

Doctoral Programme Public Health

Health of the Chinese university students in an era of globalisation

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ABSTRACT

Background and aim

The fast globalisation process has exponentially increased the flows of people, goods, capital as well as ideas across borders in the last decades. This process has had a fundamental impact on the development of China's economy, as well as higher education in China. Between 1997 and 2006 the number of enrolment at higher educational institutes in China has increased fourfold with increasing international students studying on Chinese campuses. At the same time, an accelerating number of Chinese students enrol at Western universities. The aim of this work was to obtain a comprehensive insight into the subjective health of the Chinese university students in front of the background of increasing international mobility. The research focused on health indicators and their associated factors of Chinese university students in comparison with international students studying at Chinese university and university students in Germany.

Methods

Data used were from two student health surveys, one was conducted in 2006–2007 among (N = 3,306) students at 16 German universities, another in 2010–2011 at two Chinese universities (N = 1,853, including 1,543 Chinese and 300 international students). In both surveys, the applied self-administered questionnaire contained questions concerning socio-demographic information, lifestyle-related attributes, a perceived stress scale, a health complaint (HC) list, as well as two variables measuring alcohol consumption frequency and problem drinking prevalence. In the Chinese survey, the 18-item Study-related Life Satisfaction Scale, the Leipzig Short Scale of Sense of Coherence (SOC-L9) were also included. The research objectives were: 1) assessing the levels of perceived stress and study-related life satisfaction among Chinese students from a perspective in comparing with international students studying at Chinese universities with an

emphasis of the Only-Child (OC) role; 2) assessing the rate of HCs, alcohol consumption prevalence and the associated factors with such prevalence among Chinese students in a comparative approach with German students; 3) identifying the associated factors of Sense of Coherence (SOC) in Chinese students.

Results

Chinese and international students did not differ with respect to the levels of perceived stress or study-related life satisfaction. Chinese Non-only-children (NOCs) were more dissatisfied than Only-children (OCs) (OR = 1.37, 1.09-1.73) in study-related life satisfaction. The Chinese NOCs were also more stressed than OCs (OR = 1.39, 1.11-1.74) with a stronger association among men (OR = 1.48, 1.08-2.02) than women (OR = 1.26, 0.89-1.77). Among the international students no association between OC status, perceived stress and study-related life satisfaction was found. In the Sino-German comparison, more German students reported multiple HCs (47.2 vs. 35.8%) and “At least once a week” alcohol consumption (59.8 vs. 9.0%) than Chinese students. Age showed a positive association with “At least once a week” drinking among the Chinese (OR = 1.33, 1.21-1.46), but a negative association among the Germans (OR = 0.97, 0.94-0.99). Perceived stress is positively related to problem drinking (OR = 1.08, 1.04-1.13) but not associated with occasionally drinking. Whereas a positive association between HCs and perceived stress, and between physical activity frequency and alcohol use was reported in both Chinese and German students, the gender difference in terms of females reporting more frequent HCs and less alcohol consumption especially less problem drinking (OR = 0.32, 0.26-0.40) was only found among the German students. For both student groups having a father with a high educational degree was related with “At least once a week” alcohol consumption (OR = 1.32, 1.01-1.27 for the Germans; OR = 4.25, 2.67-6.78 for the Chinese). A strong SOC was found to be positively associated with social support (OR = 2.56, 1.87-3.50), paying more attention to nutrition (OR = 1.67, 1.04-2.69),

being better in academic performance compared with peers (OR = 1.64, 1.15-2.34), being not isolated at the university (OR = 1.60, 1.04-2.47), and being satisfied with the political situation (OR = 2.05, 1.57-2.67). Whereas perceived stress shows a negative impact (OR = 0.81, 0.79-0.83) on developing a strong SOC.

Conclusions

The results of this research highlight the relatively high prevalence of HCs among university students and the negative impact of stress on students' health. The results suggest providing stress management, promoting integration and participation at Chinese universities to promote students' subjective health. The differences in alcohol consumption and its related factors between Chinese and German students provide empirical evidence for the importance of culture sensitive intervention. At the same time, the research findings give hints to the impact of social and political dimensions on student health.

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List of abbreviations

ALDH	Aldehyde dehydrogenase
BMI	Body mass index
EI	Emotional intelligence
HC	Health complaint
GAS	General Adaptation Syndrome
HPA	Hypothalamic-pituitary-adrenocortical
NOC	Non-only-child
OC	Only-child
OCP	One-Child Policy
PSS	Perceived Stress Scale
GRRs	Generalised resistance resources
SAM	Sympathetic-adrenal-medullary
SOC	Sense of Coherence

List of publications that form the basis of this thesis

Paper 1

Chu, J. J., Khan, M. H., Jahn, H. J., & Kraemer, A. (2015). Only-child status in relation to perceived stress and studying-related life satisfaction among university students in China: a comparison with international students. *PloS one*, *10*(12), e0144947 (IF: 3.057 in 2015)

Paper 2

Chu, J. J., Khan, M. H., Jahn, H. J., & Kraemer, A. (2015). Comparison of subjective health complaints between Chinese and German university students: a cross-sectional study. *International journal of environmental research and public health*, *12*(12), 15794-15806 (IF: 2.035 in 2015)

Paper 3

Chu, J. J., Jahn, H. J., Khan, M. H., & Kraemer, A. (2016). Alcohol consumption among university students: a Sino-German comparison demonstrates a much lower consumption of alcohol in Chinese students. *Journal of Health, Population and Nutrition*, *35*(1), 1 (IF: 1.038 in 2014/2015)

Paper 4

Chu, J. J., Khan, M. H., Jahn, H. J., & Kraemer, A. (2016). Sense of coherence and associated factors among university students in China: cross-sectional evidence. *BMC public health*, *16*(1), 1 (IF: 2.264 in 2014/2015)

1 Introduction

1.1 Globalisation and higher education reform in China

Globalisation, as an economic, political and cultural phenomenon, has fundamental implications for the process of development and the role of education in that process, because it changes not only the nature of the world markets but also what it takes to be competitive in these markets (Green et al., 2007). Non-material inputs of know-how, advancements in science and technology constitute the larger part of the value of national economic development in the so called “knowledge economy” (World Bank, 2003). Since the Education Revitalization Action Plan, issued by the Chinese government in 1998 with focus on strategies of revitalizing China through science and education, the Chinese higher educational system has been undergoing drastic reforms. Radical expansion in student enrolments has taken place, leading to a fourfold increase of the student body between 1997 and 2006 (National Bureau of Statistics of China, 2008). Meanwhile as the world’s leading exporter of goods, highly foreign-educated graduates, with interculturally connected communication networks are considered to be of particular significance to China. For the Chinese students, as underemployment among graduates increases, a degree from a foreign university is seen as providing advantages in competition on the job market. According to UNESCO around 763,000 Chinese students were studying at higher educational institutions abroad in 2013, accounting for 19% of all international students worldwide (UNESCO Institute for Statistics, 2013). At the same time, studying abroad is becoming a global trend. The so called “floating academic potential”, the share of international students is increasing at universities in most developed and developing countries in the last decade (World Bank, 2016). In 2013, over 4.1 million students went abroad to study, up from 2 million in 2000, representing 1.8% of all tertiary enrolments globally (UNESCO Institute for Statistics, 2013). The most popular host countries among the international students are the USA, the UK, and

Germany, as Chinese students form by far the biggest foreign group in all these three receiving countries (Michael, 2015). China has been a major drive of the global growth of student mobility in the last decade. On the one side, with Chinese students as a large proportion of students studying internationally, China has a dramatic impact on the global marketplace for education. On the other side, China also plays an important role in hosting students, in 2013 there were more than 30 million students enrolled in Chinese higher educational institutes including 132,000 foreign students (MOE, 2013; UNESCO Institute for Statistics, 2013).

1.2 Understanding student health in the global era

Increasing international mobility of students benefits cultural exchange as well as local economy through tuition fees. Additional to giving students access to more universities, it also provides potentials to raise academic standards due to the ever-expanding pool of applicants (DAAD, 2016). However, this phenomenon may bring challenge to understanding student health on campus. Multiple factors operating at individual, interpersonal, and institutional levels are related to the overall health of university students (Byrd & McKinney, 2012). The increasing diversity of students' origin may add cultural complex to all these three levels. College is a stressful time for many students as they go through the process of adapting to new educational and social environments. College may become even more stressful when adding strain of learning different cultural values and norms in addition to academic preparation and environmental adjustment (Mori, 2000). According to Matsumoto (2007), one of the important functions of culture is to provide a set of norms and values to coordinate social interactions of its members, thereby to allow the group meeting basic needs of survival, pursuing wellbeing and deriving meaning from life (Matsumoto, 2007). Two types of values that culture facilitates are especially pertinent to an understanding of social encounters, i.e. values related to interpersonal relationships and emotions (Matsumoto, Yoo, & Nakagawa, 2008). Emotions serve communicative and social functions,

conveying information about people's thoughts and intentions, and coordinating social interactions (Keltner & Haidt, 1999). Therefore, how people express, judge and regulate emotions affects their relationships, wellbeing, and stress level (Lopes et al., 2005). Moreover, it has been reported that difficulty in intercultural communication and adaptation is related to the culture distance between the origin and sojourn countries (Furnham & Bochner, 1982). As a result, cross-cultural interactions may become more challenging when encounters involve people from Far East China and Western industrialized countries. The following three concepts may provide some help in understanding the differentiation of cultural values between East and West that related to emotions, interpersonal relations, and leaning style. These factors have demonstrated influence on academic adjustment, social participation, cultural integration and mental health of international students (Henze & Zhu, 2012; Mori, 2000).

1.2.1 Academic cultural style

There is a trend of dividing the educational systems between Chinese or Asian and Western countries into two contrary categories based on their academic cultural style in terms of instruction mode, academic expectations, and curricular orientations (Henze & Zhu, 2012). Whereas the Eastern educational system is characterised as: teacher-centred, student passive participation, contextualised communication, and with focus on developing collectivistic literate citizenry; the Western educational system is described as: learner-centred, student active involvement, verbal explicitness, and with focus on developing individual's full potential (Henze & Zhu, 2012; Chan, 1999; Cortazzi & Jin, 1997).

1.2.2 Individualism vs. collectivism

Generally, researchers conceptualize individualism as the opposite of collectivism, especially when contrasting North American, Western European with East Asian cultural frames (Hofstede,

1980; Triandis, et al., 1988). Four attributes define this value orientation: self, goals, relationship, and determinants of behavior (Triandis, 1995). Whereas individualistic cultures tend to promote the development of independent self, foster personal goals over in-group goals; collectivistic cultures tend to encourage interdependent selves, foster in-group goals over personal goals (Suh et al., 1998; Triandis, 1995). As attitudes and emotions are relatively more important determinants of behaviours in individualistic cultures, norms are relatively more important in collectivistic cultures (Suh et al., 1998; Oyserman, Coon, & Kemmelmeier, 2002). With respect to wellbeing and life satisfaction, whereas individualism implies open emotional expression and attainment of one's personal goals are important sources of wellbeing and life satisfaction (Diener & Diener, 1995; Markus & Kitayama, 1991); collectivism implies restraint in emotional expression to ensure in-group harmony, life satisfaction derives from successfully carrying out social roles and obligations (Kim, 1994; Markus & Kitayama, 1991).

1.2.3 In-group and minority advantages in recognising emotions

Not only values in emotion expression vary between cultures, emotions may be more accurately understood when they are expressed by members of one's own cultural or subcultural group (Matsumoto & Assar, 1992). Minority group members seem better able to judge the emotions of majority group members than majority group members are, in return, able to judge the emotions of minority group members (Elfenbein & Ambady, 2002).

Cultural differences are still significant today and diversity tends to increase (Schmid-Ott et al., 2007). It has been reported that health of university students is better predicted by psychosocial factors, such as emotions and social norms on behaviours than biological attributes or genetic predisposition (Byrd & Mckinney, 2012; Mori, 2000). In the process of fast increasing international mobility among university students, being aware of the existing cultural differences

in expression of emotions, expectation on relations, and social norms for behaviours is important for improving campus communication and understanding student health. Consequently, there is a need for cross-country studies assessing the health situation of students in different cultural contexts (Ravens-Sieberer et al., 2009).

2 Theoretical orientation and public health concepts

Health of university students in the global era is a complex topic and therefore it is important to specify the underlying concepts and how these will be used in the thesis. This chapter begins by presenting the determinants of student health in general. The following section addresses the measurements used in the study and their origins in theory. The last section will touch upon the relevance of these measurements for this thesis.

Subjective health, or self-rated health, is an important component in the WHO definition of health (WHO, 1948). Research based evidence demonstrates that self-report measures of subjective health display adequate levels of validity and reliability (Diener, 1994). The concepts of subjective health, subjective wellbeing, and quality of life are frequently used interchangeably in literature (Ottova & Ravens-Sieberer, 2010). According to Diener (1984, 1994) subjective health addresses three important marks: First, it is the subjective experience of the individual. Second, it is not just the absence of negative factors, but also includes positive measures. Third, it includes a global assessment of various life domains. In this research students' life satisfaction in diverse areas related to studying was assessed. Perceived stress and prevalence of different health complaints (HCs) were evaluated as negative affect of students' subjective health, Whereas Sense of Coherence (SOC) was measured as positive affect or health resource.

2.1 Study-related life satisfaction

Multiple factors operating at different levels combine together to affect the overall health of

university students (Byrd & McKinney, 2012). It has been shown that not only personal behaviours, but also the public policy, and living and studying conditions that influence students' behaviours indirectly, have an independent influence on health (Nutbeam, 2000). Based on a previous model of Committee on Assuring the Health of the Public in the 21st Century (2002), Figure 1 shows a modified version of the model depicting the main determinants of university student health. At the center are the individual traits, including age, sex, and other biological factors; followed by individual behavior; social, family and community networks; living and learning conditions; as broad social, economic, cultural, health and environmental factors, policies at the global, national, state and local level are found at the very outer level.

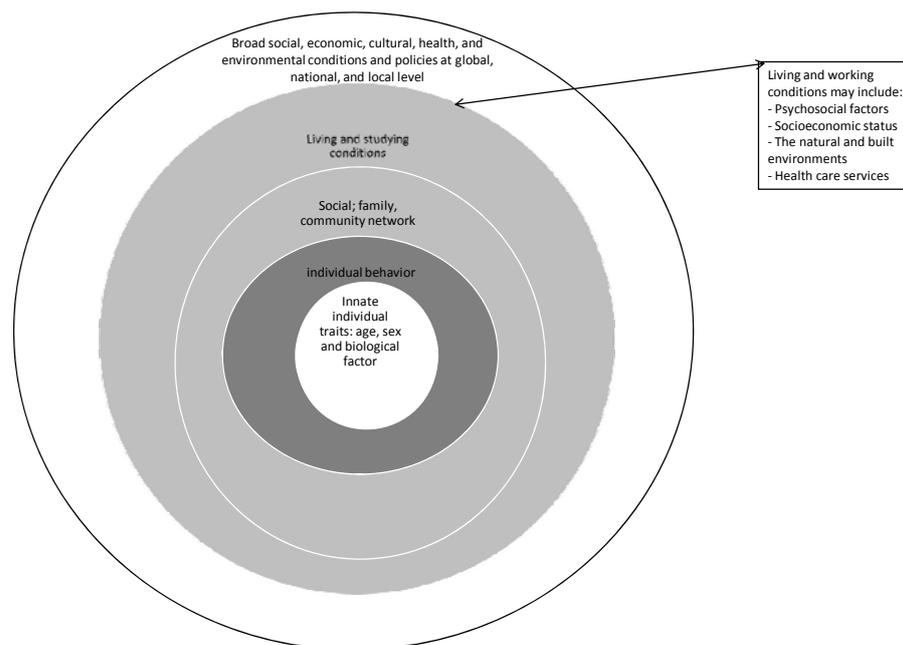


Figure 1: Determinants of student health; Source: Committee on Assuring the Health of the Public in the 21st Century (2002), p. 52

Using this model as a basis students' study-related life satisfaction was measured by the 18-item Study-related Life Satisfaction Scale from Stock and Kraemer (2001) with the question "To what extent are you satisfied with the following aspects of your life" (6-point Likert type scale from 1

= “very unsatisfied” to 6 = “very satisfied”). Questions concerned the following topics: studies in general, major and minor subjects, grades at university, social integration at university, job opportunities, accommodation, neighbourhood, place of study, free time, financial situation, relations with friends, relations with parents, private life, health, the country of study, political and economic situation in the country of study, and life in general (Stock & Kraemer, 2001).

2.2 Health and stress in university students

University students in general are vulnerable to stress as a result of the diverse challenges they face during their studies, including establishing new social networks, maintaining a good level of academic achievement, making personal choices about their health behaviors, as well as managing the basic demands of everyday life challenges (Roberti, Harrington, & Storch, 2006). Recent reports show that college students’ stresses have increased in severity (Benton et al., 2003). Published studies across the globe have consistently highlighted a wide range of physical and psychological symptoms pertaining to college students despite their relatively young age (American College Health Association, 2007; Stock et al., 2008). Alcohol use is broadly reported among university students, in many countries they are at an elevated risk for problem drinking (Karam, Kypri, & Salamoun, 2007). Although students typically live under stress, some seem to manage stress better than their peers do. Stress can be loosely defined as bodily processes created by circumstances that place physical or psychological demands on an individual (McGrath, 1982). The greater the demand and the less ability the individual has to reduce it, the greater will be the person’s state of stress. There seems to be no fundamental difference between the introspective information the brain uses in its normal regulation of the body and the information it receives from outside as determined by the behaviours of the individual or by the cultural environment (Kristeller, 2003). Theories that focus on the specific relationship between external demands (stressors) and bodily processes (stress) can be grouped in two different categories: approaches to

‘systemic stress’ based in physiology and psychobiology (Selye, 1976) and approaches to ‘psychological stress’ developed within the field of cognitive psychology (Lazarus 1966, 1991; McGrath 1982; Lazarus & Folkman 1984).

2.2.1 Selye's General Adaptation Syndrome (GAS) model

GAS model shows in three phases what the alleged effects of stress has on the body. The first stage of GAS is the ‘Alarm Reaction Stage’. During this stage there is an increase in activity in the sympathetic-adrenal-medullary system (SAM) and the hypothalamic-pituitary-adrenocortical axis (HPA). The main stress hormones cortisol, adrenaline, and noradrenaline, are released during this phase to provide instant energy. The second stage is the ‘Resistance Stage’. This is the phase when the body is adapting to the demands of the environment. If the body is in short term stress, it undergoes homeostasis and returns into its normal state at a steady rate, and tries to reabsorb excess resources such as cortisol, glucose, adrenaline or noradrenalin. If a stressful condition persists, the body repeats this process too often with little or no recovery. Ultimately this moves the body into the final stage of ‘Exhaustion stage’. If stage three is extended, long term damage may result as the capacity of glands, especially the adrenal gland, and the immune system is exhausted and function is impaired resulting in decompensation. The result can manifest itself in obvious illnesses such as ulcers, diabetes, troubles with the digestive system or even cardiovascular problems, along with other mental illnesses. Selye first notified the importance and effects of stress medically and in diseases with animals. The association between long-term perceived stressful conditions, diminished immune response, and chronically elevated levels of health complaints has been observed later in humans (Evans, et al., 1995; Ursin, 1997). Meanwhile it has to be taken in account that the stress experienced by humans is almost always the result of a cognitive mediation. Therefore, the way in which one person reacts to one stressor may vary from the way another person may react to the same stressor. Different levels of

hormones may be produced and the patterns may differ with different people due to how they perceive and cope with the stress (Lazarus, 1966).

2.2.2 Lazarus' cognitive appraisal model

Lazarus' cognitive appraisal model of psychological stress, takes a cognitive view of how people engage with the world. Psychological stress refers to a relationship with the environment that the person appraises as significant for his or her wellbeing and in which the demands tax or exceed available coping resources (Lazarus & Folkman, 1984). This definition points to two processes as central mediators within the person–environment transaction: cognitive appraisal and coping. The concept of appraisal (Lazarus, 1966), is based on the idea that emotional processes are dependent on actual expectancies that persons manifest with regard to the significance and outcome of a specific encounter. This concept is necessary to explain individual differences in quality, intensity, and duration of an elicited emotion in environments that are objectively equal for different individuals. Coping potential means a person's evaluation of the prospects for generating certain behavioral or cognitive operations that will positively influence a personally relevant encounter (Lazarus, 1966). An actual coping process depends on a number of factors, among them the particular stress situation, one's history of coping with similar situations, and one's personal and social coping resources. Research on stress coping resources has grown substantially over the past decades, the Salutogenic approach in this field has established a central construct to an understanding of stress coping.

2.2.3 Salutogenic model

Salutogenic Model was proposed by Aaron Antonovsky in 1979 to emphasise the origins of health (Antonovsky, 1979). In this model, health is conceptualized as a movement in a continuum on an axis in which health-ease is at the optimal end of the continuum and dis-ease at the unfavourable end. An individual's position and direction of movement along the continuum is

determined by the interplay of environmental threats (stimuli), generalized resistance resources (GRRs) at one's disposal, and the strength of one's SOC (Antonovsky, 1979; Eriksson & Lindström, 2007). When the demand made by the internal or external environment of an individual exceeds his/her readily available response resources, a stimulus becomes a stressor (Antonovsky, 1979). The GRRs include physical, biological, economic, and psychosocial sources, which can also be divided into internal (personal qualities) and external sources. Some examples of internal personal qualities are e.g. physical strength, knowledge-intelligence, and/or social emotional skills. Similarly examples of external factors are ability to provide social support, opportunities of education, or economic possibilities to satisfy daily needs (Antonovsky, 1987). SOC, the key element of the Salutogenic model, is formally defined as:

“a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to offset the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement” (Antonovsky, 1987, p. 19). This definition includes three components: comprehensibility, manageability and meaningfulness (Antonovsky, 1987). The positive health effects of a strong SOC are assumed to result from (1) the decrease of the probability that psychological tension will be transformed into health damaging stress, (2) the increase of health promoting/preventive behaviour, and (3) via the mobilization of neuroimmunological and neuroendocrinological resources to prevent damage to the organism (Antonovsky, 1979; Cacioppo, 1994). Studies conducted among college students show that both perceived stress and coping resource availability moderately predict level of life satisfaction. It was further found that the combination of coping resource availability and perceived stress is a better predictor of life satisfaction than either variable is when considered separately (Simons et

al., 2002). It has been also demonstrated that students' SOC levels predict their level of subjective wellbeing as well as their prevalence of psychosomatic complaints (Togari et al., 2008; Simonsson, 2008).

2.3 Research need

Rapid expansion in higher education in China inevitably brings with it problems, salient among that are insufficient supply of learning facility in terms of library holdings and classroom space, and qualified faculty (Yan et al., 2006). Faculty-student ratio had jumped from 9 in 1995 to 18 in 2006 (National Bureau of Statistics of China, 2008). The strengthening of students' life satisfaction is an important mission of education. In order to make institutional efforts to enhance the wellbeing and academic development of the students, it is essential to identify factors associated with their life satisfaction in specific aspects regarding their studying experience and learning environment (Chow, 2005). The higher education expansion took place when the generation of Only-children (OCs) began to reach the age of going to college in China. Their experience and wellbeing on college campus has been research focus since then. Along with the increasing international students studying at Chinese universities, there is a rising interest in assessments of subjective health of the Chinese OCs by comparing with their foreign fellow students to evaluate the impact of the One-child Policy (OCP) on students' health. As aforementioned the acceleration of Chinese students studying in Western countries has made significance of conducting cross-country health research in university students including the Chinese. Among the main hosting countries of international students, Germany is of specific interest for being selected as counterpart country for comparing with China in university student health. Firstly, similar to China, Germany contributes to the increasing international student mobility in receiving as well as in sending. In 2013 Germany was the third largest country in sending students to study internationally after China and India (UNESCO Institute for Statistics,

2013). Secondly, previous studies in Sino-foreign student comparison have been done more between China and North America, especially the USA and Canada (Gelfand et al., 2000; Li & Rosenblood, 1994; Chow, 2005), less between China and Europe. Thirdly, although the USA has hosted the highest numbers of international students worldwide, only around 4% of all students in the USA are foreign students; in contrast 12% of the students in German higher educational institutions are international with students of Chinese origin forming the largest foreign group (DAAD, 2016). Therefore, a Sino-German comparison may add more insights into an understanding on university student health from a cross-cultural perspective. The key point of the Salutogenic approach is the orientation towards problem solving and the capacity to use resources available. University students are at the stage of SOC developing (Antonovsky, 1979, 1987), identifying factors associated with a strong SOC at university is not only important for health promotion on campus but also relevant to wellbeing of students in their later life. Hence, applying the aforementioned conceptual frame, this research was with focuses on assessing the subjective health of students studying at Chinese universities with an emphasis on perceived stress, study-related life satisfaction, and the role of Only-child (OC) status; 2) assessing the rate of health complaints, alcohol consumption prevalence among Chinese and German students; 3) identifying the associated factors of SOC in Chinese students.

3 Aim, objectives and research questions

The general aim of this dissertation is to obtain a comprehensive understanding of the subjective health of Chinese university students in the global era. To this end, with an emphasis on the health impact of the OC status and perceived stress, a cross-country comparative approach was applied.

Objectives

- 1) To assess the levels of perceived stress and study-related life satisfaction in Chinese national and international students (paper 1)
- 2) To assess the role of OC status in perceived stress and study-related life satisfaction in Chinese national and international students respectively (paper 1)
- 3) To assess the prevalence of HCs, alcohol consumption and their associated factors in Chinese and German university students (paper 2 and paper 3)
- 4) To assess the factors associated with SOC in Chinese students with an emphasis on the effect of perceived stress (paper 4)

Research questions

- 1) Is there a difference with respect to the levels of perceived stress and study-related life satisfaction between Chinese university students and their international fellow students?
- 2) Is OC status associated with perceived stress and study-related life satisfaction? Does this association differ between Chinese and international students?
- 3) Are the underlying constructs of the HC scale between Chinese and German students the same?
- 4) Is there any significant difference in HC and alcohol prevalence between Chinese and German students?
- 5) Do the associations between HC components and their associated factors differ between Chinese and German students?
- 6) Do the associations between alcohol consumption and their associated factors differ between Chinese and German students?

7) What are the factors associated with SOC of Chinese university students?

4 Methods

The data used in the analyses were extracted from two health surveys. Firstly, a multicenter student health survey was administrated in 2006–2007 at 16 universities (N = 3,306) in North Rhine-Westphalia, Germany. A detailed description of this study was provided elsewhere (Faller et al., 2010). This was followed by a Chinese student health survey at two universities in 2010–2011 (N = 1,853, including 1,553 Chinese nationals and 300 international students). Altogether, 5,159 students from the social and natural sciences in different academic years were included from 18 universities in Germany and China. Ethical approval for the Chinese study was obtained from the Institutional Review Board of Peking University. The students were asked to complete the survey questionnaires at the end of lectures in the lecture rooms. They were informed in writing that participation was voluntary and anonymous. In both surveys, a self-administered, pre-tested questionnaire that contained questions concerning socio-demographic information, lifestyle-related attributes, social support, alcohol consumption, a perceived stress scale, and a HC list including 10 items was applied. For the Chinese survey, in order to assess the students' life satisfaction related to their studying, and also identify factors for health promotion on campus, the 18-item Study-related Life Satisfaction Scale (Stock, & Kraemer, 2001), the Leipzig Short Scale of Sense of Coherence (SOC-L9) were also included (Schumacher, & Brähler, 2000).

Paper 1

The first paper included a comparison between 1,543 Chinese, and 300 international students from two Chinese universities. The main objectives of the analysis were to assess: 1) whether the levels of perceived stress and study-related life satisfaction are associated with the OC status after controlling for demographic, socio-economic characteristics; and 2) whether these associations

differ between Chinese and international students. Cohen's Perceived Stress Scale (PSS-14) were used to measure perceived stress (Cohen, Kamarck, & Mermelstein, 1983). Study-related life satisfaction was measured by the 18-item Study-related Life Satisfaction Scale from Stock and Kraemer (2001). Multivariable logistic regression analyses were used to examine the associations of OC status with perceived stress and study-related life satisfaction by sex for Chinese students and international students separately.

Paper 2

This paper intended to 1) identify and compare underlying dimensions of HC components; 2) access and compare HC prevalence, and the associations between HC components, socio-demographic, lifestyle-related factors, and perceived stress among 3,306 German, and 1,853 Chinese university students. A HC list including 10 items (neck/shoulder pain, back/low back pain, headaches, stomach trouble, diarrhea, constipation, concentration difficulties, nervousness/anxiety, mood swings, and depressive mood) was applied. Factor analysis was performed to reduce 10 self-reported HCs into three HC components. Logistic regression was applied to identify factors associated with HC in both student groups.

Paper 3

Data used in this analysis were from 1,853 Chinese and 3,306 German students with objectives to assess 1) the prevalence of alcohol consumption and 2) associated factors with alcohol consumption among university students in both countries. Alcohol consumption frequency was measured by a question "How often did you drink alcohol in the last three months?" with six possible responses, which were later collapsed into three categories of "At least once a week", "Less than once a week" and "Never". Problem drinking was measured by the CAGE test

and defined as a CAGE score of two or more (four as the maximum) (Ewing, 1984). Binary and multinomial logistic regressions were used for association analyses.

Paper 4

This paper used data of 1,853 Chinese university students with objectives to: 1) investigate the association between SOC, socio-demographic and lifestyle-related characteristics; 2) assess the effect of perceived stress on SOC controlling for other variables among students at Chinese university. Analyses were done to derive a better view on possible strategies to strengthen students' SOC and with that to promote their health. The SOC was assessed by the "Leipzig Short Scale" – SOC-L9 based on Antonovsky's 29-items Sense of Coherence Scale (SOC-29) scale. Perceived stress was assessed by Cohen's 14-item Perceived Stress Scale (PSS-14). SOC scale sum score median was used as cut-off value for multivariable logistic regression analyses.

This section only presents a brief overview of the methods used as they are explained in detail in the single papers (attached as Appendices of this dissertation) that form the basis of this thesis.

5 Summary of results

In a summarised way, this section presents a selection of major results answering the aforementioned research questions.

In both Germany and China, the majority of students rated their general health as good (87.0-89.2%). Chinese students reported a higher rate of sufficient income (81.2 vs. 58.5%), a lower rate of good quality of life (39 vs. 57.8 %) than their German counterparts (paper 3).

5.1 Levels of perceived stress and study-related life satisfaction

Chinese and international students did not differ with respect to the levels of perceived stress or study-related life satisfaction. Chinese NOCs (non-Only-children) were more dissatisfied than OCs (OR = 1.37, 1.09-1.73) in study-related areas. The Chinese NOCs were also more stressed

than OCs (OR = 1.39, 1.11-1.74) with a stronger association among men (OR = 1.48, 1.08-2.02) than women (OR = 1.26, 0.89-1.77). Among the international students no association between OC status, perceived stress or study-related life satisfaction was found. Chinese NOCs were statistically less satisfied in “relations with friends” and “integration at university” than OCs. Regarding the associated factors with perceived stress and study-related life satisfaction, insufficient social support was positively associated with higher level of perceived stress (OR = 3.43, 2.65-4.43 for the Chinese; OR = 2.50, 1.52-4.10 for the international) and study-related life dissatisfaction in both Chinese students and their international follows (OR = 3.35, 2.56-4.38 for the Chinese; OR = 1.74, 1.06-2.86 for the international). A negative association between age and levels of perceived stress (OR = 0.87, 0.77-0.97) and life dissatisfaction (OR = 0.87, 0.76-0.98) was only found in Chinese females (paper 1).

5.2 Prevalence of health complaints

Factor analysis of the 10 HCs provided three HC components: psychological symptoms, gastrointestinal complaints, and pain/aches in both Chinese and German students. The presence of the three components explained about 57% of the total variance for both groups. More German students reported at least one HC (80.5 vs. 68.2%) and multiple HCs (47.2 vs. 35.8%) than the Chinese students. A positive association between all three types of HCs, levels of perceived stress and poor subjective health status reveals in both Chinese and Germans. Among the Germans not having a partner was related to less pain (OR = 0.75, 0.64-0.88) and less gastrointestinal problems (0.78, 0.65-0.92). A positive association between age and psychological symptoms (OR = 1.03, 1.01-1.05) and gastrointestinal problems (OR = 1.03, 1.01-1.05) was found only in the German students. Female students reported more psychological symptoms (OR = 1.68, 1.38-2.04), more often pain (OR = 2.43, 2.04-2.89) and more gastrointestinal problems (OR = 1.65,

1.36-1.99) than male students in the German group. No gender difference in HC prevalence was found in the Chinese group (paper 2).

5.3 Alcohol consumption

More German students reported “At least once a week” alcohol consumption (59.8 vs. 9.0%) than their Chinese counterparts. Among the German students 20.3% reported problem drinking. Age showed a positive association with “At least once a week” drinking among the Chinese (OR = 1.33, 1.21-1.46), but a negative association among the Germans (OR = 0.97, 0.94-0.99). Gender difference in terms of females reporting less alcohol consumption especially less problem drinking (OR = 0.32, 0.26-0.40) was only found among the German students. For both student groups having a father with a high educational degree was related with “At least once a week” alcohol consumption (OR = 1.32, 1.01-1.27 for the Germans; OR = 4.25, 2.67-6.78 for the Chinese). Doing less than once a week physical activity was associated with less frequent “At least once a week” alcohol use in both Chinese and German students (OR = 0.27, 0.15-0.48 for the Chinese; OR = 0.69, 0.49-0.96 for the Germans). Perceived stress was positively related to problem drinking (OR = 1.08, 1.04-1.13), but not associated with occasionally drinking (paper 3).

5.4 Factors associated with SOC

A strong SOC was found to be positively associated with social support (OR = 2.56, 1.87-3.50), paying more attention to nutrition (OR = 1.67, 1.04-2.69), being better in academic performance compared with peers (OR = 1.64, 1.15-2.34), being not isolated at the university (OR = 1.60, 1.04-2.47), and being satisfied with political situation (OR = 2.05, 1.57-2.67). Whereas perceived stress shows a negative association (OR = 0.81, 0.79-0.83) with SOC (paper 4).

6 Joint discussion

In this section main findings of the research presented will be discussed to obtain an understanding of university students' health in the background of increasing international mobility.

6.1 Difference in health indicators between nations and groups

The research findings confirm the existing differences in health problems, substance use behaviours as well as subjective health in university student between nations and groups (Stock et al., 2008; karam, Kypri, & Salamoun, 2007; Ye, Yu, & Li, 2012). In the comparison between Chinese and German students, the Chinese reported less HCs, less alcohol consumption than the Germans although more Germans perceived good life quality compared with their Chinese counterparts (Chu et al., 2015b, 2016a). These findings are in consistence with previous studies. The results of two multi-country studies show that higher level of happiness, and higher rate of maladjustment behaviours such as alcohol and tobacco use, were found in individualistic cultures than in collectivistic cultures (Grant, Wardle, & Steptoe, 2009; Matsumoto, Yoo, & Nakagawa, 2008). Researchers suggested that substance use may considered in the individualistic society as signs for expressing personal freedom and independence, while in the collectivistic culture getting drunk may bring embarrassment or shame to the family, therefore such behaviour may be suppressed (Matsumoto, Yoo, & Nakagawa, 2008). The results of this research reveal that gender difference in terms of women having less drinking problem but more HCs was only found in German students (Chu et al., 2015b, 2016a); while the negative influence of NOC status on perceived stress was found only in Chinese men (Chu et al., 2015a). These may reflect the impact of the social, political factors on individuals' health and behaviours. Due to the OCP practiced in the last three decades in China, the current Chinese female students at university may be the first generation that share the same right to go university as their male counterparts. This empowerment compared with their mothers' generation has helped the new Chinese women in

reducing the relatively big gender difference in many life areas in traditional Chinese culture. Previous studies even reported higher perceived life satisfaction and self-esteem in females than males among Chinese university students (Ye, Yu, & Li, 2012). Additionally, compared with previous studies conducted among university students in many countries, the HC prevalence found among the Chinese sample of this research is quite low (Chu et al., 2015b). It has been reported in countries where more gender empowerment exists; not only girls, but also boys had a lower level of health complaints (Torsheim et al., 2006). This may bring insights for other regions in the world where high gender inequality exists, it seems plausible that women empowerment in a country may have positive effects on the health of the whole population of the nation.

6.2 Stress impact on student health

Although differences exist between cultures and nations, there were common associations in health and behaviours found among students from different countries in this research. The similar underlying structure of the HC scale, the positive association of all HCs with higher level of perceived stress in both German and Chinese students, shows the homogeneous, pervasive harmful impact of stress on student health (Chu et al., 2015b). These findings indicate the importance of stress management at university. Stress coping includes both the ability to mobilise resources to solve the problem (instrumental), and the ability to regulate emotions in the situation (emotional) (Lazarus & Folkman, 1984). Emotion regulation is not exclusive to the individual concerned, but also involves interaction between people and the society around them (Eriksson & Lindström, 2007). In the background of increasing cultural diversity on campus, the concept of emotional intelligence (EI) may be useful in understanding the complex of emotional communication in shaping students' health. According to the ability model developed by Mayer and Salovey (1997), EI includes four constructs: emotional perception, emotional facilitation, emotional understanding, and emotional management (Mayer & Salovey, 1997). It was shown

that students who have learnt how to control their own emotional reactions and to understand how others feel can deal better when facing difficulties with peers and administrators; they receive more support from their social surroundings, also show increased “stress tolerance” and “life satisfaction” (Brackett & Katulak, 2006; Palmer, Donaldson, & Stough, 2002). In intercultural interactions individuals from different cultural background may encounter difficulties in coordinating emotions. For instance, whereas authenticity to one's inner feelings is often regarded as a virtue in individualist cultures, in many cases, it is considered as a sign of personal immaturity or selfishness in collectivist cultures (Suh et al., 1998). Previous studies on acculturation stress suggest that earlier exposure to cultural diversity and direct cross-cultural personal contacts may increase emotional understanding, therefore reduce culture shock (Matsumoto, Yoo, & Nakagawa, 2008). It has also been assumed that cultural links, such as exchange programmes among school children and cross-country research projects, could help reduce inter-group tension, prejudice, hostility, and increase cross-cultural co-operation (Sam, 2001). In this regard the minority advantage in recognising emotions confirms the potential of cultural learning (Elfenbein & Ambady, 2002). The quality of social interactions is influenced by many factors, including social skills, language proficiency, personality traits, person-environment fit, and motivation. Therefore, any specific abilities are likely to have only a modest impact on the outcome of social interactions. Given the importance of cross-cultural adaptation, however, such small effects can be very important (Lopes et al., 2005). The findings of this research that isolation at university is related to a weak SOC, whereas social support is associated with lower levels of perceived stress and higher levels of study-related life satisfaction among both Chinese and international students may provide evidence for the significance of social integration in shaping student health on campus in the global era (Chu et al., 2015a, 2016b).

6.3 Culture sensitive approach in student health promotion

For intervention programs, findings of this research provide evidence for culture sensitive approach. The research results show that having a partner is related to more psychological and gastrointestinal symptoms among German students, as age was found to be positively associated with these two types of HC (Chu et al., 2015b). This may imply the potential of providing relationship counseling to older students in Germany. Among the Chinese offering programmes to improve peer relations could help enhancing students' wellbeing, since problems with fellow students were found to be related to life dissatisfaction of the NOCs (Chu et al., 2015a). The study results show a positive association between age and alcohol consumption among Chinese but a negative association in German students (Chu et al., 2016a). In combination with the cultural difference in onset age of drinking between China and Europe, i.e. in China the majority drinkers start alcohol use after 20 years, in Europe around 12-13 years, it seems sensible to suggest alcohol abuse prevention at Chinese university but before students entering college in Germany (Chu et al., 2016a). Here it is also worth mentioning the specific situation in acculturation, it was demonstrated that among the international students their alcohol consumption is predicted the best by the drinking behaviour of their close peers (Hahm, Lahiff, & Guterman, 2004). A previous study reported that among the Chinese students studying in the USA, those who were more socially affiliated with American culture were more likely to be regular drinkers (Cai, 2015). Although Chinese students consume relatively low alcohol compared with German students, internationally studying Chinese may acquire more alcohol related harm when they increase drinking in the course of acculturation in their Western hosting countries, due to the high rate of ALDH (aldehyde dehydrogenase) deficiency of this population (Chu et al., 2016a). At the same time, it is important to realise the complex of human health maintaining and promotion, as higher levels of perceived stress were found to be associated with less physical activity (Chu et al., 2015a), the research results also show a positive association

between physical activity and alcohol consumption among students in China and Germany (Chu et al., 2016a). Therefore, for promoting more sport to reduce stress without increasing alcohol consumption among university students, it requires an interdisciplinary cooperation among sport organizers, alcohol selling regulators, and health educators at university. Meanwhile, it has been shown that woman empowerment is associated with increased substance use in this population (Bloomfield et al., 2001), the climbing binge drinking among German female adolescents was assumed to be related to the increasing emancipation of this group in recent year (the Federal Centre for Health Education, 2012). The paradox of the positive association between increased personal freedom, enhanced subjective wellbeing, and elevated maladjustments in terms of psychological symptoms and substance use grants further research in this field (Grant, Wardle, & Steptoe, 2009; Matsumoto, Yoo, & Nakagawa, 2008).

6.4 Health impact of social conditions and policies

The research findings among the Chinese university students may reflect the current social situation of China to a certain extent. Although more Chinese students reported financial sufficiency than the German students, the rate of perceived good quality of life was lower among the Chinese compared with their German counterparts (Chu et al. 2016a). This is in line with a previous study conducted among general population in China, despite the fast increase in income per capita in the last decade, life satisfaction decreased in the country partially due to the increased inequality (Easterlin et al., 2012). As shows in figure 1, policies at different levels have impact on health. As a controversial policy implemented in China to limit population growth for more than three decades, OCP has a fundamental impact on China's fast demographic, social transition, as well as on health and behaviors of the population (Hvistendahl, 2012). The dramatic fertility rate decrease related to the OCP has in large contributed to the fast ageing population process in China. The research findings confirm the previous study, that the OCP has reduced

educational gender differences in urban China (Tsui & Rich, 2002), while the association between son preference accelerated by the OCP and female infant death in rural China was also reported (Li & Lavelly, 2003). At the same time, gender imbalance with respect to huge male surplus among the people under 30 years old has brought observable changes in social interactions, such as dating patterns in the new generation of Chinese (Hvistendahl, 2012). This may provide some explanation to our findings, that better adaptation in terms of reduced stress perception and increased study-related life satisfaction along with the time at university was only found among the Chinese women (Chu et al., 2015a). Based on Antonovsky's Salutogenic concept participation in socially-valued decision-making promotes a strong SOC. The extent to which people have a voice in what goes around them has significant influence on their level of meaningfulness, while lack of substantive complexity, disregarding people's potentials can lead to increasing paralysis of their sense of manageability (Antonovsky, 1987). In the Chinese context, as the educational system still emphasizes teacher-centred teaching with its reliance on memory-based learning, academic freedom remains one of the central developmental constraints for Chinese universities (Mohrman, 2008). Professors and students must still observe strict parameters to the exercise of their critical faculties, especially with studies in the humanities and social sciences, politics still tends to thwart the practice of open, critical debate (Green et al., 2008). The finding that dissatisfaction with the political situation in China was related to weaker SOC of university students, may give a hint in this regard (Chu et al., 2016b). The research results that more than 43% of the students were not satisfied with the political situation in China may add some explanation to the increasing number of Chinese study abroad. On the other hand, the long year training of the Chinese educational system may have made a fast academic adjustment at Western universities difficult for the Chinese students studying abroad.

6.5 Mutual learning in intercultural communication

In general, self-expression and individualism increase with economic growth independent of any culture (Schmid-Ott, et al., 2007). With relatively fast economic development in the globalization process, China will probably be moving into a more individualistic direction in the future. The research findings that students with a father having a high educational degree consumed more alcohol both in China and Germany may add some credit to this statement (Chu et al., 2016a). Meanwhile, cultural expression in terms of individualism or collectivism also relates to the work pattern of the group members involved. As cultivating rice requires more specialization by teams than cultivating wheat in China, people from areas suited for growing wheat tend to have more individualist views than people from areas suited for growing rice (Talhelm et al., 2014). This confirms the flexibility of cultural orientation in meeting environmental challenges to guarantee group survival. Studies provide support to the tendency of individualistic European Americans in overestimating behaviour as a product of the individual's dispositions and underestimating important situational determinants of the behaviour; whereas more collectivistic East Asians are more oriented toward contextual factors than are European Americans (Norenzayan, Choi, & Nisbett, 1999; Gilbert & Malone, 1995). In the background of fast globalization challenges, such as handling climate change, fighting against cross-country terrorism, require cooperation and team work of all involved international players. Mutual understanding between East and West promotes consensus on global solutions for common challenges of all. For coping the integration of accelerating international students at Western universities, debates and discourses about 'internationalization agenda', that calls for a 'cosmopolitan' curriculum for both home and international students to become 'global citizens', are undertaking (Henze & Zhu, 2012). Whereas language serves as a tool for communication, overlapping knowledge in linguistic, cultural, historical narratives plays an important role in intercultural interactions (Heublein, Özkilic, & Sommer, 2007; Bennett, 1998). East Asian languages are highly contextual in every

sense, because of the minimal nature of syntax in Sinitic languages, context is important to understanding sentences (Freeman & Habermann, 1996); due to their multiple meanings, words must be understood in the context of sentences (Logan, 1986). In contrast, European languages are decontextualized, words and utterances are supposed to be understandable independent from verbal and situational context (Heath, 1982). In this context, scholars (Freeman & Habermann, 1996; Logan, 1986; Heath, 1982) suggest potential of mutual language learning in promoting cross-cultural understanding and adaptation.

6.6 Limitations

The four papers that form the basis of this thesis have specific limitations that were mentioned in detail in the single publications. Thus, this section only describes these limitations in brief.

Although a representative sample of students was sought by selecting courses that represented the different departments/faculties, due to organizational difficulties and variation in response rates, students of health sciences were overrepresented in the final sample in both countries. Therefore, even with a big sample and good response rates, the research sample remains a convenience sample, and generalizations of the findings should be made with caution. Students were recruited during lectures; thus, those who were absent in the class during data collection were not included in the survey. This may have affected the results since absence from lectures might be due to alcohol consumption, or health complaints. Compared with the Chinese nationals, the sample of the international group was relatively small, this may have a certain impact on the study results. And as cross-sectional surveys, the findings are associations not causations. Additionally, this cumulative doctoral thesis has its own limitations that should be reported. In the first paper, the international students studying in China were distinguished from the Chinese nationals. In the second and third papers in the comparison between Chinese and German students, the international students at Chinese universities were included in the data of Chinese side. This may

affect the differences of findings reported between the two countries. Nevertheless, although the information regarding nationality of the German students was not collected, it is reasonable to expect a share of international students among the German subsample too. Therefore, the plausible consequences are, the comparison in health and health behavior between the two subsamples reflects the actual situation of the students studying at universities in China and Germany. Since the information regarding OC status was not collected in German sample, it was not possible to compare the impact of OC status on HCs and alcohol consumption between the two countries.

7 Conclusion

In summary, it can be concluded that the four papers forming the basis of this thesis provide an overview of Chinese university student health in the global era. Taking into account the role of the OC status, in comparison with international students studying in China, two important indicators of student subjective health, (1) the study-related life satisfaction, and (2) the levels of perceived stress were assessed (Paper 1). These two indicators provide a basis for understanding the subjective health of Chinese university students and comparing Chinese with other nationals. In comparison with German students, the prevalence of health complaints and alcohol consumption among Chinese university students were evaluated (paper 2 and paper 3). The information drawn from the cross-country comparison enables an understanding of university student health and health behaviors in different cultural settings. In the context of the applied theoretical approach, factors associated with Sense of Coherence of Chinese university students were identified (paper 4). It can be concluded that the findings of this research provide a reasonable empirical evidence for further research and interventions to improve the health of Chinese university students.

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APPENDICES

Declaration of originality

Bielefeld University, school of Public Health

Doctor of Public Health (Dr.PH)

Declaration

The work presented is the results of independent investigation. The contribution indebted to the work of others has been acknowledged and cited. This thesis has not been accepted or submitted for any other degree at any other university. I further declare that I have previously made no attempt to do a doctorate.

Bielefeld, 8. 11. 2016

Janet JQ Chu

Janet Junqing Chu

Publications that form the basis of this thesis

Paper 1

Paper 2

Paper 3

Paper 4