴比妥／苯巴比妥及东莨菪片		
(30) Rohypnol 十字架 / 氟 硝 安 定 / 氟硝西泮 / 羅眠樂 / 忘憂藥		
(31) Dormicum 藍精靈 / 速眠安 / 咪達唑侖 / 多美康		
(32) Estazolam 舒 樂 安 定 / 艾 司 唑 侖		
(33) Mogadon 耐妥眠 / 硝基安定 / 硝甲西泮 / 硝西泮 / “睡覺幫” / ”笑哈哈”		
(34) 其他鎮靜劑 List: _____		
(35) Ritalin 利他林（香港） / 立得寧 / 利他能 / 哌醋甲脂 / 哌甲酯		
(36) Concerta 專注達 / 專思達 / 哌甲酯		
(37) Biphetamine 黑美人 / 安非他命(明) / 苯丙胺		
(38) Dexedrine 右旋安非他命 / 右旋安非他明		
(39) Mephedrone 喵 喵		
(40) 其他興奮劑 List: _____		
(41) Prozac 百憂解 / 氟西汀		
(42) Paxil/Seroxat 克憂果 / 帕羅西汀 / 賽樂特		
(43) Celexa/Cipram 西酞普蘭 / 喜普妙		
(44) Zoloft 樂復得 / 舍曲林 / 復蘇樂		
(45) Effexor 速悅 / 文拉法辛 / 怡諾思		

	到目前為止	在過去 3 個月
	次數	次數
(46) Remeron 米氮平 / 瑞美隆 / 瑞美龍 / 樂活憂錠		
(47) 其他抗焦慮藥 List: _____		

C. 處方藥的非醫療使用期待

1. 你會多認同以下對服用處方藥的看法呢？請選出最合適的答案

我認為使用處方藥可以：	完全不同意				完全同意
1. 使我更放鬆和在社交時更自在	1	2	3	4	5
2. 使我不會在害羞	1	2	3	4	5
3. 使我更容易跟別人相處	1	2	3	4	5
4. 使我更大膽	1	2	3	4	5
5. 使我能更放開去表達自己	1	2	3	4	5
6. 使能更容易去認識他人	1	2	3	4	5
7. 使我自己正為被關注的中心	1	2	3	4	5
8. 使我不在在意別人對自己的自法	1	2	3	4	5
9. 使我能更享受聚會	1	2	3	4	5
10. 使我變得更外向	1	2	3	4	5
11. 使我變得更風趣幽默	1	2	3	4	5
12. 使我更武斷	1	2	3	4	5
13. 使我覺得一切都變得有趣，使我笑得更多	1	2	3	4	5
14. 使我更自信	1	2	3	4	5
15. 使我覺得更可能走出自己的身軀	1	2	3	4	5
16. 使減少自我意識	1	2	3	4	5
17. 使我更準備好去冒險	1	2	3	4	5
18. 使我更享受學習	1	2	3	4	5
19. 使我更開心	1	2	3	4	5
20. 使我覺得世上所有事都是對的	1	2	3	4	5
21. 使我更有勇氣	1	2	3	4	5
22. 使我感到不孤獨	1	2	3	4	5
23. 使我感到更有精力	1	2	3	4	5
24. 使我更好地切換我的想法 / 思路	1	2	3	4	5
25. 使我不再緊張起來	1	2	3	4	5
26. 使我能夠忘記煩心事	1	2	3	4	5
27. 使我更平靜	1	2	3	4	5
28. 使我更容易睡覺	1	2	3	4	5
29. 使我不再感到時間緊迫	1	2	3	4	5
30. 使我容易從憤怒平靜下來	1	2	3	4	5
31. 使我感到較少的罪惡感	1	2	3	4	5
32. 使我能感到較少沮喪	1	2	3	4	5
33. 使我能夠得到更好的成績	1	2	3	4	5

我認為使用處方藥可以：	完全不同意				完全同意
34. 使我能更好地集中	1	2	3	4	5
35. 使我可以持續長時間清醒	1	2	3	4	5
36. 使我工作更有效率	1	2	3	4	5
37. 使我的想法可以維持正確的方向	1	2	3	4	5
38. 使我的神志更敏脫	1	2	3	4	5
39. 使我神志不再游離	1	2	3	4	5
40. 使我可以學習多個小時	1	2	3	4	5
41. 使我有更好的記憶	1	2	3	4	5
42. 使我不再分心	1	2	3	4	5
43. 使我不會再做白日夢	1	2	3	4	5
44. 使我可以安心坐下來	1	2	3	4	5
45. 使我可以更有工作效率	1	2	3	4	5
46. 使我感到高昂	1	2	3	4	5
47. 使我減輕體重	1	2	3	4	5
48. 使我感到更少痛楚	1	2	3	4	5
49. 使我感到有更好的身體	1	2	3	4	5
50. 使我能在運動後感覺更好	1	2	3	4	5
51. 使我能感到更少的頭痛	1	2	3	4	5
52. 使我感到更少飢餓	1	2	3	4	5
53. 使我更難集中	1	2	3	4	5
54. 使我不能很好地進行對話	1	2	3	4	5
55. 使我我變得遲緩	1	2	3	4	5
56. 使我不能清晰地思考	1	2	3	4	5
57. 使我感到疲倦	1	2	3	4	5
58. 使我感到我覺得無精打采	1	2	3	4	5
59. 使我很難正確判斷形勢	1	2	3	4	5
60. 使我的效率降低	1	2	3	4	5
61. 使我會覺得頭暈/眼花	1	2	3	4	5
62. 使我感到反胃	1	2	3	4	5
63. 使我的心跳加快	1	2	3	4	5
64. 使我感到頭痛	1	2	3	4	5
65. 使我服用後感到混亂	1	2	3	4	5
66. 使我感到搖搖欲墜	1	2	3	4	5
67. 使我擔心我會上癮	1	2	3	4	5
68. 使我覺得我可以依靠它	1	2	3	4	5
69. 使我感到有罪惡感	1	2	3	4	5
70. 使我覺得不能一天沒有它	1	2	3	4	5
71. 使我覺得可以更快地做好事情	1	2	3	4	5

D．文化取向

以下說法符合你的特徵嗎？

	極不符合	**極為符合**

1. 我寧可依靠自己也不依靠別人	1	2	3	4	5
2. 我大多數依靠自己，很少依靠別人	1	2	3	4	5
3. 我常常做自己的事情	1	2	3	4	5
4. 做一個獨特的個體對我很重要	1	2	3	4	5
5. 對我來說，工作做得比別人好很重要	1	2	3	4	5
6. 贏重於一切	1	2	3	4	5
7. 競爭是自然規律	1	2	3	4	5
8. 當別人做得比我好時，我會變的緊張和敏感	1	2	3	4	5
9. 如果我的合作夥伴的到嘉獎，我會感到自豪	1	2	3	4	5
10. 合作夥伴的幸福對我而言很重要	1	2	3	4	5
11. 對我而言，與別人共度時光是快樂的	1	2	3	4	5
12. 當與別人合作的時候，我感到愉快	1	2	3	4	5
13. 父母和孩子必須盡可能多在一起相處	1	2	3	4	5
14. 儘管有時我不得不放棄自己的追求，但照顧好家庭是我的職責	1	2	3	4	5
15. 不管需要做出何種犧牲，家庭成員都應團結一起	1	2	3	4	5

72. 考	1	2	3	4	5
73. 使我感到疲倦	1	2	3	4	5
74. 使我感到我覺得無精打采	1	2	3	4	5
75. 使我很難正確判斷形勢	1	2	3	4	5
76. 使我的效率降低	1	2	3	4	5
77. 使我會覺得頭暈/眼花	1	2	3	4	5
78. 使我感到反胃	1	2	3	4	5
79. 使我的心跳加快	1	2	3	4	5
80. 使我感到頭痛	1	2	3	4	5
81. 使我服用後感到混亂	1	2	3	4	5
82. 使我感到搖搖欲墜	1	2	3	4	5
83. 使我擔心我會上癮	1	2	3	4	5
84. 使我覺得我可以依靠它	1	2	3	4	5
85. 使我感到有罪惡感	1	2	3	4	5
86. 使我覺得不能一天沒有它	1	2	3	4	5
87. 使我覺得可以更快地做好事情	1	2	3	4	5

E．文化取向

以下說法符合你的特徵嗎？

	極不符合				**極為符合**
16. 我寧可依靠自己也不依靠別人	1	2	3	4	5
17. 我大多數依靠自己，很少依靠別人	1	2	3	4	5
18. 我常常做自己的事情	1	2	3	4	5
19. 做一個獨特的個體對我很重要	1	2	3	4	5
20. 對我來說，工作做得比別人好很重要	1	2	3	4	5
21. 贏重於一切	1	2	3	4	5
22. 競爭是自然規律	1	2	3	4	5
23. 當別人做得比我好時，我會變的緊張和敏感	1	2	3	4	5
24. 如果我的合作夥伴的到嘉獎，我會感到自豪	1	2	3	4	5
25. 合作夥伴的幸福對我而言很重要	1	2	3	4	5
26. 對我而言，與別人共度時光是快樂的	1	2	3	4	5
27. 當與別人合作的時候，我感到愉快	1	2	3	4	5
28. 父母和孩子必須盡可能多在一起相處	1	2	3	4	5
29. 儘管有時我不得不放棄自己的追求，但照顧好家庭是我的職責	1	2	3	4	5
30. 不管需要做出何種犧牲，家庭成員都應團結一起	1	2	3	4	5

Vita

Cheuk Chi Tam was born on December 22, 1987, in Hong Kong Special Administrative Region of the People's Republic of China, and is a Hong Kong citizen. After receiving a Bachelor of Science at Beijing Normal University (BNU) in Beijing, China, he pursued the study in psychology, and obtained a Master's Degree of Art from BNU in 2012. He then worked as a research assistant in the School of Medicine in Wayne State University, Michigan, for three years (2012-2015). To pursue a doctoral degree in psychology, Cheuk Chi enrolled in the Ph.D. program in Health Psychology at Virginia Commonwealth University (VCU), Virginia, from 2015. As a progressive achievement, he was awarded a Master's Degree of Science in Psychology from VCU in 2017.