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Cheuk Chi Tam

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NON-MEDICAL USE OF PRESCRIPTION DRUGS, STRESS, CULTURAL ORIENTATION,  
UTILIZATION OF HEALTHCARE, AND PROTECTIVE FACTORS AMONG COLLEGE  
STUDENTS IN CHINA

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science  
at Virginia Commonwealth University

By

Cheuk Chi Tam  
M.A. in Developmental Psychology,  
Beijing Normal University, Beijing, China, 2012

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

Virginia Commonwealth University  
Richmond, Virginia  
October 2017

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## Abstract

### NON-MEDICAL USE OF PRESCRIPTION DRUGS, STRESS, CULTURAL ORIENTATION, UTILIZATION OF HEALTHCARE, AND PROTECTIVE FACTORS AMONG COLLEGE STUDENTS IN CHINA

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science  
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**Background:** Non-medical use of prescription drugs (NMUPD) refers to the use of prescription drugs which are traditionally utilized to manage pain or treat psychiatric problems but without a doctor's prescription. In 2010, an investigation by the Substance Use and Mental Health Services Administration (SAMHSA) revealed that 5.3% of young adults (18 to 25-year-olds) in the United States reported past-month NMUPD. NMUPD has become a growing concern owing to associations with consequences such as college dropout, poor academic achievement, and health jeopardizing behaviors. College students' NMUPD has been well documented in the United States. Limited studies, however, have been conducted among college students in China. The purposes of this study are to examine the prevalence and motives of NMUPD among college students in China, and to assess its relationship with stress (i.e., perceived stress and traumatic events), mental health problems (depression, anxiety, and post-traumatic stress disorder (PTSD)), utilization of healthcare, cultural orientation, and protective factors (i.e., resilience and future

orientation). **Methods:** In Jan-April 2017, online data were collected using SONA system from a total of 720 undergraduates at Beijing Normal University (BNU) and University of Macau (UM) with an average age of 19.65. All participants reported their nonmedical use of prescription drugs (i.e., opioids, sedatives, stimulants, and anxiolytics) in their lifetime and the past three months, stress, mental health, utilization of healthcare, cultural orientation, and protective factors.

Spearman's rank-order corrections and logistic regression were employed for statistical analyses.

**Results:** Findings indicate that 41.2% of Chinese students reported taking prescription drugs without a doctor's prescription. The most commonly misused prescription drugs were opioids (40.5% lifetime use, 31.8% past-three-months use), followed by sedatives (1.8% lifetime, 0.8% past 3 months), anxiolytics (0.9% lifetime, 0.3% past three months), and stimulants (0.2% lifetime, 0% past three months). Bivariate analyses suggest significantly positive correlations of lifetime NMUPD with mental health problems (anxiety and PTSD), cultural orientation (individualism and collectivism), and utilization of healthcare (frequency of healthcare use, time spent for healthcare, and money spent for healthcare). Similar results were found in terms of past-three-month NMUPD. The results of logistic regressions indicate the significant association of lifetime NMUPD with individualism of cultural orientation, and frequency of healthcare use. Specially, individualism, frequency of healthcare use, and time spent for healthcare were found to be associated with lifetime opioid misuse, and depression was significantly associated with sedative misuse. Resilience was negatively associated with lifetime sedative misuse. Frequency of healthcare use was also found to be positively associated with past-three-month opioid misuse.

**Conclusion:** Utilization of healthcare, cultural orientation, and mental health problems appear to be the factors associated with NMUPD among college students at BNU and UM. More discussion is needed in Chinese society about regulation of prescription drug use. Future



culturally-tailored prevention intervention programs may be beneficial to reduce the risk of NMUPD among Chinese college students.

**Keywords: nonmedical use of prescription drugs, individualism, collectivism, utilization of healthcare, resilience, Chinese college students**

## Introduction and background

Non-medical use of prescription drugs (NMUPD) refers to the use of prescription drugs that are traditionally used to manage pain or treat psychiatric problems but without approval from a physician (McCabe, Teter, Boyd, Knight, & Wechsler, 2005). The commonly misused prescription drugs can be divided into several categories, including sedatives (e.g., Ambien), stimulants (e.g., Ritalin), opioids (e.g., OxyContin), and anxiolytics (e.g., Ativan). It is estimated that 26 to 36 million people worldwide engage in NMUPD (UNODC, 2012). NMUPD has increased substantially in recent decades, and these numbers have been growing at a faster rate than illicit drug use. An American national investigation found that, between 1993 and 2005, NMUPD increased 343% for painkillers, 93% for stimulants, 450% tranquilizers, and 225% for sedatives (National Center on Addiction and Substance Abuse [NCASA] at Columbia University, 2007).

College students contribute the greatest number to NMUPD incidence and have the highest rates of NMUPD (Substance Use and Mental Health Service Administration, 2006; McLarnon, Stewart, & Berrent, 2012). National investigations in the United States (US) document that approximately 5.3% of 18- to 25-year-olds report past-month NMUPD, while 3.0% of youth aged 12-17 and 2.2% for adults with 26 and older age report past-month NMUPD (SAMHSA, 2011). In addition, other studies estimate the prevalence of NMUPD among college students between 2.5% (past-three-month use) to 35.6% (lifetime use) (Wells et al., 2015; Bavarian et al., 2013). Moreover, the NMUPD trend has continued to increase in the college student population. Existing evidence shows significant increases in past-year and lifetime nonmedical use of stimulants from 5.4 % (past-year) and 8.1% (lifetime) in 2003 to 9.3% (past-year) and 12.7% (lifetime) in 2013 (Bavarian et al., 2015; McCabe, West, Teter, & Boyd, 2014).

## **NMUPD in China**

Illicit drug (e.g., heroin and opium) misuse among adolescents and young adults is a significant public health problem in China (Zhang & Chin, 2015). Significant efforts have been made by Chinese health researchers and practitioners to develop and implement a variety of prevention interventions, and these programs have been found to be effective in preventing and decreasing illicit drug use among youth in China (Zhimin et al., 2001). However, recent research indicates a shift of the drug use pattern from use of illicit drugs to NMUPD in China (Xinhua, 2006). There are only a few studies on NMUPD among the Chinese population. Studies conducted in southern China found that the prevalence of lifetime NMUPD was 2.9% to 14.2% among high school students, higher than illicit drug use in China (1%) (Guo & Lu, 2014; Guo et al., 2015; Wu et al., 2016). In addition, Wu et al (2016) held a study in secondary vocational schools in six Chinese cities and found that 3.49% of students reported lifetime NMUPD. NMUPD has also been documented in Hong Kong and Macau. Two investigations of hospital records in Hong Kong revealed that 11.9% of registered clinic cases reported nonmedical use of sedatives and 26.7% cases engaged in opioid misuse (Lam et al., 1996; Ming, 2005). A study in Macau documented that 68.4% of patients in a psychiatric ward were diagnosed with opioid abuse (Duarte, Wong, & Lao, 2008). Although several studies have assessed NMUPD in China, most of these focused on high school students and clinic cases. Scant literature examines the prescription drug misuse pattern among college students.

## **Consequences related to NMUPD**

NMUPD among college students can be detrimental. The US literature shows NMUPD is associated with college dropout, worse employment outcomes following graduation, sexual victimization, health-jeopardizing behaviors such as driving under the influence, and high-risk

sexual behaviors (Benotsch et al., 2011; Benotsch et al., 2015; Arria et al., 2013). In addition, college students who engage in NMUPD report higher rates of poly-substance use including use of illicit drugs such as cocaine, ecstasy, and amphetamine-like substances (Benotsch et al., 2011). In addition to behavioral risks, NMUPD is also deleterious to psychological and physical well-being. NMUPD has been linked with mental health symptoms (e.g., depression and anxiety), poor sleep, deliberate self-harm, suicidal ideation, and suicidal attempts (Juan et al., 2015; Zullig & Divin, 2012; Martins et al., 2012). Furthermore, NMUPD can lead to fatal consequences. The number of unintentional overdose and poisoning deaths from prescription pain relievers has skyrocketed since 1999 (Dowell, Haegerich. & Chou, 2016; Hall et al., 2008). The death toll across all age groups from NMUPD exceeds that for all illicit substances combined (Wunsch et al., 2009). Hence, NMUPD has become a clear threat to public health and prompted health researchers and health caregivers to take action to prevent and reduce NMUPD among young adults (Looby et al., 2013).

### **Demographic factors and NMUPD**

A number of demographic variables, such as gender, age, and socioeconomic status (SES), have been found to be associated with NMUPD. McCabe et al. (2005) conducted a study among college students in the US and found that males reported significantly higher NMUPD. Similar gender patterns of use have been documented among high school students in China (Juan et al., 2015). Age has also shown a consistent relationship to NMUPD. For instance, Juan and colleagues (2015) found that Chinese youths with higher age reported greater frequency of NMUPD. Moreover, socioeconomic status is linked with NMUPD. In the US, Simoni-Wastila et al. (2004) indicated that people with higher SES (having a job) have higher likelihood of

engaging in NMUPD. A Chinese study held by Wang et al. (2014) revealed similar results showing that adolescents with higher SES reported higher NMUPD.

### **Motives of NMPUD**

Several American studies have shed light on motives of NMUPD. For example, Boyd and McCabe (2006) conducted a web-based survey among adolescents in the US and identified a variety of motivations for NMUPD, including self-medication (e.g., help me sleep, relieve pain, lose weight), schooling (e.g., study, concentration, and alertness), and some other at-risk motives (e.g., give me a high, counteracts effects of other drugs, safer than street drugs, experimentation, and I'm addicted). Individuals consistently reported self-medication motives across prescription drug classes in the US (e.g., Boyd & McCabe, 2006; McCabe et al., 2009; Rozenbroek & Rothstein, 2011; Rigg & Ibanez, 2010). The pattern of motivation for NMPUD varies by prescription drug classes. For individuals with nonmedical use of opioids or sedatives, self-medication (e.g., pain relief and to sleep) was a common motive, while study-related motives (e.g., "help with concentration", "increase alert") and "to get high" were identified as the main motive for stimulant misusers (Boyd & McCabe, 2006; University of Michigan Substance Abuse Research Center, 2001). However, only a few studies in China have assessed the motives for NMUPD. One study conducted among college students in southern China and found that most participants reported their NMUPD due to self-medication (Guo, Yang, Wang, Wang, & Li, 2003).

### **Stress and NMUPD**

In order to develop appropriate prevention interventions, US researchers have conducted exploratory studies to understand the psychological reasons for NMUPD among young adults.

The literature emphasizes the role of stress on substance use among college students. College life is known as a stressful period for young adults who face various challenges including heavy academic workload, fear of failure, competition for high grades, and anxiety of separation from families (Ford & Schroeder, 2008; Mattanah, Hancock, & Brand, 2004). Within this high stress environment, college students may engage in substance use to manage the pressure. College students with higher levels of perceived stress report greater levels of drinking and a greater number of substance-related problems (Colder & Chassin, 1993; Carpenter & Hasin, 1999; Broman, 2005). Similar results have also been found in NMUPD studies. Ford & Schroeder (2008) found that college students who experienced academic strain reported higher negative affect and nonmedical use of prescription stimulants. Besides current perceived stress, studies have examined relationships between traumatic experiences and NMUPD among young adults. Life history of exposure to traumatic events, such as child abuse and history of rape, are associated with increased likelihood of NMUPD in young adults (Kubiak, Arfken, Boyd, & Cortina, 2006; McCauley et al., 2011). Although the existing Chinese literature documents the role of stress on illicit drug misuse (e.g., Wang, Du, Sun, Wu, Xiao, & Zhao, 2010), limited research has examined the association between stress and NMUPD among college students in China.

### **Post-traumatic stress disorder and NMUPD**

American literature has highlighted the risk of NMUPD among people experiencing serious emotional problems, such as post-traumatic stress disorder (PTSD). For example, McCauley et al. (2012) conducted a study among more than 3000 adolescents in the US and found that lifetime history of PTSD was associated with increased likelihood of NMUPD. Similar results were found in Chinese studies about substance use. Several studies have

documented substance use (i.e., illicit drug misuse and alcohol misuse) among people suffering from PTSD in China (Zeng, 2012; Hong et al., 2015; Wang et al., 2010). Other Chinese literature has focused on PTSD-related behaviors and NMUPD. Guo et al. (2016) held a study among Chinese adolescents and found a significant association of suicidal ideation and suicidal attempts with NMUPD. Despite those findings, there is a dearth of studies that have examined the relationship between PTSD and NMUPD among young adults in China.

### **Cultural orientation and NMUPD**

Cultural orientation (i.e., individualism versus collectivism) differs across world regions and may play essential role in substance use (Herman-Stahl, Spencer, & Duncan, 2003). Young adults with different cultural orientations have inconsistent perceptions and attitudes towards substance use (Nelson, Badger, & Wu, 2004). Young adults with an individualism cultural orientation may view young adulthood as a period for identity exploration without fully taking on adult responsibilities; in contrast, individuals with a collectivism cultural orientation may have greater expectation of obligation towards society, such as being less self-oriented and developing greater consideration for others (Nelson, Badger, & Wu, 2004; Arnett, 1997). Such differences in cultural orientation may lead to disparate attitudes towards risk behaviors. Individuals with an individualistic orientation may perceive substance use to be acceptable because these behaviors reflect independence, but people with a collectivist orientation may perceive substance use more negatively due to the potential shame and embarrassment that they may bring to society and family (Nelson et al., 2004). For instance, Johnson (2007) integrated the findings from the international literature about substance use and found that misuse of illicit drugs (cannabis and ecstasy) were higher within nations with an individualistic cultural orientation (e.g., U.S.). Cultural orientation is also associated with attitudes towards illicit drug

misuse in the Chinese population. For example, Liu et al. (2010) conducted a study among Chinese adolescents and found that individuals with higher collectivism scores reported less favorable attitudes towards heroin use. However, to my knowledge, prior work has not examined the role of cultural orientation in NMUPD.

### **Utilization of healthcare and NMUPD**

Barriers to healthcare utilization may also be factors associated with NMUPD in China. To improve the accessibility of healthcare in China, the Chinese government reformed healthcare policy, aiming to strengthen primary care and expand basic government-subsidized health insurance (Rameash & Wu, 2009). Though the policy priorities have appeared to improve insurance coverage, Chinese healthcare is still viewed as unaffordable by many Chinese citizens (Economic, U. C., & Security Review Commission., 2013). A survey conducted in China in 2013 found that 95% of respondents believed healthcare was expensive and that 87% believed that healthcare was more expensive than 4 years prior (Huang, 2014). In addition, healthcare in China is inefficiently utilized due to patients' preferences to use larger hospitals in urban areas, resulting in long outpatient waiting times (Hew, 2006; Economic, U.C., & Security Review Commission, 2013). Challenges in healthcare utilization may lead to increased self-medication with prescription drugs. Lv et al. (2014) suggested that the high expenditures and long waiting times, especially in developed regions such as Beijing, contribute to self-medication with prescription drugs in Chinese families. Given that Chinese college students mostly use prescription drugs for medical purposes, it is possible that barriers to healthcare utilization are associated with NMUPD among college students (Guo, Yang, Wang, & Li, 2003).

### **Protective factors of NMUPD: resilience and future orientation**



Although some risk factors (e.g., stress) were found to increase the likelihood to engage in NMUPD, not all college students who face these factors engage in NMUPD. Resilience, a critical concept in positive psychology, is defined as a process by which individuals overcome or positively adapt from a variety of adversities (Luthar & Ziegler, 1991; Masten et al., 1990; Rutter, 2006). Resilience theory emphasizes protective factors for positive adaptation to adversities and challenges, providing a paradigm shift in substance use studies from focusing on risk amelioration to concentrating on strengths, effective coping, and positive adaptation (Hart & Sasso, 2011). A number of core protective factors, such as self-esteem, positive emotion, and social support, have been identified in resilience studies (Steinhardt & Dolbier, 2008). In addition, prior studies identified some specific protective factors, such as future orientation, that are associated with lower levels of the misuse of drugs, alcohol, and tobacco (Wong, Silva, Kecojovic, Schragar, Bloom, Lverson, and Lankenau, 2013; Boivin, Piscopo, & Wilbrecht, 2015; Keough, Zimbardo, & Boyd, 1999). In line with the protective factor model of resilience, protective factors moderate the effects of stress on risk behaviors (Zimmerman et al., 2013). Within this framework, it is possible that resilience protective factors work as moderators which buffer the effects of stress on NMUPD of young adults. However, more studies need to be carried out to verify this interactive fashion of resilience on NMUPD among college students.

### **Present Research**

The purposes of the current study are (1) to examine the prevalence and motives of NMUPD and (2) to assess its relationship with stress (i.e., perceived stress and traumatic events), and mental health problems (depression, anxiety, and post-traumatic stress disorder (PTSD)), utilization of healthcare, cultural orientation, and protective factors (resilience and future orientation) among college students in China.

**Hypothesis 1:** In line with previous studies (e.g., Juan et al., 2015; Simoni-Wastila et al., 2004), it is hypothesized that NMUPD differs across demographic variables (i.e., age, gender, and income). I expect that age will be positively associated with NMUPD, males will have higher frequency of NMUPD than females, and college students with greater disposable income will have greater frequency of NMUPD.

**Hypothesis 2:** As an extension of previous findings (Ford & Schroeder, 2008; Kubiak, Arfken, Boyd, & Corina, 2006), it is hypothesized that greater levels of perceived stress will be associated with higher frequency of NMUPD among college students in China. In addition, it is hypothesized that college students with a greater number of traumatic events will have higher frequency of NMUPD.

**Hypothesis 3:** In line with previous studies (Juan et al., 2015 and McCauley et al., 2012), it is hypothesized that NMUPD will be associated with higher levels of depression, anxiety, and PTSD.

**Hypothesis 4:** As an extension of findings (Liu et al., 2010), it is hypothesized that individualism of cultural orientation will be positively associated with NMUPD, while collectivism of cultural orientation will be negatively associated with NMUPD among college students in China.

**Hypothesis 5:** As an extension of previous findings (Guo, Yang, Wang, Wang, & Li, 2003), it is hypothesized that utilization of healthcare will be associated with NMUPD among college students in China. The hypothesized results include: (a) health visit (i.e., clinic, hospital, inpatient, emergency service, and specialist service) will be negatively associated with NMUPD; (b) barriers to healthcare access (time spent traveling and waiting) will be positively associated

with NMPUD; (c) satisfaction with healthcare will be negatively associated with NMUPD; and (d) money spent for healthcare will be positively associated with NMUPD.

**Hypothesis 6:** Consistent with findings reported by Cooper et al. (1992) and Zimmerman et al. (2013), it is hypothesized that protective factors (i.e., resilience and future orientation) will moderate the relationship between perceived stress/traumatic events and NMUPD among college students in China.

## Method

### Sample

The present study was conducted in 2017 in two universities in China: Beijing Normal University (BNU) and University of Macau (UM). BNU is a Chinese public university located in Beijing, the capital city in China. BNU has about 22,000 full-time students, and 8,900 of these are undergraduates from over all regions and provinces of the country. UM is a public university located in Macau, the special administrative region in China. This school has the largest faculty size and programs offered in Macau and consists of more than 9,400 students (including undergraduate and graduate students) who are from Macau locals as well as mainland China.

Convenience sampling was employed for recruitment. Two surveys were conducted via SONA system technology, a web-based computer program allowing participants to take part in an online study and earn course credit. The SONA system has been widely used in psychological research (e.g., Nadorff, Fiske, & Nazem, 2011). Students at these two universities 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 will be current undergraduate students at BNU and UM; (b) all participants will be 18 years of age or older; (c) all participants will be able to independently complete the survey online.

To determine the sample size of the present study, the suggestion from Peduzzi et al. (1996) was considered. Based on the work on Peduzzi et al. (1996), the minimum sample size for logistic regression should be determined by the formulation:  $N$  (sample size) =  $10 * k$  (the number of covariate) /  $p$  (the proportion of positive cases in the population). Considering that the logistic regression model for testing hypothesis 6 includes the most number of covariates in this study, the sample size was determined according to this model. This logistic regression model included five covariates, including two control variables (i.e., age and disposable income), two predictor variables (i.e., stress/traumatic events, resilience/future orientation), and one interaction term of predictor variables. Given that prevalence of 14.2% for NMUPD was reported in prior Chinese studies (e.g., Guo & Lu, 2014; Guo et al., 2015), the required sample size for the logistic regression was equal to  $10 * 5 / .142 = 352$ . The current study collected a sample size of 720 (124 in BNU and 596 in UM) from Jan 2017 until April 2017.

## **Procedure**

Before starting the survey, the SONA system provided an electronic informed consent form. The consent form showed the information regarding study purpose, voluntary nature and confidentiality of the study, as well as researchers' contact information for any questions. All surveys were anonymous. After reading through the form, participants were allowed to complete the consent form or refuse to take part in the study. After obtaining the agreements from participants, the SONA system navigated them to the online questionnaire. The questionnaire took about 45 minutes to complete on average. In order for participant answers to be saved in the SONA system and made accessible to researchers, participants were guided to click a button on the survey to indicate they wanted their answers to be saved. Participants were allowed to terminate their participation and thus erase their data at any time prior to submission. Upon

completion, participants in UM were eligible to receive course or extra credit for a class through the SONA system (1 credit). As the incentive for survey completion, participants in BNU received RMB 10 Yuan (equivalent to 1.48 USD), and every 10<sup>th</sup> participant was provided with additional 100 Yuan (equivalent to 14.80 USD).

## **Measures**

**Demographics.** Participants were asked to provide demographic information including age, gender (i.e., male, female, transgender, or other), race/ethnicity (i.e., Han or other), college year, and monthly income (including pocket money, scholarship, and any available financial source).

**Non-medical use of prescription drugs.** This scale was adapted from previous studies (Benotsch, Koester et al., 2011; McCabe & Boyd, 2005). To identify prescription drugs in the Chinese market, I consulted with local pharmacists and identified brand names and additional types of prescription drugs specifically available in China. The total consisted of 40 items assessing NMUPD, divided into 4 classes (i.e., opioids [e.g., OxyContin], sedatives [e.g., Ambien], anxiolytics [e.g., Xanax], and stimulants [e.g., Ritalin]). 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 prescription drugs.

**Motives for nonmedical use of prescription drugs.** A 12-item survey developed by Boyd and McCabe (2006) was utilized to investigate Chinese college students' reasons why they used prescription medications without a doctor's prescription. Participants were provided with a list of motivations related to NMUPD (e.g., "help me sleep", "relieve pain", and "study") and asked to check all items that applied.

**Perceived stress.** This 14-item scale was developed by Cohen, Kamarck, & Mermelstein (1983) to measure the degree to which situations in a participant's life are appraised as stressful. The scale consists of seven positive items (e.g., How often have you felt that you were effectively coping with important changes that were occurring in your life?) and seven negative items (e.g., How often have you found that you could not cope with all the things that you had to do?). This scale was translated into Chinese by Leung et al. (2010). Participants rated all items on a five-point Likert-type scale ranging from 1 (Never) to 5 (Very often). The positive items were recoded and the mean scores of the scale was used for data analysis. The Cronbach's alpha for this scale was .51. The higher mean scores mean lesser control and negative reaction to existing stressors.

**Traumatic events.** The Life event checklist (LEC) was utilized to assess participants' experience of 17 potential traumatic events, such as natural disaster, physical assault, and serious accident at work, home or during recreational activity. The LEC was developed by Gray, Litz, Hsu, & Lombardo (2004). This scale was translated into Chinese in this study according to the back-translation procedures (Chapman & Carter, 1979). Participants were asked to score each event on a five-point scale (1 = happened to me, 2 = witnessed, 3 = learned about it, 4 = not sure, 5 = does not apply). Responses were code dichotomously: 0 (never experienced/witnessed at least one traumatic event) and 1 (experienced/witnessed at least one traumatic event). The LEC had good reliability among students in this study ( $\alpha = .89$ ).

**Utilization of healthcare.** Several questions about the use of healthcare, time spent for healthcare, satisfaction with healthcare, and money spent for healthcare were included to assess utilization of healthcare among college students in China. Participants were asked to report their past-12-month use of healthcare (i.e., clinic visit, hospital visit, inpatient stay, emergency

service, and specialist service [e.g., mental health and rehabilitation service]). The sum of frequencies of the use of six kinds of healthcare was generated to represent use of healthcare among college students. Participants answered two questions about their average time (minutes) spent for travel to healthcare and for outpatient waiting. The sum of time reported in these two questions was utilized to represent time spent accessing healthcare. One question with four response options (1=very dissatisfied to 4=very satisfied) was used to evaluate college students' satisfaction with healthcare. Participants were asked to report money spent (RMB) for healthcare in the past 12 months (Leggett et al., 2016; Golding et al., 1988).

***Cultural orientation.*** The individualism and collectivism scale (INDCOL) (Triandis & Gelfland, 1998) was utilized to measure 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, & Zhou (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.

**Future orientation.** The future orientation subscale of the Zimbardo Time Perspective Scale (ZTPI) (Keough, Zimbardo, & Boyd, 1999) was used to assess college students' sense of future orientation. ZTPI was adapted and translated into Chinese by Gao (2011) and Wang et al. (2015). The Future subscale of ZTPI has 13 items (e.g., "When I want to achieve something, I set goals and consider specific means for reaching those goals") with five response options ranging from 1 (very untrue) to 5 (very true). Higher total scores indicate a greater degree of future orientation and concern for consequences and future goals. This scale yielded an adequate reliability for this study sample ( $\alpha = .77$ ).

**Resilience.** Participants were asked to rate their resilience by using the 25-item Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003). The CD-RISC assesses a variety of personal characteristics such as tenacity, positive acceptance of change, tolerance of negative affect, self-efficacy to deal with stress, optimism, and positive view of stress as a challenge or opportunity. This scale has been translated into Chinese with good reliability and validity (Yu, Lau, Mak, Zhang, & Lui, 2011). Participants were asked to rate items on a five point Likert-type scale ranging from 1 (not true at all) to 5 (true nearly all of the time). Higher total scores indicate greater resilience. The CD-RISC obtained a good internal consistency among students in BNU and UM ( $\alpha = .89$ ).

**Depression.** The Shorter form of the Center for Epidemiological Studies Depression (SF-CES-D) scale was utilized to assess depression symptoms among college students in Beijing and Macau.



SF-CES-D has 10 items and was developed by Kohout et al (1993). Participants scored all items on the scale with four response options (0 = rarely or none of the time, 1 = some of the time, 2 = much of the time, 3 = most or all the time). In the present study, higher total scores indicate a greater level of depression. The SF-CES-D had good reliability in the current study ( $\alpha = .88$ ).

**Anxiety.** Participants were asked to complete the 7-item State Social Anxiety scale (SSA) to assess the extent to which they feel worried in social situations (e.g., I worried about what other people thought of me). This scale was developed by Kashdan & Steger (2006). This scale was translated into Chinese using the back-translation procedure in order to accommodate the needs of the present study (Chapman & Carter, 1979). Responses were scored on a five-point Likert format ranging from 1 (not at all) to 5 (extremely). Participants with higher total scores indicated a greater level of social anxiety. The SSA had a Cronbach's alpha of .92 in the current study.

**Post-traumatic stress disorder (PTSD).** Participants were asked to answer the 17-item PTSD checklist – civilian version (PCL-C) to evaluate their level of PTSD. PCL-C was developed by Weathers et al. (1994) and translated into Chinese by Wu, Chan, and Yiu (2008). Participants scored all items on the scales with four response options (1 = not at all to 5 = extremely). Higher total scores indicate a greater level of PTSD. This scale had great internal consistency in this study ( $\alpha = .95$ ). As suggested by the fifth version of the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV), PTSD diagnosis should be determined in line with the criterion that a person has been exposed to at least one traumatic event (American Psychiatric Association, 2013). Hence, only sum scores of PCL-C of participants who reported one or more traumatic events in the LEC were used for data analyses (n = 379).

### **Statistical Analysis**

First, for the measures I translated into Chinese for the purpose of this study (i.e., LEC and SSA), exploratory factor analysis with oblique rotation was performed to examine the factorial validity. As suggested by Worthington and Whittaker (2006), the items with factor loadings smaller than .40 were removed from the initial factor composition. In addition, items that cross-load strongly on another factor were deleted (Worthington & Whittaker, 2006). The eigenvalue of one was utilized to determine the simple structure of the scales. The EFA was rerun among retained items to reexamine the factor structure. In terms of LEC, all 17 items were entered into and retained in the EFA, suggesting retention of a three-factor model (see Table 1).

**Table 1.**  
**Results of Exploratory factor analysis for self-translated LEC**

	Factor loadings			Eigenvalue	% of variance
	Factor 1	Factor 2	Factor 3		
Combat or exposure to a war-zone (in the Military or as a civilian)	<b>.939</b>	-.074	-.092	6.18	40.55%
Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)	<b>.936</b>	-.075	-.094		
Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)	<b>.844</b>	.026	-.077		
Serious injury, harm, or death you caused to someone else	<b>.738</b>	.181	-.080		
Other unwanted or uncomfortable sexual experience.	<b>.713</b>	.131	-.086		
Exposure to toxic substance (for example, dangerous chemicals, radiation)	<b>.708</b>	-.192	.272		
Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)	<b>.633</b>	.044	.176		
Sudden, violent death (for example, homicide, suicide )	<b>.609</b>	.176	.078		
Severe human suffering	.051	<b>.751</b>	.086	10.92	51.47%
Any other very stressful event or experience	-.071	<b>.741</b>	.051		

Sudden, unexpected death of someone close to you	.054	<b>.708</b>	-.068		
Life-threatening illness or injury	.071	<b>.701</b>	.023		
Fire or explosion	.143	-.189	<b>.762</b>	1.12	58.03%
Transportation accident (for example, car accident, Boat accident, train wreck, plane crash)	-.034	.035	<b>.740</b>		
Natural disaster (for example, flood, hurricane, Tornado, earthquake)	-.286	.134	<b>.667</b>		
Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)	.009	.200	<b>.539</b>		
Serious accident at work, home, or during Recreational activity	.252	.012	<b>.536</b>		

Similarly, all 7 items of the SSA were entered into and retained in the final EFA, suggesting retention of a one-factor model (see Table 2).

**Table 2.**  
**Results of Exploratory factor analysis for self-translated SSA**

	<b>Factor loadings</b>	<b>Eigenvalue</b>	<b>% of variance</b>
	<b>Factor 1</b>		
When I was talking to someone, I was worried about what they were thinking of me	.860	6.18	40.55%
I was worried that I would say or do the wrong things	.853		
I was afraid that others did not approve of me	.853		
I worried about what other people thought of me	.839		
I was afraid other people noticed my shortcomings	.833		
I felt uncomfortable and embarrassed when I was the center of attention.	.790		
I found it hard to interact with people.	.703		

Inter-item Pearson's correlation and Cronbach's alpha tests were performed among retained items to examine the reliabilities (internal consistencies). We then used multiple statistical strategies to examine the hypotheses in this study.

### **Hypothesis 1:**

Several statistical tests were utilized to examine the difference of four classes of NMUPD (i.e., opioids, sedatives, anxiolytics, and stimulants) between demographic variables. Chi-square tests were used to examine the difference of four classes of NMUPD (lifetime and past-three-month) between genders and college years. Spearman's rank-order correlations were used to determine the correlation of age and disposable income with NMUPD (lifetime and past-three-month).

### **Hypothesis 2-5:**

Spearman's rank-order correlations were firstly employed to test the correlation of mental health problems (i.e., depression, anxiety, and PTSD), stress (i.e., perceived stress and traumatic events), utilization of healthcare (i.e., healthcare visits, time spending, satisfaction with healthcare, and money spending for healthcare), and culture orientation (i.e., individualism and collectivism) with four classes of lifetime and past-three-month NMUPD. Logistic Regression was then utilized to further examine the prediction of those variables on four classes of NMUPD (lifetime and past-three-month use, respectively) above the demographics factors. In these analyses, the demographic variables (e.g., age and disposable income) were entered as control variables and mental health problems, stress, utilization of healthcare, and cultural orientation were separately entered in the logistic regression model to examine each of these hypotheses.

### **Hypothesis 6:**

Logistic regression was employed to examine the moderation effects of protective factors (i.e., resilience and future orientation) on the relationship between stress (i.e., perceived stress and traumatic events) and four classes of NMUPD (lifetime and past-three-month use) after controlling for demographic factors. To reduce the potential effect of multicollinearity, predictor

variables (perceived stress and traumatic events) and moderator variables (resilience and future orientation) were centered. The interaction terms of centered predictor variables \* centered moderator variables (e.g., perceived stress \* resilience) were generated for analysis. In each logistic regression model, the demographic variables, centered predictor variables and centered moderator variables were entered in the stage one, and interaction terms were then added in the stage two to examine the moderation effects.

## Results

### Demographic Information

The demographic characteristics of the sample are shown in Table 3. The average year of age for participants was 19.65. A majority of the sample were from Macau. The sample was also majority female, and was mostly Freshmen.

**Table 3.**

#### Sample demographic characteristics

Characteristics	Mean (SD) / n (%)
Year of age, <i>Mean (SD)</i>	19.65 (1.69)
Disposal monthly income (RMB)	2657.77 (3156.07)
Study Site	
Macau (UM)	596 (82.8%)
Beijing (BNU)	124 (17.2%)
Gender	
Male	232 (33.6%)
Female	456 (63.3%)
Transgender	1 (.1%)
Other	1 (.1%)
College year	
Freshmen	357 (51.8%)
Sophomore	127 (18.4%)
Junior	128 (18.6%)
Senior	63 (9.1%)
Other	14 (2.0%)

Ethnicity	
Han	667 (97.1%)
Non-Han	20 (2.9%)

*N* = 720

*SD* = Standard deviation

### NMUPD

The percent of Chinese college students reporting the specific type and class of NMUPD is shown in Table 4. Overall, 41.2% of Chinese students reported taking prescription drugs without a doctor's prescription. Specifically, the most commonly used class of drug was opioids (40.5% lifetime use, 31.8% past-three-months use). Only a minority of students reported engaging in sedative misuse (1.8% lifetime, 0.8% past 3 months), anxiolytic misuse (0.9% lifetime, 0.3% past three months) or stimulant misuse (0.2% lifetime, 0% past three months). The most frequently misused medications in each class were Scattered analgesics (opioids), Phenobarbital and scopolamine (sedatives), Valium (anxiolytics), and Biphphetamine (stimulants).

**Table 4.**  
**Percent of sample reporting NMUPD**

Medication	Lifetime (% using)			3 months (% using)		
	Macau	Beijing	Overall	Macau	Beijing	Overall
Ever NMUPD	36.3%	62.1%	41.2%			
Opioids (any in class)	35.8%	61.3%	40.5%	31.5%	33.1%	31.8%
Tylenol with codeine	2.4%	11.3%	4.1%	0.0%	3.2%	0.6%
Empirin with codeine	12.0%	22.7%	13.9%	4.0%	8.1%	4.8%
Demerol	0.2%	1.6%	0.5%	0.2%	0.8%	0.3%
Actiq/ Duragesic/ sublimaze	0.6%	0.0%	0.5%	0.0%	0.0%	0.0%
OxyContin	0.4%	2.4%	0.8%	0.2%	1.6%	0.5%
Percocet	1.1%	2.4%	1.4%	0.2%	0.0%	0.2%
Tramadol	0.4%	0.0%	0.3%	0.0%	0.0%	0.0%
Compound aminopyrine phenacetin tablets	7.1%	18.9%	9.3%	3.6%	7.3%	4.3%
Scattered analgesics	24.5%	21.3%	23.9%	16.4%	6.5%	14.4%
Robitussin A-C <sup>a</sup>	N/A	0.8%	2.1%	N/A	0.0%	0.5%
Percodan	7.1%	17.9%	9.1%	1.6%	5.6%	2.4%
Dilaudid	0.2%	1.6%	0.5%	0.0%	0.8%	0.2%
Tylox	0.4%	6.5%	1.5%	0.0%	3.2%	0.6%
Compound liquorice tablets	11.9%	52.1%	19.2%	2.6%	16.1%	5.3%

Compound codeine phosphate oral solution <sup>a</sup>	N/A	15.3%	23.1%	N/A	7.3%	12.0%
Dimotil/Lomotil	9.4%	8.9%	9.3%	3.9%	3.3%	3.8%
Other opioids	6.4%	5.7%	6.3%	3.2%	4.0%	3.3%
Sedatives (any in class)	0.9%	5.6%	1.8%	0.6%	1.6%	0.8%
Halcion	0.2%	2.4%	0.6%	0.4%	1.6%	0.6%
Klonopin/Rivotril	0.0%	0.8%	0.1%	0.0%	0.0%	0.0%
Ambien/Stilnox	0.0%	0.8%	0.2%	0.0%	0.0%	0.0%
Phenobarbital and scopolamine	0.4%	1.6%	0.6%	0.0%	0.0%	0.0%
Rohypnol	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
Dormicum	0.4%	0.8%	0.5%	0.2%	0.8%	0.3%
Other sedatives	0.4%	0.0%	0.3%	0.2%	0.0%	0.2%
Anxiolytics (any in class)	0.6%	2.4%	0.9%	0.2%	0.8%	0.3%
Xanax	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
Valium	0.4%	1.6%	0.6%	0.2%	0.0%	0.2%
Librium	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Ativan/Loran	0.0%	0.0%	0.0%	0.0%	0.8%	0.2%
Amytal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Nembutal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Seconal	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
Estazolam	0.0%	0.8%	0.2%	0.0%	0.0%	0.0%
Mogadon	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other anxiolytics	0.4%	0.8%	0.5%	0.0%	0.8%	0.2%
Stimulants (any in class)	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
Ritalin	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Concerta	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Biphetamine	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
Dexedrine	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mephedrone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other stimulants	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*N* = 720

<sup>a</sup> Medication that is not classified as a prescription drug in Macau

## Demographic variables and NMUPD

### Hypothesis 1

T-tests and Chi-square tests were conducted to examine differences in NMUPD (lifetime and past three months) across demographic variables. The results related to lifetime NMUPD are shown in Table 5. Compared to Macau, students in Beijing reported significantly higher likelihood of misusing opioids (37.9% vs. 62.1%;  $\chi^2(1, N = 656) = 27.68, p < .001$ ) and

sedatives (0.9% vs. 5.6%;  $\chi^2 (1, N = 676) = 13.04, p < .001$ ). Women (45.7%) were significantly more likely to report nonmedical use of opioids than men and transgender individuals ( $\chi^2 (2, N = 661) = 19.14, p < .001$ ). College years significantly differed in the rates of opioid misuse ( $\chi^2 (4, N = 660) = 22.32, p < .001$ ) and sedative misuse ( $\chi^2 (4, N = 675) = 16.46, p = .002$ ). In addition, significantly more misuse of opioids ( $t(655) = -2.21, p = .03$ ) and sedatives ( $t(670) = -3.48, p = .001$ ) was reported among students of older age. Individuals varying by ethnicity and disposal monthly income did not significantly differ in the rates of NMUPD.

**Table 5.**

**Lifetime NMUPD and demographics characteristics (N = 720)**

	Ever NMUPD		$\chi/t$	Opioids		$\chi/t$
	No	Yes		No	Yes	
Study site						
Macau	339(63.7%)	193(36.3%)	27.68***	345(64.2%)	192(35.8%)	27.25***
Beijing	47(37.9%)	77(62.1%)		48(38.7%)	76(61.3%)	
Gender						
Male	149(70.0%)	65(30.0%)	18.45***	152(70.7%)	63(29.3%)	19.14***
Female	237(53.7%)	204(46.3%)		241(54.3%)	203(45.7%)	
Transgender or other	0(0%)	2(100%)		0(0.0%)	2(100.0%)	
College year						
Freshmen	221(65.0%)	119(35.0%)	22.55***	223(65.4%)	118(34.6%)	22.32***
Sophomore	77(63.6%)	44(36.4%)		79(64.8%)	43(35.2%)	
Junior	55(46.6%)	63(53.4%)		57(47.5%)	63(52.5%)	
Senior	26(41.9%)	36(58.1%)		27(42.9%)	36(57.1%)	
other	6(42.9%)	8(57.1%)		6(42.9%)	8(57.1%)	
Ethnicity						
Han	375(59.1%)	260(40.9%)	.59	381(59.6%)	258(40.4%)	.37
Non-Han	9(50.0%)	9(50.0%)		10(52.6%)	9(47.4%)	
Year of age, Mean (SD)	19.54(1.48)	19.84(1.97)	-2.18*	19.54(1.49)	19.84(1.97)	-2.21*
Disposal monthly income	2590.14(2555.28)	2664.40(3924.34)	-.14	2602.78 (2551.99)	2680.68 (3937.95)	-.30

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$



**Table 5. continued****Lifetime NMUPD and demographics characteristics (N = 720)**

	Sedatives			Anxiolytics			Stimulants		
	No	Yes	$\chi/t$	No	Yes	$\chi/t$	No	Yes	$\chi/t$
Study site									
Macau	547(99.1%)	5(0.9%)	13.04**	530(99.4%)	3(0.6%)	3.83	531(99.8%)	1(0.2%)	.23
Beijing	117(94.4%)	7(5.6%)		121(97.6%)	3(2.4%)		124(100.0%)	0(0.0%)	
Gender									
Male	217(96.9%)	7(3.1%)	3.12	212(99.5%)	1(0.5%)	.71	213(100.0%)	0(0.0%)	.49
Female	445(98.9%)	5(1.1%)		437(98.9%)	5(1.1%)		440(99.8%)	1(0.2%)	
Transgender or other	2(100.0%)	0(0.0%)		2(100.0%)	0(0.0%)		2(100.0%)	0(0.0%)	
College year									
Freshmen	344(98.6%)	5(1.4%)	16.46**	338(99.4%)	2(0.6%)	4.21	340(100.0%)	0(0.0%)	4.42
Sophomore	125(100.0%)	0(0.0%)		120(99.2%)	1(0.8%)		120(99.2%)	1(0.8%)	
Junior	122(98.4%)	2(1.6%)		118(99.2%)	1(0.8%)		118(100.0%)	0(0.0%)	
Senior	58(92.1%)	5(7.9%)		60(96.8%)	2(3.2%)		62(100.0%)	0(0.0%)	
other	14(100.0%)	0(0.0%)		14(100.0%)	0(0.0%)		14(100.0%)	0(0.0%)	
Ethnicity									
Han	643(98.3%)	11(1.7%)	1.35	630(99.1%)	6(0.9%)	.17	634(99.8%)	1(0.2%)	.03
Non-Han	18(94.7%)	1(5.3%)		18(100.0%)	0(0.0%)		18(100.0%)	0(0.0%)	
Year of age, <i>Mean (SD)</i>	19.63(1.68)	21.33(1.92)	-3.28**	19.65(1.71)	20.33(1.63)	-.98	19.66(1.71)	19.00(.)	.38
Disposal monthly income	2658.00 (3196.93)	2091.67 (1388.56)	.61	2630.00 (3202.72)	1550.00 (784.22)	.83	2622.69 (3194.80)	1500.00(.)	.35

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$

In terms of past-three-month NMUPD, women reported significantly higher misuse of opioids (36.2%;  $\chi^2(2, N = 666) = 17.34, p < .001$ ) relative to men (22.2%). No significant difference in past-three-month NMUPD was found across college year, place, ethnicity, age, and disposal income.

### Psychosocial factors, utilization of healthcare, and NMUD

The descriptive statistics of psychosocial factors and utilization of healthcare by lifetime NMUPD users and non-users are shown in Table 6. NMUPD users reported higher scores in psychosocial factors (i.e., perceived stress, traumatic events, depression, anxiety, PTSD, individualism, collectivism) and utilization of healthcare (i.e., frequency of healthcare use, time spent for healthcare, satisfaction with healthcare, and money spent for healthcare).

**Table 6.**  
**Descriptive statistics of psychosocial variables and healthcare utilization across NMUPD users and non-users.**

NMUPD	Non-users			Users			Total		
	Mean/%	N	SD	Mean/%	N	SD	Mean/%	N	SD
<b>Perceived stress</b>	2.41	405	0.67	2.44	271	0.69	2.43	676	0.68
<b>Traumatic events<sup>a</sup></b>	55.2%	208	--	59.6%	159	--	57.0%	367	--
<b>Mental health problems</b>									
Depression	2.27	402	0.5	2.31	269	0.53	2.29	671	0.51
Anxiety	3.01	402	0.84	3.18	269	0.83	3.08	671	0.84
PTSD <sup>b</sup>	36.61	123	14.63	40.21	110	13.97	38.30	233	14.41
<b>Cultural orientation</b>									
Individualism	3.42	402	0.52	3.55	271	0.55	3.47	673	0.54
Collectivism	3.66	402	0.54	3.74	271	0.56	3.7	673	0.55
<b>Utilization of healthcare</b>									
Frequency of healthcare use	3.08	403	3.23	5.1	271	9.48	3.89	674	6.58
Time spent for healthcare	68.18	402	50.82	79.67	270	53.2	72.8	672	52.05
Satisfaction with healthcare	2.7	400	0.54	2.73	271	0.53	2.72	671	0.54
Money spent	849.06	392	2430.53	1446.63	266	3881.95	1090.63	658	3111.29

for healthcare  
(RMB)

*SD* = Standard Deviations

<sup>a</sup> People who reported (experienced or witnessed) at least one traumatic event.

<sup>b</sup> Only the samples who reported at least one traumatic event were included.

## Bivariate analyses

To examine the association of psychosocial variables (i.e., stress & traumatic events, mental health problems, cultural orientation, resilience and future orientation) and utilization of healthcare with NMUPD (lifetime and past three months; hypotheses 2-6), the Spearman's rank-order correlation was employed.

### Hypotheses 2: Stress and NMUPD

#### *Lifetime NMUPD*

The results of Spearman's rank-order correlation for lifetime NMUPD is shown in Table 7. Perceived stress and traumatic events were not correlated with lifetime NMUPD or specific class of NMUPD.

**Table 7.**

**Spearman's rank-order correlations between perceived stress/traumatic events and lifetime NMUPD (*N* = 720)**

	Ever NMUPD	Opioids	Sedatives	Anxiolytics	Stimulants
Perceived stress	.03	0.02	0.05	-0.01	-0.06
Traumatic events <sup>a</sup>	.04	.05	.04	-.05	-.05

\*\**p* < .01; \**p* < .05

<sup>a</sup> People who reported (experienced or witnessed) at least one traumatic event.

#### *Past-three-month NMUPD*

Similar to the findings for lifetime NMUPD, no significant results were found in terms of perceived stress and traumatic events with past-three-month NMUPD.

**Table 8.****Spearman's rank-order correlation between psychosocial variables and past-three-month NMUPD (N = 720)**

	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Perceived stress</b>	-.03	.02	-.02	--
<b>Traumatic events<sup>a</sup></b>	.07	.002	-.01	--

\*\* $p < .01$ ; \* $p < .05$

<sup>a</sup> People who reported (experienced or witnessed) at least one traumatic event.

**Hypothesis 3: Mental health problems and NMUPD***Lifetime NMUPD*

The results of Spearman's rank-order correlation of mental health problems and lifetime NMUPD are shown in Table 9. Higher levels of anxiety were significantly associated with lifetime NMUPD ( $r_s(652) = .09, p = .02$ ), and higher sum scores of PTSD were significantly associated with lifetime NMUPD ( $r_s(233) = .13, p = .04$ ). Lifetime opioids misuse was significantly associated with anxiety ( $r_s(656) = .09, p = .03$ ) and PTSD ( $r_s(234) = .13, p = .05$ ). Lifetime sedative misuse significantly correlated to higher depression ( $r_s(671) = .08, p = .03$ ) and PTSD ( $r_s(241) = .13, p = .04$ ).

**Table 9.****Spearman's rank-order correlations between mental health problems and lifetime NMUPD (N = 720)**

	Ever NMUPD	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Mental health problems</b>					
Depression	.03	.02	.08*	-.01	.02
Anxiety	.09*	.09*	.03	-.02	-.01
PTSD <sup>a</sup>	.14*	.13*	.13*	-.05	.

\*\* $p < .01$ ; \* $p < .05$

<sup>a</sup>  $n = 379$ ; only participants who reported at least one traumatic event were used

*Past-three-months NMUPD*

As shown in Table 10, in terms of past-three-month NMUPD, depression was significantly related to sedative misuse in past three month ( $r_s(624) = .04, p = .005$ ). No significant correlation was found for anxiety or any class of NMUPD in past three months.

**Table 10.**  
**Spearman's rank-order correlation between mental health problems and past-three-month NMUPD (N = 720)**

	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Mental health problems</b>				
Depression	.00	.08*	-.01	--
Anxiety	.04	.00	-.01	--
PTSD <sup>a</sup>	.11	.12	-.08	--

\*\* $p < .01$ ; \* $p < .05$

<sup>a</sup>  $n = 379$ ; only participants who reported at least one traumatic event were used

#### **Hypothesis 4: cultural orientation and NMUPD**

##### *Lifetime NMUPD*

The associations between cultural orientation and lifetime NMUPD are shown in Table 11. Individualism and collectivism significantly and positively correlated with lifetime NMUPD ( $r_s(654) = .13, p = .001$ ;  $r_s(654) = .08, p = .04$ , respectively). Specifically, lifetime opioid misuse was significantly associated with individualism ( $r_s(658) = .14, p = .001$ ) and collectivism ( $r_s(658) = .10, p = .01$ ). Lifetime sedative misuse significantly correlated to lower collectivism ( $r_s(673) = -.10, p = .01$ ). Individualism significantly correlated with lifetime anxiolytic misuse ( $r_s(655) = .09, p = .02$ ).

**Table 11.**  
**Spearman's rank-order correlations between cultural orientation and lifetime NMUPD (N = 720)**

	Ever NMUPD	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Cultural orientation</b>					
Individualism	.13**	.14**	-.04	.09*	-.04
Collectivism	.08*	.10*	-.10**	-.05	-.05

\*\* $p < .01$ ; \* $p < .05$

### *Past-three-month NMUPD*

In terms of past-three-month NMUPD, past-three-month opioid misuse was found to significantly correlate with individualism ( $r_s(663) = .09, p = .002$ ), and collectivism ( $r_s(663) = .11, p = .005$ ; see Table 12). No significant relationship was found for sedative, anxiolytic, or stimulant misuse.

**Table 12.**  
**Spearman's rank-order correlation between cultural orientation and past-three-month NMUPD ( $N = 720$ )**

	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Cultural orientation</b>				
Individualism	.08*	-.02	.05	--
Collectivism	.11**	-.01	.00	--

\*\* $p < .01$ ; \* $p < .05$

### **Hypothesis 5: Utilization of healthcare and NMUPD**

#### *Lifetime NMUPD*

The results regarding correlations of utilization of healthcare and lifetime NMUPD is depicted in Table 13. Students with NMUPD reported significantly higher frequency of healthcare use ( $r_s(656) = .22, p < .001$ ), time spent for healthcare ( $r_s(656) = .12, p = .002$ ), and money spent for healthcare ( $r_s(641) = .20, p < .001$ ). Lifetime opioid misuse was significantly associated with frequency of healthcare ( $r_s(659) = .22, p < .001$ ), time spent for healthcare ( $r_s(657) = .12, p = .001$ ), and money spent for healthcare ( $r_s(644) = .20, p < .001$ ).

**Table 13.****Spearman's rank-order correlations between utilization of healthcare and lifetime NMUPD (N = 720)**

	Ever NMUPD	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Utilization of healthcare</b>					
Frequency of healthcare use	.22**	.22**	.05	.03	-.06
Time spent for healthcare	.12**	.13**	.02	-.02	-.07
Satisfaction with healthcare	.01	.01	-.03	-.02	.02
Money spent for healthcare	.20**	.20**	.02	-.03	-.06

\*\* $p < .01$ ; \* $p < .05$

*Past-three-month NMUPD*

As shown in Table 14, students with higher level opioid misuse in the past three months reported significantly higher frequency of healthcare use ( $r_s(664) = .21, p < .001$ ), time spent for healthcare ( $r_s(662) = .13, p = .001$ ), money spent for healthcare ( $r_s(659) = .22, p = .002$ ).

**Table 14.****Spearman's rank-order correlation between utilization of healthcare and past-three-month NMUPD (N = 720)**

	Opioids	Sedatives	Anxiolytics	Stimulants
<b>Utilization to healthcare</b>				
Frequency of healthcare use	.21**	.00	-.01	--
Time spent for healthcare	.13**	.05	.01	--
Satisfaction with healthcare	-.01	.01	.03	--
Money spent for healthcare	.22**	-.03	-.01	--

\*\* $p < .01$ ; \* $p < .05$

**Multivariate analyses**

Logistic regression analyses were conducted to further examine the predictive utility of psychological factors and utilization of healthcare on NMUPD (hypotheses 2-5). The results of logistic regression models are shown in Table 14-16 (lifetime) and Table 17 (past three month).

Four sets of variables (i.e., stress and traumatic events, mental health problems, cultural orientation, and utilization of healthcare) were entered into the logistic regression models (five total models) separately to test their predictive effects on NMUPD or specific classes of NMUPD (i.e., opioids, sedatives, and anxiolytics). Due to only a small minority reporting nonmedical use of stimulants (0% past three months to 0.2% (lifetime), logistic regression was not run for nonmedical use of stimulants. Demographic variables (i.e., gender, study site, college year, and age) which were significantly associated with lifetime/past-three-month NMUPD according to bivariate analyses were entered into each model as control variables.

Multivariate regression was employed to examine the multicollinearity among predictor variables (i.e., psychosocial variables and utilization of healthcare) and the results suggested no multicollinearity (VIF = 1.00 – 1.35). Based on a classification threshold predicted probability of target group member of .50, the overall models were not significant,  $\chi^2(8) = 1.84 - 10.10, p > .05$ , except the model between utilization of healthcare and past-three-month opioid misuse,  $\chi^2(8) = 23.13, p < .01$ . The Nagelkerke pseudo  $R^2$ s suggested that these logistic regression models account for 8% (the model of utilization to healthcare on past-three-month opioid misuse) to 36% (the model of mental health problems on lifetime sedatives). The overall prediction success rates were high, ranging from 59.9% (the model of PTSD on lifetime NMUPD) to 99.2% (the model of cultural orientation on past-three-month sedative misuse).

#### *Lifetime NMUPD*

The results of logistic regression models for lifetime NMUPD are shown in Table 15. In model 1, no significant effect was found for either perceived stress or traumatic events. In terms of mental health problems (model 2), no significantly predictive relationships were found for depression and anxiety on lifetime NMUPD. Similarly, no significant association was suggested



in logistic regression model of PTSD on lifetime NMUPD (model 3). However, individualism of cultural orientation was significantly and positively associated with lifetime NMUPD, suggesting for a one-unit increase on individualism, students were 1.41 times more likely to engage in NMUPD ( $B = .35, p < .05, OR = 1.41, 95\%CI = 1.03, 1.95$ ; model 4). Moreover, frequency of healthcare use was significantly and positively associated with lifetime NMUPD, indicating that, for a 1-unit increase on the frequency of healthcare use, Chinese college students were 1.08 times more likely to engage in lifetime NMUPD ( $B = .08, p < .01, OR = 1.08, 95\%CI = 1.03, 1.13$ ; model 5).

**Table 15.**  
**Logistic Regression of psychosocial variables on lifetime NMUPD, controlling for demographic variables**

	Lifetime NMUPD			
	B	SE B	Odd ratio	95%CI
<b>Model 1: Stress and traumatic events</b>				
Perceived stress	-0.17	0.14	0.84	0.64-1.11
Traumatic events	0.09	0.17	1.09	0.78-1.52
Constant	0.27	1.34	1.31	
$\chi^2$	7.43			
$df$	8			
Nagelkerke's $R^2$	0.09			
Overall prediction success rate	62.3%			
<b>Model 2: Mental health problems</b>				
Depression	0.12	0.20	1.12	0.77-1.65
Anxiety	0.19	0.12	1.21	0.96-1.52
constant	-0.90	1.35	0.41	
$\chi^2$	13.19			
$df$	8			
Nagelkerke's $R^2$	0.10			
Overall prediction success rate	63.8%			
<b>Model 3: PTSD</b>				
PTSD <sup>a</sup>	0.02	0.01	1.02	1.00-1.04
constant	-0.44	1.69	0.64	
$\chi^2$	6.46			

<i>df</i>	8			
Nagelkerke's R <sup>2</sup>	.09			
Overall prediction success rate	60.2%			
<b>Model 4: Cultural orientation</b>				
Individualism	0.35*	0.16	1.41	1.03-1.95
Collectivism	0.13	0.16	1.14	0.83-1.60
Constant	-1.71	1.48	0.14	
$\chi^2$	1.76			
<i>df</i>	8			
Nagelkerke's R <sup>2</sup>	0.10			
Overall prediction success rate	63.1%			
<b>Model 5: Utilization of healthcare</b>				
Frequency of healthcare use	0.08**	0.03	1.08	1.03-1.13
Time spent for healthcare	0.00	0.00	1.00	1.00-1.01
Satisfaction with healthcare	0.16	0.17	1.18	0.85-1.64
Money spent for healthcare	0.00	0.00	1.00	1.00-1.00
Constant	-1.08	1.41	0.34	
$\chi^2$	10.22			
<i>df</i>	8			
Nagelkerke's R <sup>2</sup>	0.14			
Overall prediction success rate	66.8%			

Note: Controls are gender, study site, college year, and age,  $N = 677$

<sup>a</sup>  $n = 379$ ; only participants who reported at least one traumatic event were used

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

The results of logistic regression models for specific classes of lifetime NMUPD are depicted in Table 16 (opioids and sedatives misuse) and Table 17 (anxiolytics misuse). As seen in Table 16, the model for lifetime opioids misuse suggested no significant effect was found in terms of perceived stress and traumatic events. For mental health problems, the logistic model suggested a significant association between depression and lifetime sedative misuse, indicating a 7.83 greater likelihood to misuse sedative for each one-unit increase on depression ( $B = 2.06$ ,  $p < .05$ ,  $OR = 7.83$ ,  $95\%CI = 1.48, 41.51$ ; model 2). In terms of PTSD, no significant association was

found with lifetime NMUPD (model 3). Significant results were found in terms of cultural orientation (model 4). The significant effect of individualism suggested that students were 1.43 times more likely to engage in nonmedical use of opioids for each one-unit increase on individualism ( $B = .36, p < .05, OR = 1.43, 95\%CI = 1.04, 1.97$ ). In addition, the significant effects of frequency of healthcare use ( $B = .07, p < .01, OR = 1.07, 95\%CI = 1.02, 1.13$ ) and time spent for healthcare ( $B = .004, p < .05, OR = 1.004, 95\%CI = 1.00, 1.01$ ; model 5) suggested that, with a one-unit increase of the frequency of healthcare use, students were 1.07 times more likely to engage in nonmedical use of opioids, while a one-unit increase of the time spent for healthcare predicted 1.004 greater likelihood of opioid misuse. No significant effect for either psychosocial variables or utilization of healthcare was found in the model for lifetime sedative misuse.

**Table 16.**  
**Logistic Regression of psychosocial variables on the lifetime opioids and sedatives misuse, controlling for demographic variables**

	Lifetime opioids misuse				Lifetime sedative misuse			
	B	SE B	Odd ratio	95%CI I	B	SE B	Odd ratio	95%CI
<b>Model 1: Stress and traumatic events</b>								
Perceived stress	-0.17	0.14	0.84	0.64-1.11	-0.25	0.54	0.78	0.27-2.25
Traumatic events	0.10	0.17	1.10	0.79-1.53	0.48	0.72	1.61	0.39-6.61
constant	0.03	1.34	1.03		-16.10	4.77	0.00	
$\chi^2$	10.12				6.94			
$df$	8				8			
Nagelkerke's $R^2$	0.09				0.23			
Overall prediction success rate	62.7%				98.3%			
<b>Model 2: Mental health problems</b>								
Depression	0.03	0.19	1.04	0.71-1.51	2.06*	0.85	7.83	1.48-41.51

Anxiety	0.20	0.12	1.23	0.98-1.54	-0.47	0.50	0.63	0.24-1.66
Constant	-1.01	1.34	0.36		-19.38	4.89	0.00	
$\chi^2$	8.77				3.89			
<i>df</i>	8				8			
Nagelkerke's R <sup>2</sup>	0.09				0.26			
Overall prediction success rate	63.7%				98.2%			
<b>Model 3: PTSD</b>								
PTSD <sup>a</sup>	0.02	0.01	1.02	1.00-1.04	0.05	0.03	1.05	0.99-1.12
Constant	-0.60	1.66	0.55		-20.43	7.08	.004	
$\chi^2$	8.47				2.80			
<i>df</i>	8				8			
Nagelkerke's R <sup>2</sup>	0.08				0.34			
Overall prediction success rate	59.9%				97.9%			
<b>Model 4: Cultural orientation</b>								
Individualism	0.36*	0.16	1.43	1.04-1.97	-0.45	0.48	0.64	0.25-1.65
Collectivism	0.19	0.16	1.21	0.88-1.66	-0.86	0.47	0.42	0.17-1.06
Constant	-2.20	1.48	0.11		-9.75	4.39	0.00	
$\chi^2$	8.55				2.72			
<i>df</i>	8				8			
Nagelkerke's R <sup>2</sup>	0.1				0.24			
Overall prediction success rate	63.1%				98.2%			
<b>Model 5: Utilization to healthcare</b>								
Frequency of healthcare use	0.07**	0.02	1.07	1.02-1.13	0.03	0.03	1.03	0.97-1.09
Time spent for healthcare	0.004*	0.00	1.00	1.00-1.01	-0.01	0.01	0.99	0.98-1.01
Satisfaction with healthcare	0.17	0.17	1.18	0.85-1.65	0.14	0.64	1.15	0.33-4.04
Money spent for healthcare	0.00	0.00	1.00	1.00-1.00	0.00	0.00	1.00	1.00-1.00
Constant	-1.34	1.40	0.26		-18.46	5.25	0.00	
$\chi^2$	9.05				10.12			
<i>df</i>	8				8			
Nagelkerke's R <sup>2</sup>	0.14				0.24			
Overall prediction success rate	67.1%				98.3%			

rate

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Note: Controls are gender, study site, college year, and age,  $N = 720$

<sup>a</sup>  $n = 422$

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

The results regarding lifetime anxiolytics are shown in Table 17. Again, individualism was found to be significantly and positively associated with anxiolytic misuse, with a one-unit increase on individualism predicting 6.76 times more likelihood to engage in nonmedical use of anxiolytics ( $B = 1.91, p < .05, OR = 6.76, 95\%CI = 1.51, .30.17$ ). No other psychosocial variables were found to be significantly associated with nonmedical use of anxiolytics.

**Table 17.**  
**Logistic Regression of psychosocial variables on lifetime anxiolytics, controlling for demographic variables**

	Lifetime anxiolytics misuse			
	B	SE B	Odd ratio	95%CI
Individualism	1.91*	0.76	6.76	1.51-30.17
Collectivism	-0.75	0.62	0.47	0.14-1.59
Constant	-10.31	6.23	0.00	
$\chi^2$	9.34			
$df$	8			
Nagelkerke's $R^2$	0.17			
Overall prediction success rate	99.1%			

Note: Controls are gender, study site, college year, and age,  $N = 677$

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

#### *Past-three-month NMUPD*

As shown in Table 18, only the variables related to utilization of healthcare were found to be significantly associated with the past-three-month nonmedical use of opioids or sedatives.

Specifically, frequency of healthcare was positively associated with past-three-month opioids

misuse, showing that college students with one-unit increase on their frequency of healthcare use were 1.06 times more likely to engage in misusing opioids in past three months ( $B = .06, p < .01, OR = 1.06, 95\%CI = 1.02, 1.11$ ). Time spent on healthcare was positively associated with past-three-month nonmedical use of sedatives, which means college students with one-unit increase on time spent on healthcare were 1.01 times more likely to report sedative misuse in past three months ( $B = .01, p < .05, OR = 1.01, 95\%CI = 1.00, 1.03$ ).

**Table 18.**

**Logistic Regression of psychosocial variables on past-three-month NMUPD, controlling for demographic variables**

	Past-three-month opioid misuse				Past-three-month sedatives misuse			
	B	SE B	Odd ratio	95%CI	B	SE B	Odd ratio	95%CI
Frequency of healthcare use	0.06**	0.02	1.06	1.02-1.11	0.04	0.15	1.04	0.79-1.39
Time spent for healthcare	0.00	0.00	1.00	1.00-1.01	0.01*	0.01	1.01	1.00-1.03
Satisfaction with healthcare	0.08	0.17	1.09	0.78-1.53	1.03	1.16	2.81	0.29-27.28
Money spent for healthcare	0.00	0.00	1.00	1.00-1.00	0.00	0.00	1.00	1.00-1.00
Constant	-3.15	1.56	0.04		-20.96	8.57	0.00	
$\chi^2$	23.13**				3.03			
<i>df</i>	8				8			
Nagelkerke's $R^2$	0.08				0.21			
Overall prediction success rate	68.5%				99.2%			

Note: Controls are gender, study site, college year, and age,  $N = 720$

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

## Hypothesis 6

### Moderation effects of protective factors

According to the moderation effects examination approach proposed by Aiken and West (1991), the first step of the test is to examine the model between the predictor variable and the dependent variable, followed by the comparison of the effects for the model including the

interaction terms with the prior model. However, perceived stress, traumatic events, and future orientation were not found to have a significant effect on lifetime/past-three-month NMUPD (or any class of NMUPD; see Table 19). Nevertheless, resilience was found to be negatively and significantly associated with lifetime opioids misuse, suggesting that one-unit increase on resilience predicted 81% less likelihood to engage in sedatives misuse among Chinese college students ( $B = -1.68, p < .05, OR = .19, 95\%CI = .04, .84$ ). Given that no significant effect was found in terms of perceived stress and traumatic events, I did not run the logistic regression models for testing moderation effect of resilience and future orientation.

**Table 19.**  
**Logistic Regression of stress, traumatic events, resilience, and future orientation on the lifetime opioids, controlling for demographic variables**

	Lifetime opioids misuse			
	B	SE B	Odd ratio	95%CI
Stress	-0.60	0.57	0.55	0.18-1.69
Traumatic events	0.01	0.03	1.01	0.96-1.06
Resilience	-1.85*	0.82	0.16	0.03-0.79
Future orientation	0.47	0.84	1.60	0.31-8.35
Constant	12.31	5.32	0.00	
$\chi^2$	3.75			
$df$	8			
Nagelkerke's $R^2$	0.28			
Overall prediction success rate	98.3%			

Note: Controls are gender, study site, college year, and age,  $N = 720$

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$

## Discussion

The current study investigated lifetime and past-three-month NMUPD and specific classes of NMUPD among college students in China. I also examined the relationship of

demographic variables and psychosocial variables with NMUPD of Chinese college students. The results indicated that the most commonly misused class of medication is opioids, followed by sedatives and anxiolytics. In addition, data suggested the significant predictive effects of mental health problems (e.g., depression), cultural orientation (e.g., individualism), utilization of healthcare (e.g., frequency of healthcare use, time spent on healthcare), and protective factors (e.g., resilience) on NMUPD. To my knowledge, this is the first attempt to document Chinese young adults' NMUPD behaviors and its relations with psychosocial factors.

The results of the current study suggest an overall prevalence rate of 41.5% for lifetime NMUPD among college students at BNU and UM. This prevalence rate is higher than the findings from previous studies among adolescents in China. Guo et al. (2015) and Guo & Liu. (2014) documented the rates of lifetime NMUPD ranging from 2.9% to 14.2% among high school students in China. American studies show that about 19.8% college students report lifetime NMUPD (Dussault & Weyandt, 2011). In addition to the differences in the study samples (Chinese college vs. Chinese youth; Chinese college students vs. American college students), the variability in prevalence rates may be due to the difference in the items of prescription drugs assessed. In the current study, I consulted with local doctors and pharmacists and confirmed 40 specific prescription drugs likely to be misused, while the previous Chinese studies only investigated one specific class of drugs (e.g., pain relievers). The results of the current study suggest that opioids were the most commonly misused class of prescription medication. This finding is consistent with previous Chinese studies among adolescents (e.g., Guo et al., 2015; Wang et al., 2014; Juan et al., 2015) which found the highest prevalence of misusing opioids such as Scattered analgesics and Percocet, relative to the prevalence of misusing sedatives or stimulants.



The current study found that NMUPD differs as a function of demographic variables (i.e., age, study site, college year, and gender). First, we found that college students with older age were more likely to report NMUPD (lifetime and past-three-month). This result is consistent with previous studies (e.g., Juan et al., 2015). Second, the results suggest a higher prevalence of NMUPD among Beijing college students relative to students in Macau. This difference may be explained by variation in drug management between Macau and Beijing. Due to a change of drug policy in 1978, the drug distribution platform in mainland China (e.g., Beijing) shifted from a previously centrally controlled supply system to a market-oriented demand system (Dong et al., 1999). This policy change makes it easy for people in mainland China to access medications from private drug stores or online shops without a doctor's prescription even if these medications are nominally only given with a prescription (Ministry of Health, 1994; Dong et al., 1999). On the other hand, Macau has stricter regulation of its pharmaceutical industry than mainland China, leading to safer prescription drug management. Third, the result suggested a higher prevalence in females than males. Similar results have been documented in the U.S. literature (e.g., Weiss, Bailey, O'Malley, Barrett, Elixhauser, & Steiner, 2017). Given that some opioids are pain relievers, females may non-medically use these medications for the reason of menstrual cramps (Boyd, McCabe, Cranford, & Young, 2006). In addition, relative to men, women may experience higher rates of anxiety disorders in the college years (Eisnberg, Gollust, Golberstein, & Hefner, 2007), leading women to be more likely to engage in misuse of prescription drugs for managing mental distress.

The multivariate analyses suggest several psychosocial factors associated with NMUPD among Chinese college students. In terms of mental health symptoms, the results suggest an association between depression and lifetime sedative misuse in Chinese college students.

Specifically, the results indicate that Chinese college students who reported higher level of depression were more likely to engage in lifetime sedative misuse. This finding is consistent with previous studies showing sedative misuse among college students in face of mental distress (Zullig & Divin, 2012). In addition, bivariate analyses show significant correlations of lifetime NMUPD (opioid and sedative misuse, specifically) with PTSD among Chinese college students. These results are consistent with American studies showing positive link of PTSD lifetime NMUPD among college students (e.g., McCauley et al., 2011). Due to the intensive burden of study, Chinese college students have a high risk of mental distress symptoms (an overall prevalence of 23%; Lei, Xiao, Liu, & Li, 2016), and have high rate of suicide attempts (2.6%; Yang, Zhang, Sun, Sun, & Ye, 2015). These results may imply that Chinese college students cope with their mood/mental distress symptoms through misusing prescription drugs, a pattern consistent with the self-medication hypothesis (Kelly et al., 2015). Our findings would merit clinical attention to evaluate prescription drug use behaviors in anxiety-related and PTSD treatment settings.

Notably, our results suggested a significant relationship between cultural orientation and NMUPD. Individualism was found to be a risk factor for NMUPD among Chinese college students. This finding is consistent with previous cultural studies indicating individualism is positively associated with risk behaviors such as substance use among older people (65 years of age or older) across 64 countries (Johnson, 2007). There are at least two possible explanations for this association. First, individualism emphasizes independent values such as autonomy, encouraging the exploration of identity, and leading young adults to view risk-taking (e.g., NMUPD) as acceptable (Nelson, Badger, & Wu, 2004; Arnett, 1997). The second reason may be associated with the person-culture match effect (Fulmer et al., 2010). Given that collectivism is

advocated in Chinese society, people with individualistic worldviews may be more vulnerable to stressors relative to people with collectivist worldviews. In such an “unmatched” situation, individualists may be more likely to become depressed and engage in maladaptive coping such as substance use behaviors. Unexpectedly, the results suggest no significant association between collectivism and NMUPD. However, similar results were documented in cultural studies conducted in China (e.g., Du, Li, Lin, & Tam, 2014) or in US (e.g., Unger, Ritt-Olson, Teran, Huang, Hoffman, & Palmer, 2002), showing that collectivism was not associated with health behaviors (e.g., substance use and condom use). It is argued that, even though collectivism benefits psychosocial well-being in a collectivistic society, collectivism influences health behaviors through available social resources (e.g., social capital; Du et al., 2014). Hence, future studies may benefit from further exploring the indirect mechanisms among collectivism, social resources, and NMUPD among Chinese college students. The findings of the present study highlight the association of cultural orientation and NMUPD in the Chinese.

The results in the current study also suggest an association between utilization of healthcare and NMUPD among young adults at BNU and UM. Frequency of healthcare use was consistently and positively associated with lifetime and past-three-month NMUPD (opioids). Similar results were found in previous studies in the US (e.g., Jeffers et al., 2015), which indicate significantly more health care visits and inpatient hospital stays among adults who engaged in NMUPD relative to individuals who did not engage in NMUPD. This association may be due to prescription drug overdose or disorder, leading to an increase of healthcare visits for medical reasons such as detoxification (Frank, Binswanger, Calcaterra, Brenner, & Levy, 2015). Health anxiety (hypochondriasis) is a potential alternate explanation (Jeffers et al., 2015). In addition to the frequency of healthcare use, our results also suggest the predictive effect of time spent for

healthcare on lifetime opioid misuse and past-three-month sedative misuse. This finding is supported by Lv et al. (2014), which found that long healthcare wait times were related to self-medication with prescription drugs among Chinese college students. These findings emphasize the important role of healthcare settings on NMUPD among Chinese college students. Interventions to enhance pharmaceutical management in healthcare as well as the efficiency in healthcare services may help prevent NMUPD in China.

The present study indicates that resilience was negatively associated with opioid misuse, showing that it is a protective factor for NMUPD among Chinese students. The finding supports the resilience theory proposing that promotive factors (e.g., tenacity, positive coping, emotion regulation, and social support) can protect people from maladaptation and risk behaviors (e.g., substance use; Fergus & Zimmermen, 2005). Additionally, this finding also suggests the cultural applicability of resilience theory in the Chinese context. Resilience emphasizes positive coping and avoiding bad consequences. Such concepts are relevant to Chinese's religious and cultural views. For example, Taoists advocate viewing adversity as a chance for positive changes instead of a negative event, encouraging proactive coping strategies (e.g., acceptance of challenges) and avoiding passive coping approaches that are harmful to well-being (e.g., substance use; Hu & Gan, 2008; Wang & Wang, 2006). However, the present study did not find a protective effect of future orientation for NMUPD. This may be due to the sources of stressors faced by Chinese college students. The major sources of stressors among college students are short-term, such as studying for exams and mastery of information in a short time period (Abouserie, 1994; Ekpenyong, Davis, Akpan, & Daniel, 2011; Ekpenyong, Daniel, & Aribio, 2013). While future orientation can promote future planning or future-oriented action, it may provide limited contribution to cope with short-term stressors (Keough, Zimbardo, & Boyd, 1999). In contrast,

people will be more likely to use a present-oriented perspective to cope with short-term stressors, and this perspective increases the likelihood of risk behaviors for college students (Keough et al., 1999). In addition, the association of resilience implies the importance of identifying protective factors of NMUPD and applying resilience theory into prevention interventions among Chinese college students.

Inconsistent with previous studies (Ford & Schroeder, 2008; Kubiak, Arfken, Boyd, & Corina, 2006), the present study found no significant association between stress variables (e.g., perceived stress and traumatic events) and NMUPD in multivariate analyses. There are several potential reasons for this non-finding. The first reason may be associated with my operationalization of stress. I measured levels of general stress instead of particular stressors, such as academic stress, which has been found to be the major motive for NMUPD in some previous U.S.-based studies of college students (e.g., Ford & Schroeder, 2008). In addition, only a minority of students experienced traumatic events. The second reason may be related to measurement. The measure for perceived stress had low reliability for the study sample ( $\alpha = .51$ ), reducing the statistical power for analyses. Future studies may benefit from assessing academic stress and examining its relation with NMUPD using measures with better psychometric properties.

There are several methodological limitations in the current study. First, by using convenience sampling, the findings in this study are not representative of all college students in China. Although web-based survey methodology can increase the response rate of questions related to risk behaviors (Cook, 2000), such approaches are limited by only reaching participants who have access to the SONA system and who are familiar with web-based surveys. Moreover, the results were found 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 Macau and Beijing may cause additional sample bias, leading to confounding effects and increasing the threats to validity. In addition, given a minority engaged in some specific class of NMUPD (sedatives, 1.8%; anxiolytics, 0.8; and stimulants, 0.2), the effect size were small. Future studies should be conducted in additional universities across diverse Chinese cities with a longitudinal study design.

Despite these limitations, as the first attempt to assess NMUPD and examine its relationship with psychosocial factors among Chinese college students, the current study has several compelling implications. First, the findings about the relationship of utilization of healthcare with NMUPD merit political or administrative attentions to address issues regarding pharmaceutical management. More discussion is needed in Chinese society about regulation and administration for prescription drug use. Additional training for healthcare providers about communication with patients and discussion regarding use of prescription drugs may be helpful to reduce the likelihood of medication misuse. In addition, the robust predictive association of anxiety with NMUPD suggests that the evaluation of NMUPD may be warranted for individuals receiving mental health treatment. Although illicit substance use is often measured in the psychiatric service, the use of prescription drugs is not commonly assessed in psychiatric settings. Furthermore, the predictive effects of cultural orientation and resilience suggest the applicability to develop and deliver a culturally-tailored and resilience –based NMUPD prevention intervention for Chinese college students. A culturally-tailored prevention intervention program based on the focus of social value-matching coping style and resilience factors may be beneficial to Chinese college students and reduce their risk of NMUPD.

## Reference

- Abouserie, R. (1994). Sources and levels of stress in relation to locus of control and self esteem in university students. *Educational psychology, 14*(3), 323-330.
- Abuse, S. (2005). Mental Health Services Administration (SAMHSA), 2006 Substance Abuse and Mental Health Services Administration (SAMHSA). *Results from the*.
- Abuse, S. (2011). Mental Health Services Administration (SAMHSA), Results from the 2010 national survey on drug use and health: summary of national findings (NSDUH Series H-41, HHS Publication No.(SMA) 11-4658). *Office of Applied Studies. Rockville, MD.*
- Arnett, J. J. (1997). Young people's conceptions of the transition to adulthood. *Youth & Society, 29*(1), 3-23.
- 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.
- 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, 132*(3), 665-673.
- Bavarian, N., Flay, B. R., Ketcham, P. L., & Smit, E. (2015). The Illicit Use of Prescription Stimulants on College Campuses A Theory-Guided Systematic Review. *Health Education & Behavior, 1090198115580576*.
- Benotsch, E. G., Koester, S., Luckman, D., Martin, A. M., & Cejka, A. (2011). Non-medical use of prescription drugs and sexual risk behavior in young adults. *Addictive behaviors, 36*(1), 152-155.

- 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.
- Boivin, J. R., Piscopo, D. M., & Wilbrecht, L. (2015). Brief cognitive training interventions in young adulthood promote long-term resilience to drug-seeking behavior. *Neuropharmacology, 97*, 404-413.
- Boyd, C. J., McCabe, S. E., Cranford, J. A., & Young, A. (2006). Adolescents' motivations to abuse prescription medications. *Pediatrics, 118*(6), 2472-2480.
- Broman, C. L. (2005). Stress, race and substance use in college. *College Student Journal, 39*(2), 340.
- Carpenter, K. M., & Hasin, D. S. (1999). Drinking to cope with negative affect and DSM-IV alcohol use disorders: a test of three alternative explanations. *Journal of studies on alcohol, 60*(5), 694-704.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior, 385-396*.
- Colder, C. R., & Chassin, L. (1993). The stress and negative affect model of adolescent alcohol use and the moderating effects of behavioral undercontrol. *Journal of studies on alcohol, 54*(3), 326-333.
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and anxiety, 18*(2), 76-82.
- Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web-or internet-based surveys. *Educational and psychological measurement, 60*(6), 821-836.



- Dong, H., Bogg, L., Rehnberg, C., & Diwan, V. (1999). Drug policy in China: pharmaceutical distribution in rural areas. *Social science & medicine*, 48(6), 777-786.
- Dowell, D., Haegerich, T. M., & Chou, R. (2016). CDC guideline for prescribing opioids for chronic pain—United States, 2016. *JAMA*, 315(15), 1624-1645.
- Du, H., Li, X., Lin, D., & Tam, C. C. (2014). Hopelessness, individualism, collectivism, and substance use among young rural-to-urban migrants in China. *Health Psychology and Behavioral Medicine: An Open Access Journal*, 2(1), 211-220.
- Duarte, Wong, & Lao. (2008). Co-occurring Psychiatric and Substance use Disorders in Patients Admitted to a Psychiatric Ward in Macao. *Health Science Journal of Macao*, 8(2), 105.
- Dussault, C. L., & Weyandt, L. L. (2013). An examination of prescription stimulant misuse and psychological variables among sorority and fraternity college populations. *Journal of attention disorders*, 17(2), 87-97.
- Economic, U. C., & Security Review Commission. (2013). *2013 Report to Congress of the US-China Economic and Security Review Commission: One Hundred Twelfth Congress, First Session*. US Government Printing Office.
- Eisenberg, D., Gollust, S. E., Golberstein, E., & Hefner, J. L. (2007). Prevalence and correlates of depression, anxiety, and suicidality among university students. *American Journal of Orthopsychiatry*, 77(4), 534-542.
- Ekpenyong, C. E., Daniel, N. E., & Aribio, E. O. (2013). Associations between academic stressors, reaction to stress, coping strategies and musculoskeletal disorders among college students. *Ethiopian journal of health sciences*, 23(2), 98-112.

- Ekpenyong, C. E., Davis, K. J., Akpan, U. P., & Daniel, N. E. (2011). Academic stress and menstrual disorders among female undergraduates in Uyo, South Eastern Nigeria-the need for health education. *Niger J Physiol Sci*, 26(2), 193-8.
- Ford, J. A., & Schroeder, R. D. (2008). Academic strain and non-medical use of prescription stimulants among college students. *Deviant Behavior*, 30(1), 26-53.
- Frank, J. W., Binswanger, I. A., Calcaterra, S. L., Brenner, L. A., & Levy, C. (2015). Non-medical use of prescription pain medications and increased emergency department utilization: Results of a national survey. *Drug and alcohol dependence*, 157, 150-157.
- Fulmer, C. A., Gelfand, M. J., Kruglanski, A. W., Kim-Prieto, C., Diener, E., Pierro, A., & Higgins, E. T. (2010). On “feeling right” in cultural contexts: How person-culture match affects self-esteem and subjective well-being. *Psychological Science*, 21(11), 1563-1569.
- Gao, Y. J. (2011). Time perspective and life satisfaction among young adults in Taiwan. *Social Behavior and Personality: an international journal*, 39(6), 729-736.
- Golding, J. M., Gongla, P., & Brownell, A. (1988). Feasibility of validating survey self-reports of mental health service use. *American Journal of Community Psychology*, 16(1), 39-51.
- Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the life events checklist. *Assessment*, 11(4), 330-341.
- Guo, L., & Lu, C. (2014). The nonmedical use of alcohol and prescription drugs among adolescents in China. *The European Journal of Public Health*, 24(suppl 2), cku165-082.
- 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.

- Hall, A. J., Logan, J. E., Toblin, R. L., Kaplan, J. A., Kraner, J. C., Bixler, D., & Paulozzi, L. J. (2008). Patterns of abuse among unintentional pharmaceutical overdose fatalities. *Jama*, *300*(22), 2613-2620.
- Hart, K. E., & Sasso, T. (2011). Mapping the contours of contemporary positive psychology. *Canadian Psychology/Psychologie Canadienne*, *52*(2), 82.
- Herman-Stahl, M., Spencer, D. L., & Duncan, J. E. (2003). The implications of cultural orientation for substance use among American Indians. *American Indian and Alaska native mental health research (Online)*, *11*(1), 46.
- Hew, C. (2006). Healthcare in China: Towards greater access, efficiency and quality. *New York IBM Business Consulting Service working paper*.
- Hong, C., & Efferth, T. (2016). Systematic review on post-traumatic stress disorder among survivors of the wenchuan earthquake. *Trauma, Violence, & Abuse*, *17*(5), 542-561.
- Huang, R. (2006). Reliability and Validity of Individualism and Collectivism Scale in Chinese Students. *Chinese Journal of Clinical Psychology*, *14*(6), 564.
- Huang, Y. (2014). What Money Failed to Buy: The limits of China's Healthcare Reform. *Council on Foreign Relations*. Retrieved March 4, 2014, from <http://www.forbes.com/sites/yanzhonghuang/2014/03/04/what-money-failed-to-buy-the-limits-of-chinas-healthcare-reform/#46387d54292b>
- Jeffers, A.J., Benotsch, E.G., Green, B.A., Bannerman, D., Darby, M., Kelley, T., & Martin, A.M. (2015). Health anxiety and the non-medical use of prescription drugs in young adults: A cross-sectional study. *Addictive Behaviors*, *50*, 74-77.
- Johnson, T. P. (2007). Cultural-level influences on substance use & misuse. *Substance use & misuse*, *42*(2-3), 305-316.

- 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.
- Kashdan, T. B., & Steger, M. F. (2006). Expanding the topography of social anxiety an experience-sampling assessment of positive emotions, positive events, and emotion suppression. *Psychological Science, 17*(2), 120-128.
- Kelly, B. C., Rendina, H. J., Vuolo, M., Wells, B. E., & Parsons, J. T. (2015). Influences of motivational contexts on prescription drug misuse and related drug problems. *Journal of substance abuse treatment, 48*(1), 49-55.
- Keough, K. A., Zimbardo, P. G., & Boyd, J. N. (1999). Who's smoking, drinking, and using drugs? Time perspective as a predictor of substance use. *Basic and applied social psychology, 21*(2), 149-164.
- Kohout, F. J., Berkman, L. F., Evans, D. A., & Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D depression symptoms index. *Journal of aging and health, 5*(2), 179-193.
- Kubiak, S. P., Arfken, C. L., Boyd, C., & Cortina, L. M. (2006). More severe violence exposure associated with poly-pharmaceutical use. *American journal on addictions, 15*(6), 457-461.
- Lam, L. C., Lee, D. T., Shum, P. P., & Chen, C. N. (1996). Cough mixture misuse in Hong Kong-an emerging psychiatric problem?. *Addiction, 91*(9), 1375-1378.
- Leggett, L. E., Khadaroo, R. G., Holroyd-Leduc, J., Lorenzetti, D. L., Hanson, H., Wagg, A., ... & Clement, F. (2016). Measuring Resource Utilization: A Systematic Review of Validated Self-Reported Questionnaires. *Medicine, 95*(10), e2759.

- Lei, X. Y., Xiao, L. M., Liu, Y. N., & Li, Y. M. (2016). Prevalence of depression among chinese university students: a meta-analysis. *PloS one*, *11*(4), e0153454.
- Liu, H., Li, J., Lu, Z., Liu, W., & Zhang, Z. (2010). Does Chinese culture influence psychosocial factors for heroin use among young adolescents in China? A cross-sectional study. *BMC public health*, *10*(1), 1.
- Liu, X. C., Tang, M. Q., Chen, K., Hu, L., & Wang, A. Z. (1995). The comparison of depression evaluation results between SDS and CES-D scales among college students. *Chin Ment Health J*, *9*, 19-20.
- 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*, *132*(1), 362-368.
- Luthar, S. S., & Zigler, E. (1991). Vulnerability and competence: a review of research on resilience in childhood. *American journal of Orthopsychiatry*, *61*(1), 6.
- Lv, B., Zhou, Z., Xu, G., Yang, D., Wu, L., Shen, Q., ... & Fang, Y. (2014). Knowledge, attitudes and practices concerning self-medication with antibiotics among university students in western China. *Tropical Medicine & International Health*, *19*(7), 769-779.
- Martins, S. S., Fenton, M. C., Keyes, K. M., Blanco, C., Zhu, H., & Storr, C. L. (2012). Mood and anxiety disorders and their association with non-medical prescription opioid use and prescription opioid-use disorder: longitudinal evidence from the National Epidemiologic Study on Alcohol and Related Conditions. *Psychological medicine*, *42*(06), 1261-1272.
- Masten, A. S., Best, K. M., & Garmezzy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and psychopathology*, *2*(04), 425-444.

- Mattanah, J. F., Hancock, G. R., & Brand, B. L. (2004). Parental Attachment, Separation-Individuation, and College Student Adjustment: A Structural Equation Analysis of Mediation Effects. *Journal of Counseling Psychology, 51*(2), 213.
- McCabe, S. E., Boyd, C. J., & Teter, C. J. (2009). Subtypes of nonmedical prescription drug misuse. *Drug and alcohol dependence, 102*(1), 63-70.
- McCabe, S. E., Knight, J. R., Teter, C. J., & Wechsler, H. (2005). Non-medical use of prescription stimulants among US college students: Prevalence and correlates from a national survey. *Addiction, 100*(1), 96-106.
- McCabe, S. E., Teter, C. J., Boyd, C. J., Knight, J. R., & Wechsler, H. (2005). Nonmedical use of prescription opioids among US college students: Prevalence and correlates from a national survey. *Addictive behaviors, 30*(4), 789-805.
- McCabe, S. E., West, B. T., Teter, C. J., & Boyd, C. J. (2014). Trends in medical use, diversion, and nonmedical use of prescription medications among college students from 2003 to 2013: Connecting the dots. *Addictive behaviors, 39*(7), 1176-1182.
- McCauley, J. L., Amstadter, A. B., Macdonald, A., Danielson, C. K., Ruggiero, K. J., Resnick, H. S., & Kilpatrick, D. G. (2011). Non-medical use of prescription drugs in a national sample of college women. *Addictive behaviors, 36*(7), 690-695.
- McCauley, J. L., Killeen, T., Gros, D. F., Brady, K. T., & Back, S. E. (2012). Posttraumatic stress disorder and co-occurring substance use disorders: Advances in assessment and treatment. *Clinical Psychology: Science and Practice, 19*(3), 283-304.

- McLarnon, M. E., Barrett, S. P., Monaghan, T. L., & Stewart, S. H. (2012). Prescription Drug Misuse Across the Lifespan: A Developmental Perspective. In *Drug Abuse and Addiction in Medical Illness* (pp. 213-230). Springer New York.
- Ming, L. (2005). Retrospective study on characteristics of 104 zopiclone abusers in a substance abuse clinic in Hong Kong.
- Ministry of Health, People's Republic of China. (1994). Research on National Health Services - An Analysis Report of the National Health Services Survey in 1993. Ministry of Health, Beijing.
- Nadorff, M. R., Nazem, S., & Fiske, A. (2011). Insomnia symptoms, nightmares, and suicidal ideation in a college student sample. *Sleep, 34*(1), 93-98.
- National Center on Addiction and Substance Abuse (NCASA) at Columbia University. (2007). Wasting the best and the brightest: Substance abuse at America's colleges and universities. [On-line]. Retrieved May 28, 2010, from <http://www.casacolumbia.org/download.aspx?path=/UploadedFiles/b1kms01k.pdf>.
- Nelson, L. J., 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.
- Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., & Feinstein, A. R. (1996). A simulation study of the number of events per variable in logistic regression analysis. *Journal of clinical epidemiology, 49*(12), 1373-1379.
- Ramesh, M., & Wu, X. (2009). Health policy reform in China: lessons from Asia. *Social Science & Medicine, 68*(12), 2256-2262.

- Rigg, K. K., & Ibañez, G. E. (2010). Motivations for non-medical prescription drug use: A mixed methods analysis. *Journal of substance abuse treatment, 39*(3), 236-247.
- Rozenbroek, K., & Rothstein, W. G. (2011). Medical and nonmedical users of prescription drugs among college students. *Journal of American College Health, 59*(5), 358-363.
- Rutter, M. (2006). Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences, 1094*(1), 1-12.
- Simoni-Wastila, L., Ritter, G., & Strickler, G. (2004). Gender and other factors associated with the nonmedical use of abusable prescription drugs. *Substance use & misuse, 39*(1), 1-23.
- Steinhardt, M., & Dolbier, C. (2008). Evaluation of a resilience intervention to enhance coping strategies and protective factors and decrease symptomatology. *Journal of American College Health, 56*(4), 445-453.
- 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.
- Unger, J. B., Ritt-Olson, A., Teran, L., Huang, T., Hoffman, B. R., & Palmer, P. (2002). Cultural values and substance use in a multiethnic sample of California adolescents. *Addiction Research & Theory, 10*(3), 257-279.
- University of Michigan Substance Abuse Research Center. (2001). University of Michigan Student Life Survey Summary. Available at:  
[http://sitemaker.umich.edu/umsarc/student\\_life\\_survey](http://sitemaker.umich.edu/umsarc/student_life_survey). Accessed September 21, 2006.
- UNPOS, U. UNODC.(2012). *Assessment of the Prison System in Mogadishu/South Central Somalia*.



- Wang, H., Deng, J., Zhou, X., Lu, C., Huang, J., Huang, G., ... & He, Y. (2014). The nonmedical use of prescription medicines among high school students: a cross-sectional study in Southern China. *Drug and alcohol dependence, 141*, 9-15.
- Wang, Y., Chen, X. J., Cui, J. F., & Liu, L. L. (2015). Testing the Zimbardo time perspective inventory in the Chinese context. *PsyCh journal, 4*(3), 166-175.
- Wang, Z., Du, J., Sun, H., Wu, H., Xiao, Z., & Zhao, M. (2010). Patterns of childhood trauma and psychological distress among injecting heroin users in China. *PloS one, 5*(12), e15882.
- Weiss AJ, Bailey MK, O'Malley L, Barrett ML, Elixhauser A, Steiner CA. (2017). Patient Characteristics of Opioid-Related Inpatient Stays and Emergency Department Visits Nationally and by State, 2014. *HCUP Statistical Brief, (224)*.
- Weiyang, G., Bailin, Y., & Peiqi, W. (2003). The Investigation and Analysis on the Use of Psychoactive Drugs among University Students in Jinzhou [J]. *Chinese Magazine of Drug Abuse Prevention and Treatment, 1*, 007.
- Wells, B. E., Kelly, B. C., Rendina, H. J., & Parsons, J. T. (2015). Prescription Drug Misuse and Sexual Behavior Among Young Adults. *The Journal of Sex Research, 52*(6), 659-668.
- Wong, C. F., Silva, K., Kecojevic, A., Schragar, S. M., Bloom, J. J., Iverson, E., & Lankenau, S. E. (2013). Coping and emotion regulation profiles as predictors of nonmedical prescription drug and illicit drug use among high-risk young adults. *Drug and alcohol dependence, 132*(1), 165-171.
- World Health Organization. (2012). World Drug Report. *New York: United Nations Offices on Drugs and Crime (UNODC)*.

- Worthington, R. L., & Whittaker, T. A. (2006). Scale development research a content analysis and recommendations for best practices. *The Counseling Psychologist, 34*(6), 806-838.
- Wu, Q., Yu, J., Yang, C., Chen, J., Yang, L., Zhang, H., ... & Zhao, Y. (2016). Nonmedical Use of Cough Syrup Among Secondary Vocational School Students: A National Survey in China. *Medicine, 95*(10), e2969.
- Wunsch, H., Kahn, J. M., Kramer, A. A., & Rubenfeld, G. D. (2009). Use of intravenous infusion sedation among mechanically ventilated patients in the United States. *Critical care medicine, 37*(12), 3031-3039.
- Yang, L. S., Zhang, Z. H., Sun, L., Sun, Y. H., & Ye, D. Q. (2015). Prevalence of suicide attempts among college students in China: a meta-analysis. *PLoS one, 10*(2), e0116303.
- Yu, X. N., Lau, J. T., Mak, W. W., Zhang, J., & Lui, W. W. (2011). Factor structure and psychometric properties of the Connor-Davidson Resilience Scale among Chinese adolescents. *Comprehensive psychiatry, 52*(2), 218-224.
- Zhang, S., & Chin, K. L. (2015). A people's war: China's struggle to contain its illicit drug problem. *Washington, DC: Brookings Institution.*
- Zheng, Y., Fan, F., Liu, X., & Mo, L. (2012). Life events, coping, and posttraumatic stress symptoms among Chinese adolescents exposed to 2008 Wenchuan earthquake, China. *PLoS One, 7*(1), e29404.
- Zhimin, L., Weihua, Z., Zhi, L., Yue, M., Zhiji, C., & Jiaqi, C. (2001). The use of psychoactive substances among adolescent students in an area in the south-west of China. *Addiction, 96*(2), 247-250.
- Zimmerman, M. A. (2013). Resiliency Theory A Strengths-Based Approach to Research and Practice for Adolescent Health. *Health Education & Behavior, 40*(4), 381-383.

Zullig, K. J., & Divin, A. L. (2012). The association between non-medical prescription drug use, depressive symptoms, and suicidality among college students. *Addictive Behaviors*, 37(8), 890-899.

## Appendix A: QUESTIONNAIRE (ENGLISH VERSION)

### A. Background

1. Age \_\_\_\_\_
2. What is your gender?  
 ① Male      ② Female      ③ Transgender      ④ Other: \_\_\_\_\_
3. What is your Ethnicity/race?  
 ① Han      ② other: \_\_\_\_\_
4. What is your college year?  
 ① Freshmen      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?**  
 ① Yes      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 time	Number of time
(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) <b>Halcion</b>		
(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: _____		

4. What prescription medication do you use the MOST without a prescription?

---

### C. Motives of nonmedical use of prescription drugs

The following items ask about your reasons to take prescription medications without a doctor's prescription. Please check all applied items according to your own experience related to the drug you use the MOST. If you have never taken drugs without a prescription, please choose "N/A" for each item.

<b>I took prescription medications (I use the MOST) without a doctor's prescription because:</b>	Yes	No	
1. Help me sleep	1	2	N/A
2. Relief pain	1	2	N/A
3. Help me decrease anxiety	1	2	N/A
4. Concentration	1	2	N/A
5. Alertness	1	2	N/A
6. Study	1	2	N/A
7. Lose weight	1	2	N/A
8. Give me a high	1	2	N/A
9. Counteracts effects of other drugs	1	2	N/A
10. Safer than street drugs	1	2	N/A
11. Experimentation	1	2	N/A
12. Because I'm addicted	1	2	N/A

### D. Utilization of healthcare

1. How many times have you utilized the following healthcare service during the past 12 months?

Clinic visit (including school clinics) \_\_\_\_\_ times

Hospital visit \_\_\_\_\_ times

Inpatient stay \_\_\_\_\_ (day)

Emergency service \_\_\_\_\_ times

Specialist service \_\_\_\_\_ times

2. How long do you typically spend traveling to a typical healthcare visit?

\_\_\_\_\_ (minutes)

3. How long do you spend waiting during a typical healthcare visit?

\_\_\_\_\_ minutes

4. To what extent are you satisfied with the healthcare service (e.g., hospital and clinics)?

1. Very dissatisfied

2. Dissatisfied

3. Satisfied

4. Very satisfied

5. How much did you spend for healthcare services in the past 12 months?  
\_\_\_\_\_ RMB

### E. 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 I 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

### F. Perceived Stress

1. The questions in this scale ask you about your feelings and thoughts during the last 3 months. In each case, you will be asked to indicate how often you felt or thought a certain way.

In last 3 months,	Never	Almost never	Sometimes	Fairly often	Very often
(1) How often have you been upset because of something that happened unexpectedly?	1	2	3	4	5
(2) How often have you felt you were unable to complete the important things in your life?	1	2	3	4	5
(3) How often have you felt nervous and "stressed"?	1	2	3	4	5
(4) How often have you dealt successfully with irritating life hassles?	1	2	3	4	5

In last 3 months,	Never	Almost never	Some-times	Fairly often	Very often
(5) How often have you felt that you were effectively coping with important changes that were occurring in your life?	1	2	3	4	5
(6) How often have you felt confident about your ability to handle your personal problems?	1	2	3	4	5
(7) How often have you felt that things were going your way?	1	2	3	4	5
(8) How often have you found that you could not cope with all the things that you had to do?	1	2	3	4	5
(9) How often have you been able to control irritations in your life?	1	2	3	4	5
(10) How often have you felt that you were on top of things?	1	2	3	4	5
(11) How often have you angered because of things that happened that been outside of your control?	1	2	3	4	5
(12) How often have you found yourself thinking about things that you have to accomplish?	1	2	3	4	5
(13) How often have you been able to control the way you spend your time?	1	2	3	4	5
(14) How often have you felt difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

## G. Future orientation

### 1. How characteristic or true is this of you in the following items?

	Very untrue			Very true	
(1) I believe that a person's day should be planned ahead each morning	1	2	3	4	5
(2) If things don't get done on time, I don't worry about it	1	2	3	4	5
(3) When I want to achieve something, I set goals and consider specific means for reaching those goals	1	2	3	4	5
(4) Meeting tomorrow's deadline and doing other necessary work comes before tonight's play	1	2	3	4	5
(5) It upsets me to be late for appointments	1	2	3	4	5
(6) I meet my obligations to friends and authorities on time	1	2	3	4	5
(7) I take each day as it is rather than try to plan it out	1	2	3	4	5
(8) Before making a decision, I weigh the cost against the benefits	1	2	3	4	5
(9) I complete projects on time by making steady progress	1	2	3	4	5
(10) I make lists of thing to do	1	2	3	4	5
(11) I am able to resist temptations when I know that there is work to be done	1	2	3	4	5
(12) I keep working at difficult, uninteresting tasks if they will help me get ahead	1	2	3	4	5
(13) There will always be time to catch up on my work	1	2	3	4	5



## H. Resilience

### 1. To what extent do you agree with the following items when you facing stressors or difficulties?

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(1) I am able to adapt to change	1	2	3	4	5
(2) I have close and secure relationships	1	2	3	4	5
(3) Sometimes I think it is fate or God can help	1	2	3	4	5
(4) I can deal with whatever comes	1	2	3	4	5
(5) My past success gives me confidence for coping with new challenge	1	2	3	4	5
(6) I see the humorous side of things	1	2	3	4	5
(7) Coping with stress can strengthen me	1	2	3	4	5
(8) I tend to bounce back after illness or hardship	1	2	3	4	5
(9) I believe things happen for a reason	1	2	3	4	5
(10) I try my best effort no matter what	1	2	3	4	5
(11) I can achieve my goals	1	2	3	4	5
(12) When things look hopeless, I don't give up	1	2	3	4	5
(13) I know where to turn for help	1	2	3	4	5
(14) Under pressure, I focus and think clearly	1	2	3	4	5
(15) I prefer to take the lead in problem solving	1	2	3	4	5
(16) I am not easily discouraged by failure	1	2	3	4	5
(17) I think of myself as strong person	1	2	3	4	5
(18) I make unpopular or difficult decisions	1	2	3	4	5
(19) I can handle unpleasant feelings	1	2	3	4	5
(20) I have to act on a hunch	1	2	3	4	5
(21) I have a strong sense of purpose	1	2	3	4	5
(22) I am in control of life	1	2	3	4	5
(23) I like challenges	1	2	3	4	5
(24) I work to attain my goal	1	2	3	4	5
(25) I take pride in my achievements	1	2	3	4	5

## I. Life events checklist

Listed below are number of difficult or stressful things that sometimes happen to people. For each event, check one or more of the boxes to the right to indicate that: (a) It happened to you personally, (b) you

witnessed it happen to someone else, (c) you learned about it happening to someone close to you, (d) you're not sure if it applies to you, or (e) it doesn't apply to you.

Mark only one item for any single stressful event you have experienced. For events that might fit more than one item description, choose the one that fits best.

Be sure to consider your entire life (growing up, as well as adulthood) as you go through the list of events.

Event	Happened to me	Witnessed It	Learned about it	Not sure	Doesn't apply
1. Natural disaster (for example, flood, hurricane, Tornado, earthquake)	1	2	3	4	5
2. Fire or explosion	1	2	3	4	5
3. Transportation accident (for example, car accident, Boat accident, train wreck, plane crash)	1	2	3	4	5
4. Serious accident at work, home, or during Recreational activity	1	2	3	4	5
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)	1	2	3	4	5
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)	1	2	3	4	5
7. Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)	1	2	3	4	5
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)	1	2	3	4	5
9. Other unwanted or uncomfortable sexual experience.	1	2	3	4	5
10. Combat or exposure to a war-zone ( in the Military or as a civilian)	1	2	3	4	5
11. Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)					
12. Life-threatening illness or injury	1	2	3	4	5
13. Severe human suffering	1	2	3	4	5
14. Sudden, violent death (for example, homicide, suicide )	N/A	2	3	4	5
<b>15. Sudden, unexpected death of someone close to you</b>	N/A	2	3	4	5
16. Serious injury, harm, or death you caused to someone else	(Check here if you were directly involved)				

17. Any other very stressful event or experience	1	2	3	4	5
--	---	---	---	---	---

#### J. CES-DC

1. How do you agree with the following items in past 3 months?

	Strongly	Disagree	Agree	Strongly
(1) I felt depressed	1	2	3	4
(2) I felt everything I did was an effort	1	2	3	4
(3) My sleep was restless	1	2	3	4
(4) I was happy	1	2	3	4
(5) I felt lonely	1	2	3	4
(6) People were unfriendly	1	2	3	4
(7) I enjoyed life	1	2	3	4
(8) I felt sad	1	2	3	4
(9) I felt that people dislike me	1	2	3	4
(10) I could not get "going"	1	2	3	4

#### K. Social Anxiety

1. Read each of the following statements and carefully indicate to what extent you engaged in the following behaviors in last 3 months.

	Not at all	A little	Moderately	Very much	Extremely
(1) I worried about what other people thought of me	1	2	3	4	5
(2) I was afraid other people noticed my shortcomings	1	2	3	4	5
(3) I was afraid that others did not approve of me	1	2	3	4	5
(4) I was worried that I would say or do the wrong things	1	2	3	4	5
(5) When I was talking to someone, I was worried about what they were thinking of me	1	2	3	4	5
(6) I felt uncomfortable and embarrassed when I was the center of attention.	1	2	3	4	5
(7) I found it hard to interact with people.	1	2	3	4	5

#### L. PTSD measure

Below is a list of problems and complaints that people sometimes have in response to stressful life experiences.

Please read each one carefully, and indicate how much you have been bothered by that problem in past three months.

	Not at all	A little bit	Moderately	Quite a bit	Extremely

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing memories, thoughts, or images of a stressful experience from the past?	1	2	3	4	5
2. Repeated, disturbing dreams of a stressful experience from the past?	1	2	3	4	5
3. Suddenly acting or feeling as if a stressful experience were happening again (as if you were reliving it)?	1	2	3	4	5
4. Feeling very upset when something reminded you of a stressful experience from the past?	1	2	3	4	5
5. Having physical reactions (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of stressful experience from the past?	1	2	3	4	5
6. Avoid thinking about or talking about a stressful experience from the past or avoid having feelings related to it?	1	2	3	4	5
7. Avoid activities or situations because they remind you of a stressful experience from the past?	1	2	3	4	5
8. Trouble remembering important parts of a stressful experience from the past?	1	2	3	4	5
9. Loss of interest in things that you used to enjoy?	1	2	3	4	5
10. Feeling distant or cut off from other people?	1	2	3	4	5
11. Feeling emotionally numb or being unable to have loving feelings for those close to you?	1	2	3	4	5
12. Feeling as if your future will somehow be cut short?	1	2	3	4	5
13. Trouble falling or staying asleep?	1	2	3	4	5
14. Feeling irritable or having angry outbursts?	1	2	3	4	5
15. Having difficulty concentrating?	1	2	3	4	5
16. Being "super alert" or watchful on guard?	1	2	3	4	5
17. Feeling jumpy or easily startled?	1	2	3	4	5

## Appendix B: 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

3. 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)?  
① Yes                  ② NO
4. 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 奧施康定/可待因酮/土海洛英/經考酮/氧可酮		
(6) Percocet 泰勒宁		

(7) Tramadol 曲馬朵/麥道馬隆/舒敏		
(8) Compound aminopyrine phenacetin tablets 去痛片/復方氨基比林及非那西丁片		
(9) Scattered analgesics 解熱止痛散/止痛散		
(10) Robitussin A-C 飲 B/諾比舒咳 AC/惠菲寧 AC/樂必治 AC/愈創罌粟待因、克斯林、奧亭、歐博士		
(11) Percodan (阿司匹林及羟考酮)		
(12) Dilaudid 氫嗎啡酮/銳寧		
(13) Tylox 對乙酰氨基酚及羟考酮		
(14) Compound liquorice tablets 複方甘草片		
(15) Compound codeine phosphate oral solution 聯邦止咳露/佩夫人止咳露/克傷風感冒液/泰諾奇/復方磷酸可待因口服溶液)		
(16) Dimotil/Lomotil 立消樂錠/苯乙呱啶/止瀉寧/地芬諾酯/復方地芬諾酯片		
(17) 其他止痛藥或鴉片類藥物 List: _____		
(18) Halcion 酣樂欣/海樂神/三唑侖片/白瓜子/藍精靈/三唑侖		
(19) Klonopin/Rivotril 氯硝西洋/氯硝安定/十字架		
(20) Ambien/Stilnox 瑞樂時/唑吡坦/思諾施/酒石酸唑吡坦		
(21) Phenobarbital and scopolamine 腸賴泰錠劑/苯巴比特魯/苯巴比妥/苯巴比妥及東莨菪片		
(22) Rohypnol 十字架/氟硝安定/氟硝西洋/羅眠樂/忘憂藥		
(23) Dormicum 藍精靈/速眠安/咪達唑侖/多美康		
(24) 其他鎮靜劑 List: _____		
(25) Xanax 贊安諾/阿普唑侖/阿普唑侖		

(26) Valium ／煩寧／安定／羅氏五號／羅氏十號／為你安／地西洋／二氮平		
(27) Librium 利彼鎮／綠豆仔／利眠寧／氯氮草		
(28) Ativan/Loran 安定文／勞拉西洋／奧善／罗拉		
(29) Amytal 巴比妥酸鹽／巴比士酸鹽／青發／异戊巴比妥		
(30) Nembutal 戊巴比妥／安寧藥丸 (peaceful pill)		
(31) Seconal 速可眠／司可巴比妥／司可巴比妥钠／莉莉四十		
(32) Estazolam 舒樂安定／艾司唑侖		
(33) Mogadon 耐妥眠／硝基安定／硝甲西洋／硝西洋／“睡覺幫”／“笑哈哈”		
(34) 其他抗焦慮藥物 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) Biphedamine 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: _____		

5. 在沒有醫生處方的情況下，哪一個處方藥是你服用最多次的？

C. Motives of nonmedical use of prescription drugs

以下列舉了一些人們在沒有醫生處方下使用處方藥的原因。請跟據你的情況，選出適合的答案。如果你從未在沒有醫生處方下使用處方藥，請在每一個題目中選擇“N/A”。

我在沒有處方情況下使用處方藥的原因是:	是	不是	
1. 幫助睡眠	1	2	N/A
2. 緩解痛楚	1	2	N/A
3. 幫助減低焦慮	1	2	N/A

4. 提高注意力	1	2	N/A
5. 提高警覺	1	2	N/A
6. 促進學習	1	2	N/A
7. 減輕體重	1	2	N/A
8. 使我興奮	1	2	N/A
9. 抵消其他藥物的影響	1	2	N/A
10. 比毒品安全	1	2	N/A
11. 想嘗試一下	1	2	N/A
12. 因為我對該藥品上癮	1	2	N/A

#### D. Utilization of healthcare

1. 在過去 12 個月，你使用下面各種醫療服務的頻率是多少？

診所（包括校醫院和社區診所）：\_\_\_\_\_次

醫院：\_\_\_\_\_次

住院：\_\_\_\_\_天

急診：\_\_\_\_\_天

專家服務（包括：精神健康服務、康服性服務、物理治療等）：\_\_\_\_\_次

2. 當你使用醫療服務時，你一般要花多少時間在交通上？

\_\_\_\_\_分鐘

3. 你到醫院或者診所看病時，你一般需要在那裡等候多長時間？

\_\_\_\_\_分鐘

4. 你對醫療服務（包括：醫院和診所等）的滿意程度為：

1. 非常不滿意
2. 不滿意
3. 滿意
4. 非常滿意

5. 在過去 12 個月，你一共花在醫療服務的金額為



\_\_\_\_\_元

E. cultural orientation

以下說法符合你的特徵嗎？

	極不符合			極為符合	
	1	2	3	4	5
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
16. 尊重集體作出的決定對我很重要	1	2	3	4	5

F. Perceived Stress

以下問題是問關於你過去 3 個月裡的感受和想法。每一條題目都是問你“幾經常”有所描述的感受和想法。雖然有些題目意思看來十分相近，其實它們是不同的。你應視它們為獨立的題目作答。最適合的方法是盡快回答每條問題。

過去 3 個月裡:	絕對 不會	大概 不會	有時 會	經常會	十分 經常會
(15) 你有幾經常對某些突然發生的事情感到不安？	1	2	3	4	5
(16) 你有幾經常感覺到總是沒法控制生活上重要的事？	1	2	3	4	5
(17) 你有幾經常感覺到焦慮和壓力？	1	2	3	4	5
(18) 你有幾經常成功地處理生活上令人煩燥的事？	1	2	3	4	5
(19) 你有幾經常感覺到有效地處理生活上的重大轉變？	1	2	3	4	5
(20) 在處理個人問題之能力方面，你有幾經常感到充滿信心？	1	2	3	4	5

過去 3 個月裡:	絕對 不會	大概 不會	有時 會	經常會	十分 經常會
(21) 你有幾經常感覺到事事順利?	1	2	3	4	5
(22) 你有幾經常發現你是沒法處理各樣應要做的事?	1	2	3	4	5
(23) 你有幾經常能控制生活上之煩燥?	1	2	3	4	5
(24) 你有幾經常感到事事駕輕就熟?	1	2	3	4	5
(25) 你有幾經常對某些屬於你控制範圍以外的事而發怒?	1	2	3	4	5
(26) 你有幾經常在思想一些務要達到的事?	1	2	3	4	5
(27) 你有幾經常能控制你對時間的分配?	1	2	3	4	5
(28) 你有幾經常感覺到有很多困難而未能克服?	1	2	3	4	5

### G. Future orientation

#### 1. 以下說法符合我的特徵嗎?

	極不符合			極為符合	
(14) 我相信：一日之計在於晨	1	2	3	4	5
(15) 即使事情沒有按時做完，我也不會擔心	1	2	3	4	5
(16) 為達成夢想，我會設立目標，並會考慮具體的實現步驟	1	2	3	4	5
(17) 在晚上玩之前，完成明天必須結束的工作和其他必要工作	1	2	3	4	5
(18) 約會遲到會是我煩躁不安。	1	2	3	4	5
(19) 我按時兌現我對朋友和權威人士的承諾	1	2	3	4	5
(20) 我的每一天都是順其自然，而不是提前計劃好	1	2	3	4	5
(21) 在做決定之前我會充分衡量成本和效益。	1	2	3	4	5
(22) 我會按部就班地規劃時間進度，按時完成任務	1	2	3	4	5
(23) 我做事情習慣列出清單	1	2	3	4	5
(24) 當我知道有工作等著完成時，我能抵制得住其他誘	1	2	3	4	5
(25) 如果那些艱難乏味的工作有助於我進步，我會堅持做好它	1	2	3	4	5
(26) 時間總會有的，能來得及做完自己的工作	1	2	3	4	5

### H. Resilience

#### 2. 當你在面對困難或壓力時，請問以下描述是否符合你的情況或想法？請在適合你的情況的選項上畫○？

	從不	很少	有時	經常	總是
(26) 我能夠改變自己去適應生活或學習環境的變化	1	2	3	4	5
(27) 我能夠和別人保持親近和穩定的關係	1	2	3	4	5
(28) 有時候人只能靠命運或上天幫忙	1	2	3	4	5

	從不	很少	有時	經常	總是
(29) 我可以應付發生的任何事件	1	2	3	4	5
(30) 過去的成功會增加我迎接新挑戰的信心	1	2	3	4	5
(31) 我能夠看到事情中有趣的一面	1	2	3	4	5
(32) 我應付壓力的能力在不斷提高	1	2	3	4	5
(33) 生病或遇到困難後我恢復很快	1	2	3	4	5
(34) 任何事情發生總有它的原因	1	2	3	4	5
(35) 不管遇到什麼情況我總是盡我最大的努力	1	2	3	4	5
(36) 我堅信只要努力，就能實現自己的目標	1	2	3	4	5
(37) 即使當事情看上去沒有希望的時候，我也不會輕易放棄	1	2	3	4	5
(38) 我知道找誰尋求幫助	1	2	3	4	5
(39) 當我有壓力的時候，我能夠做到集中注意力	1	2	3	4	5
(40) 當解決問題時，我願意帶頭去解決	1	2	3	4	5
(41) 我不會輕易被失敗嚇倒	1	2	3	4	5
(42) 我覺得我自己是一個很堅強的人	1	2	3	4	5
(43) 我能夠做別人難以做出的或不受別人歡迎的決定	1	2	3	4	5
(44) 我能處理好不愉快的心情	1	2	3	4	5
(45) 有時候必須憑直覺做事	1	2	3	4	5
(46) 我做事的目的性很強	1	2	3	4	5
(47) 我覺得我可以掌握我的生活/未來	1	2	3	4	5
(48) 我喜歡挑戰	1	2	3	4	5
(49) 我通過努力學習去實現我的目標	1	2	3	4	5
(50) 我對我在生活中取得的成績（進步）感到自豪	1	2	3	4	5

### I. Life events checklist

以下表中列出一些有時候會發生在你或者別人身上的困難或者壓力事件。請跟據你的經歷（從出生到目前為止）來選出你的答案。對於每一個事件，你有 5 種回答的選擇：(1) 發生在我身上；(2) 我目擊此事件；(3) 我知道身邊人發生過此事件；(4) 不確定；(5) 我自己以及身邊人都沒有發生過此事

對於可能適合多個答案的事件，請選出一個最合適的答案

事件	發生在我身上	我目擊此事件	我知道身邊人發生過此事件	不確定	我自己以及身邊人都沒有發生過此事

1. 自然災害（如洪水、地震、颱風、颶風）	1	2	3	4	5
2. 火災或爆炸	1	2	3	4	5
3. 交通意外（如車禍、船禍、火車失事、飛機失事）	1	2	3	4	5
4. 在工作場所、家中，或者在娛樂時發生嚴重意外	1	2	3	4	5
5. 暴露於有毒物質（例如：危險化學品，輻射等）	1	2	3	4	5
6. 受到物理侵犯（例如，被打耳光，腳踢，毆打等）	1	2	3	4	5
7. 被用武器侵犯（如：中槍、被人用刀攻擊、被人用刀、槍，或炸彈威協等）	1	2	3	4	5
8. 被性侵犯（強姦、強姦未遂、被人用武力強行 / 威協進行性行為）	1	2	3	4	5
9. 其他你不情願發生的或者讓你不安的性行為	1	2	3	4	5
10. 戰爭或者暴露於戰場（作為軍人或者市民）	1	2	3	4	5
11. 囚禁（例如被綁架、幽禁、扣留作人質，或戰俘）					
12. 危及生命的疾病或傷害	1	2	3	4	5
13. 嚴重苦難和痛苦	1	2	3	4	5
14. 意外暴斃（如：被殺死、自殺等）	N/A	2	3	4	5
15. 重要他人突然或者意外死亡	N/A	2	3	4	5
16. 對別人造成嚴重受傷或死亡	如果曾經發生此事件，請選此選項	2	3	4	5
17. 其他壓力事件或體驗	1	2	3	4	5

## J. CES-DC

以下是一些句子形容你對自己的感受。在過去3個月裡，你同意以下的說法嗎？

	很不同意	不同意	同意	非常同意
(11) 我覺得情緒低落不開心	1	2	3	4
(12) 我覺得自己以前做的事沒有起作用	1	2	3	4
(13) 我睡得沒有以前好	1	2	3	4
(14) 我覺得孤獨，好像我沒有任何朋友一樣	1	2	3	4
(15) 我覺得我認識的人都對我不友好，或者他們不想和我在一起	1	2	3	4
(16) 我很享受我的生活	1	2	3	4
(17) 我覺得悲傷	1	2	3	4
(18) 我覺得人們不喜歡我	1	2	3	4
(19) 對我來說，開始著手做一些事情很難	1	2	3	4
(20) 我覺得情緒低落不開心	1	2	3	4

### K. Social Anxiety

以下是一些句子形容你對自己的感受。在過去3個月裡，你同意以下的說法嗎？

	Not at all	A little	Moderately	Very much	Extremely
(41) 我擔心別人如何看待我	1	2	3	4	5
(42) 我害怕別人提及我的短處	1	2	3	4	5
(43) 我害怕別人不認可我	1	2	3	4	5
(44) 我擔心自己會說錯話或者做錯事	1	2	3	4	5
(45) 當我跟別人說話時，我擔心對方如何想我	1	2	3	4	5
(46) 當我被別人注意時，我感到不自然和尷尬	1	2	3	4	5
(47) 當我要去跟別人互動時，我感到困難	1	2	3	4	5

### L. Post Traumatic Stress Disorder

下表中的問題是人們通常對一些緊張生活經歷的反應。在過去3個月里，你同意以下的說法嗎？

	一点也不	有一点	中度的	相当程度的	极度的
1. 过去的一段压力性事件的经历引起的反复发生令人不安的记忆、想法 或形象？	1	2	3	4	5
2. 过去的一段压力性事件的经历引起的反复发生令人不安的梦境？	1	2	3	4	5
3. 过去的一段压力性事件的经历仿佛突然间又发生了、又感觉到了 (好像您再次体验)？	1	2	3	4	5
4. 当有些事情让您想起过去的一段压力性事件的经历时，你会非常局促不安？	1	2	3	4	5
5. 当有些事清让您想起过去的一段压力性事件的经历时，有身体反应 (比如心悸、呼吸困难、出汗)？	1	2	3	4	5
6. 避免想起或谈论过去的那段压力性事件经历或避免产生与之相关的感觉？	1	2	3	4	5
7. 避免那些能使您想起那段压力性事件经历的活动和局面？	1	2	3	4	5
8. 记不起压力性经历的重要内容？	1	2	3	4	5
9. 对您过去喜欢的活动失去兴趣？	1	2	3	4	5
10. 感觉与其他人疏远或脱离？	1	2	3	4	5
11. 感觉到感情麻木或不能对与您亲近的人有爱的感觉？	1	2	3	4	5
12. 感觉好像您的将来由于某种原因将被突然中断？	1	2	3	4	5

	一点也不	有一点	中度的	相当程度的	极度的
13. 入睡困难或易醒?	1	2	3	4	5
14. 易怒或怒气爆发?	1	2	3	4	5
15. 注意力很难集中?	1	2	3	4	5
16. 处于过度机警或警戒状态	1	2	3	4	5
17. 感觉神经质或易受惊?	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 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).