INDIVIDUAL AND CONTEXTUAL RISK FACTORS OF THE HIV PANDEMIC IN YOUNG ADULTS. A CASE OF SCHOOL, COLLEGE AND UNIVERSITY STUDENTS IN CHINA.

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ABSTRACT

Purpose: The purpose of this paper is to describe the individual and contextual risk factors for HIV infection among high school, college and university students in China.

Design/methodology/approach: A systematic search of English language literature was conducted, covering the period between 2003 and 2013. The following databases were searched: Medline, PubMed, Proquest, Google Scholar and Google. Different key terms were used, either in combination and/or as standalone. Manual searches were conducted to identify grey literature, and references to the selected articles were scrutinised to acquire additional referential literature. Because of the limited number of articles, a narrative review, including content analyses, was conducted to identify themes emerging from the literature.

Findings: The identified individual risk factors for the acquisition of HIV infection among students in China are high-risk sexual behaviours, including an early sexual debut, multiple sexual partners, and unprotected sexual encounters. Lack of knowledge about HIV transmission, low condom use, and having a history of sexually transmitted infections, have increased susceptibility to infections among students. Meanwhile, the contextual risk factors for the infection encompass socio-environmental influences, including clash of norms and views, and social relation among students. Exposure to pornographic

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material and videos, excessive alcohol consumption, and substance usage, are also influencing factors for students' involvement in high-risk sexual encounters. Lastly, socioeconomic conditions have significant influence on students' engagement in commercialised sex, leading to their exposure to HIV infection.

Conclusion: HIV risk factors amongst students in China are complex. More research to address other risk factors among diverse high school, college and university settings in different contexts across China is necessary. Recognition of these factors is imperative in order to effectively address the HIV epidemic occurring amongst this population group in China, as well as in other countries.

Key words: *China, HIV infection, risk factors, high school, college and university students.*

Introduction

Human Immunodeficiency Virus (HIV) affects various population groups across the world. Young people, high school students and college/university students are not excepted (UNAIDS, 2011, 2013). The 2013 UNAIDS report on the global HIV and AIDS epidemic estimated that 35.3 million people were living with HIV in 2012, of which 3,300,000 were children aged 0-14 years. This is an increase of 600,000 cases in the last ten years, up from 2,700,000 HIV positive children in 2002. During the same time, the HIV prevalence among young women and men aged 15-24 years was 0.5% and 0.3% respectively. This figure was lower compared with 0.7% and 0.4% in 2002 respectively, indicating a decline of 0.2% and 0.1% respectively during a ten year period (UNAIDS, 2013).

HIV infection is well recognised as one of the world's major and serious public health challenges, and at least in the last three decades, has become one of the biggest threats for the future life of young generations in many countries. China is not exceptional, and since the first case of HIV was detected in 1985, the virus has spread into many parts of this country. Here it has infected huge numbers of people, including the young, especially high school and college/university students, accounting for 700,000 by the end of 2007 (Albrektsson, Alm, & Andersson, 2009; Kaiser Health News, 2013; UNAIDS, 2009). By the end of 2009, China was reported to have the largest number of students in the world, accounting for 46.4 million high school students and 29.8 million college students (Xu *et al.*, 2011). The prevalence of HIV in the

country has been reported to be approximately 60% among population aged 15 to 29 in 2003 and 43.2% among those aged 20 to 29 in 2007 (State Council AIDS Working Committee Office - UN Theme Group on AIDS in China, 2007; Xinhua News Agency, 2003). The prevalence, however, indicates that high school and college/university students who are largely in this age categories are also at risk of HIV infection. This indication is substantiated by a number of identified risk factors for HIV transmission. For instance, they engage in high-risk sexual behaviours, lack information and knowledge of HIV transmission and prevention, as well as co-infections with other sexually transmitted infections (STIs) (Ma *et al*., 2006; Sun *et al*., 2013; Xu, *et al*., 2011).

Recognition of these risk factors is imperative in order to develop strategies which will address the HIV epidemic among students in China and in other countries. The aim of this review is to explore the determinants of increased susceptibility of high school and college/university students to HIV infection in China.

Methods

A systematic search of English language publications was conducted between 2003 and 2013. The following databases were searched: Medline, PubMed, Proquest, Google Scholar and Google (Magarey, Veale, & Rogers, 2001; Saks & Allsop, 2013). The following search terms were used, either in combination and/or as standalone: risk factor [*] OR susceptibility factor [*] OR susceptibility determinant [*] OR vulnerability factor [*] OR vulnerability determinant [*] AND HIV infection [*] OR human immunodeficiency virus infection [*] AND students AND China. Manual searches were also conducted to identify relevant grey literature. Moreover, the references of the selected articles were scrutinised to find additional literature, and only articles for which a full text was available were considered. Only the studies looking at HIV infection risk factors among students in China were included in the review. Due to the high level of methodological complexity, and the limited number of articles providing sound evidence it was not feasible to conduct a systematic review. Instead, a narrative review including a content analysis of the articles was conducted (Cipriani & Geddes, 2003; Gasparyan, Ayvazyan, Blackmore, & Kitas, 2011). Previously published information on HIV in China was synthesised and summarised (Gasparyan, et al., 2011; Green, Johnson, & Adams, 2006).

A number of major emerging themes were identified, namely through their frequent recurrence in the literature, as well as from our knowledge of medical and public health issues related to the subject. The identified emerging themes were summarised in a number of synthesis tables, which can help the readers to obtain a plain understanding of the content of each paper (Table 1, 2, 3).

Results

A total of 11 out of 53 identified articles met the inclusion criteria. A number of emerging themes were identified and clustered into two main groups including (1) individual factors and (2) contextual factors. Individual factors include themes such as (i) individuals' sexual behaviours, (ii) low condom use, (iii) lack of knowledge of HIV/AIDS, and (iv) sexually transmitted infections (STIs). Contextual factors comprise several themes including (v) socio-environmental influences, (vi) pornography and substance abuse, and (vii) economic condition. These are described below:

Individual Factors

(i) Individuals' Sexual Behaviours

Sexual behaviours have been recognised as one of the main risk factors for HIV infection – factors that contribute to the spread of HIV infection - as they increase the likelihood of viral transmission. Engagement in sexual activities, such as homosexual and anal sexual intercourse, having multiple sexual partners, including non-regular partners, and involvement in commercialised sex, are the common high-risk sexual behaviours among students (Li, Huang, Xu, Huang, & Ye, 2013; Ma, *et al*., 2006; Ma *et al*., 2009b; Sun, *et al*., 2013; Zheng, Wu, Poundstone, Pang, & Rou, 2012).

Anal sexual intercourse, for example, is believed to be a practice through which HIV infection has been widespread among male who have sex with male students (MSM). This is because it often causes injury and bleeding, which facilitate HIV transmission from one to another (Xu, *et al*., 2011; Zheng, *et al.*, 2012). Two of articles reviewed posit that anal sexual intercourse is a common practice among MSM students, and such practice along with inconsistent condom use, sexual partners experienced anal bleeding after anal intercourse, limited HIV/AIDS information

and use of illicit drug, are discovered to be significantly associated with HIV infection among this group (Xu, *et al*., 2011; Zheng, *et al*., 2012).

Students involved in sexual intercourse with multiple sexual partners including non-regular, casual and commercial partners, are at risk for HIV infection (Li, *et al*., 2013; Ma, *et al*., 2006; Maimaiti, Shamsuddin, Abdurahim, Tohti, & Memet, 2010; Tan, Pan, Zhou, Wang, & Xie, 2007; Xu, *et al*., 2011). They may come in contact with high-risk individuals (partners with HIV/STIs, with drug use, with multiple sex partners), thus increasing the likelihood of HIV transmission among them (Li, *et al*., 2013; Ma, *et al*., 2006; Ma, *et al*., 2009b; Sun, *et al*., 2013; Xu, *et al*., 2011). The percentages of students' engagement in multiple sexual partners were addressed in the results of nine of the studies reviewed. (See table 1).

Early initiation into sexual activity is as well considered one of the high-risk sexual behaviours for HIV transmission among students. This is due to the fact that those who experience sexual intercourse at a very young age initially tend to have non-regular sexual partners, have more than one sexual partner in their lifetime, and are less likely to be consistent in condom use (Li, *et al*., 2013; Ma, *et al*., 2006; Ma, *et al*., 2009b). Additionally, those who initiate early sexual relations, have become aware of sex, and engaged in sexual intercourse before high school, during high school and at university (Li, *et al*., 2013; Ma, *et al*., 2006). Data from seven of the studies reviewed indicate that significant number of students in the country had been involved in sexual intercourse at young age. (See table 1).

(ii) Low Condom Use

Low condom use has also been identified as another risk factor for HIV infection amongst students in China, as it increases the chance of virus transmission between them and their sexual partners. Several studies have shown that many high school and college/university students in the country are at risk of HIV infection because of their engagement with unprotected sexual intercourse (Li, *et al*., 2013; Ma, *et al*., 2009b; Maimaiti, *et al*., 2010; Sun, *et al*., 2013; Tan, *et al*., 2007; Xu, *et al*., 2011; Zhang *et al*., 2004; Zheng, *et al*., 2012). Sun and colleagues (2013) together with Ma and others (2009b), for instance, have reported that condom use among the college and university students who participated in their studies was very low. (See table 1).

However, Li and colleagues (2013) reported a slightly higher usage of condoms among high school students. (See table 1).

Unprotected anal intercourse, as previously described, has been reported as a common practice among Chinese MSM students (Xu, *et al*., 2011; Zheng, *et al*., 2012). It can cause injuries during intercourse, and so facilitate the transmission of the infection between both parties. A study by Xu and others (2011) reported that 46.5% of Chinese students categorised as MSM had unprotected receptive anal intercourse in the last 6 months, while 41.7% were either occasional users, or never used condoms during sexual activity with their casual male partners. Likewise, 58.6% of students of MSM who were reported to be involved in anal intercourse used condoms inconsistently (Zheng, *et al*., 2012).

Illicit drug use and alcohol are additional issues influencing students to become involved in unprotected sexual intercourse (Li, *et al*., 2013; Zheng, *et al*., 2012). Some of the reasons for less or inconsistent condom use among sexually active students include lack of knowledge of HIV transmission and lack of perceived benefits of condom use (Ma *et al*., 2009a; Sun, *et al*., 2013). Additional reasons given concerning students' unwillingness to use condoms during sexual intercourse include: (i) partners' dislike of condoms and fear of rejection, (ii) fear of disappointing a partner, (iii) feeling nervous or embarrassed to buy condoms, and (iv) not willing to waste money. Other suggested reasons are that condoms reduce sexual pleasure, not using condoms makes it easier to withdraw, other methods of contraception are more reliable, and trusting each other is more important in a relationship. Some students also do not believe that they could get pregnant or become infected with STIs. Moreover, because sexual activity is traditionally not permitted for unmarried people in China, they may need to conceal their condom usage from significant others, including parents (Sun, *et al*., 2013; Zhang, *et al*., 2004).

(iii) Sexually Transmitted Infections

Evidence exists which demonstrates that compared to individuals who do not have STIs, individuals with a history of STIs are at a heighted risk of HIV infection if exposed to the HIV virus through high-risk sexual contact (Wasserheit, 1992). Wasserheit (1992) describes the relationship between STIs and HIV infection as follows: (i) the presence of STIs increases HIV

transmission, as both HIV and other STIs share common modes of transmission, common human reservoirs and common behavioural risk factors, and (ii) the presence of STIs accelerates the progression of HIV disease as the number of exposures to an STI pathogen may be the risk factor for accelerated HIV progression. Data from the studies indicate that STIs are common among students MSM as evidenced by Xu and others (2011) and Zheng and friends (Zheng, *et al*., 2012), who reported higher percentage of STIs amongst students MSM than that of amongst heterosexual students (Ma, *et al*., 2006; Ma, *et al*., 2009b). The table below summarises evidence of existence of STIs amongst students in the country. (See table 1).

Table 1: Studies reported on multiple sexual partners, inconsistent condom use, STI and early sexual initiation among sexually active students

Study	Study Type	Total Sample Size N	Number of sexually active students	Reported Sexually active students who engaged in multiple sexual partners; n (%)	Reported inconsistent condom use among sexually active students; n (%)	Reported diagnosis of STIs among sexually active students; n (%)	Early initiation of sexual intercourse among sexually active students	
							n (%)	age
Li, et al. (2013)	Quantitative	2,668	188	74 (39.6)	80 (42.4)	-	31 (16.4) 92 (49.2)	≤ 14 15-17
Sun, et al. (2013)	Quantitative	19,123	1,702	61 (3.6)	1,261 (74.1)	-	-	18.9±2.1
Zheng, Wu Poundstone, Pang & Rou, (2012)	Quantitative	157	157	93 (59)	92 (58.6)	29 (18.5)	-	-
Xu, et al. (2011)	Mixed Methods	436	436	187 (43)	259 (59.4)	55 (12.6)	-	18.5±5.9
Maimaiti, Shamsuddin, Abdurahim, Tohti & Memet, (2010)	Quantitative	400	400	24 (6.0)	40 (10.0)	-	-	-
Ma, et al. (2009a)	Quantitative	1,850	M*: 1,326 F*: 524	M: 253 (19.1) F: 70 (1 3.4)	M: 1,134 (85.5) F: 434 (82.8)	-	M: 562 (42.4) F: 202 (38.5)	16-19
Ma, et al. (2009b)	Quantitative	1,908	1,908	612 (32.1)	1,007 (52.8)	25 (1.3)	269 (14.09)	≤ 19
Albrektsson, Alm, Tan & Andersson, (2009)	Quantitative	868	80	-	-	-	80 (9.2)	10-24
Tan, Pan, Zhou, Wang & Xie, (2007)	Quantitative	259	18	16 (6.2)	8 (43.7)	-	18(6.9)	18-23
Ma, et al. (2006)	Quantitative	22,493	M: 3,959 F: 1,934	M: 697 (17.6) F: 236 (12.2)	M: 1,390 (35.1) F: 681 (35.2)	59 (1.5) 29 (1.5)	M: 289 (7.3) F: 37 (1.9)	Before University
Zhang, et al. (2004)	Mixed Methods	1,874	-	-	-	-	-	-

*M = Male
*F = Female

(iv) Lack of Knowledge of HIV/AIDS

A lack of knowledge, including a misunderstanding of HIV/AIDS, particularly HIV transmission and prevention, has been recognised as an important supporting factor for the spread of the infection amongst students in China. Of the studies reviewed, seven indicate that there exists uneven distribution of HIV/AIDS knowledge amongst students, resulting in misunderstandings of means of HIV transmission (Albrektsson, *et al*., 2009; Ma, *et al*., 2009a; Maimaiti, *et al*., 2010; Sun, *et al*., 2013; Tan, *et al*., 2007; Xu, *et al*., 2011; Zhang, *et al*., 2004). Modes of HIV transmission, for which many students lack an understanding include: unprotected sex, transmission through unsafe blood practices, sharing needles with people living with HIV (PLWH), plus the birth process and breastfeeding from an HIV positive mother (Albrektsson, *et al*., 2009; Maimaiti, *et al.*, 2010; Sun, *et al*., 2013; Tan, *et al*., 2007; Xu, *et al*., 2011). Moreover, one of the common miscomprehensions amongst students regarding the routes of HIV transmission, is the belief that mosquito bites can transfer the virus from one person to another (Albrektsson, *et al*., 2009; Sun, *et al*., 2013; Xu, *et al*., 2011). Other misperceptions students also share concerning transmission routes are beliefs that kissing, sharing plates, drinks or meals, using a public toilet, swimming in a public pool as well as shaking hands with infected people could infect them (Albrektsson, *et al*., 2009; Maimaiti, *et al*., 2010; Sun, *et al*., 2013; Xu, *et al*., 2011; Zhang, *et al*., 2004). (See table 2).

Lack of HIV/AIDS knowledge is believed to be the result of limited distribution of the sources of HIV/AIDS information. Television, clinical doctors, free education services, the media, and HIV/AIDS-related program and training at school and university, are the common sources of HIV/AIDS information (Albrektsson, *et al*., 2009; Maimaiti, *et al*., 2010; Tan, *et al*., 2007; Xu, *et al*., 2011). For example, in their study, Albrektsson and others (2009) revealed that 40.2% out of 868 student participants received HIV/AIDS information in school or on campus. Similarly, Sun and colleagues (2013) reported that 47.5% out of 19,123 student participants received it on campus, and another 41.8% received STIs and HIV/AIDS education before entering college. This, however, indicates that the sources of HIV/AIDS information are still inaccessible for significant number of students who participated in these studies.

Table 2: Studies reported on the distribution of knowledge of routes HIV transmission amongst students in China

Study	Study Type	Total Sample Size N	Routes of HIV Transmission											
			Sex without condom (%)	Illegal blood transfusion (%)	Mother to child (%)	Breastfeeding (%)	Sharing needles (%)	Mosquitoes (%)	Legal blood donation (%)	Kissing (%)	Sharing plates /drinks (%)	Sex with condom (%)	Sharing clothes (%)	Shaking hand (%)
Li, et al. (2013)	Quantitative	2,668	-	-	-	-	-	-	-	-	-	-	-	-
Sun, et al. (2013)	Quantitative	19,123	-	-	-	-	-	54.7	-	-	83.5	-	-	-
Zheng, Wu Poundstone, Pang & Rou, (2012)	Quantitative	157	-	-	-	-	-	-	-	-	-	-	-	-
Xu, et al. (2011)	Mixed Methods	436	-	97.7	97.2	-	95.0	67.4	-	-	89.7	-	-	-
Maimaiti, Shamsuddin, Abdurahim, Tohti & Memet, (2010)	Quantitative	400	-	-	80	-	80	59.5	-	-	-	-	-	-
Ma, et al. (2009a)	Quantitative	1,850	Low: 25.89				Middle: 31.94					High: 41.02		
Ma, et al. (2009b)	Quantitative	1,908												
Albrektsson, Alm, Tan & Andersson, (2009)	Quantitative	868	97.5	94.9	90.8	61.3	92.2	31.6	30.8	29.1	9.0	21.4	3.6	0.9
Tan, Pan, Zhou, Wang & Xie, (2007)	Quantitative	259	98.8	96.5	89.9	-	97.8	40.3	-	-	3.9	-	-	1.2
Ma, et al. (2006)	Quantitative	22,493	-	-	-	-	-	-	-	-	-	-	-	-
Zhang, et al. (2004)	Mixed Methods	1,874	-	-	-	-	-	-	-	-	42	-	45	-

Contextual Factors

(v) Socio-Environmental Influences

Environmental and societal norms are also recognised as strong external influencing factors for high-risk sexual behaviours amongst the student population. Environmental influences are depicted as a clash between the environment in which students were raised prior to university, and the university environment into which they moved. This is because it provides them with huge opportunities for exposure to the wider world (Zhang, *et al*., 2004). An exposure to the wider world of different norms and views from different cultures, (where premarital sex is even encouraged), can also influence students' sexual behaviours. This is the so-called clash of norms and views within the context of the environment (Zhang, *et al*., 2004). Meanwhile, a feeling of being more mature after engaging in sexual intercourse is believed to be the intrinsic factor stimulating students to become involved in high-risk sexual behaviours (Zhang, *et al*., 2004). Likewise, students' social relation with other students (peer pressure) and with people they meet in their part-time off-campus jobs, is an important influencing factor that shapes their risky sexual behaviours for HIV infection (Zhang, *et al*., 2004).

(vi) Pornography and Substance Abuse

Students' exposure to pornographic has been reported to influence high-risk sexual behaviours among students. A number of studies have pointed out that students are exposed to pornographic material and videos through the pornographic media and the internet (Ma, *et al*., 2006; Sun, *et al*., 2013; Zhang, *et al*., 2004). For example, the study by Ma and colleagues (2006) find out that significant number of research participants had been exposed to pornography at the age of before 17. (See table 3). This is one of the influencing factors for students' early initiation of sexual intercourse as many of them found to have had sexual intercourse before entering university (Ma, *et al*., 2006). Of the studies reviewed, two describe that exposure to pornographic information is one of the determinants of sexual behaviours, and initiation of sexual intercourse at younger age is a significant risk factor for ongoing risky sexual behaviours, including sexual intercourse with multiple-partners, among students (Li, *et al*., 2013; Sun, *et al*., 2013).

Internet is as well an influencing factor for students' risky sexual behaviours for HIV infection for it is often used by many of them to find dates or a girl/boy friend, through which they may

end up with contact with high-risk sexual partners (Ma, *et al*., 2006; Zhang, *et al*., 2004). The study by Ma, et al. (2006), for example, reported that 51.1% (5,751) out of 11,255 male students, and 43.8% (4,922) out of 11,238 female student met dates or a girl/boy friend via internet.

Excessive alcohol consumption, and age also influence students' sexual behaviours, as indicated in a study by Sun et al. (2013) which stated that male students who are older and drunk are more likely to engage in sexual intercourse. Of the studies reviewed, two indicate that there is a strong association between illicit drug use, alcohol drinking, and ongoing risky sexual behaviours (Li, *et al*., 2013; Sun, *et al*., 2013). They are considered as significant risk factors for unprotected sex and multiple sexual partners among students (Li, *et al*., 2013; Maimaiti, *et al*., 2010; Sun, *et al*., 2013). (See table 3).

(vii) Economic Condition

Economic condition has been well recognised as one of the influencing factors for HIV spread across different population. It can push or pull people to get involved in risky sexual behaviours including exchanging sex for money and jobs or exchanging money for sex, with multiple sexual partners and high-risk partners (Albrektsson, *et al*., 2009; Zheng, *et al*., 2012). A study by Zhang, et al. (2004) indicates that commercialised sex for money and jobs is a common practice including amongst students. It reported that 23% (414) and 12% (217) out of 1,874 students knew that students traded sex with off-campus jobs and for money. Data from a number of studies reviewed indicate that transactional sex exists and has been associated with ongoing risky sexual behaviours for HIV infection amongst students (Albrektsson, *et al*., 2009; Sun, *et al*., 2013; Xu, *et al*., 2011; Zheng, *et al*., 2012). (See table 3).

Table 3: Studies reported on pornography, substance use and commercialised sex amongst students in China

Study	Study Type	Total Sample Size N	Reported students exposed to pornography		Reported students who engaged in Substance Use				Commercialisation sex amongst students	
			Pornographic Video; n (%)	Pornographic Website; n (%)	IDU; n (%)	Oral/rhinal drug use; n(%)	Cigarette; n (%)	Alcohol; n (%)	Sell sex; n(%)	Purchase sex; n(%)
Li, et al. (2013)	Quantitative	2,668			38 (1.4)	32 (1.2)	54 (2.0)	108 (4.0)	-	-
Sun, et al. (2013)	Quantitative	19,123: M*: 9,313 F*: 9,810	M: 5,336 (57.3) F: 1,118 (11.4)	M: 4,591 (49.3) F: 441(4.5)	-	-	yes	yes	M: 150 (1.6) F: 26 (0.3)	-
Zheng, Wu Poundstone, Pang & Rou, (2012)	Quantitative	157	-	-	Illegal drug use: 4 (2.6)				9 (5.7)	9 (5.7)
Xu, et al. (2011)	Mixed Methods	436	-	-	-	-	-	-	25 (5.7)	7 (1.6)
Maimaiti, Shamsuddin, Abdurahim, Tohti & Memet, (2010)	Quantitative	400	-	-	-	-	-	18 (4.5)	-	-
Ma, et al. (2009a)	Quantitative	1,850	-	-	-	-	-	-	-	-
Ma, et al. (2009b)	Quantitative	1,908	-	-	-	-	-	-	-	-
Albrektsson, Alm, Tan & Andersson, (2009)	Quantitative	868	-	-	-	-	-	-	3 (0.3)	9 (1)
Tan, Pan, Zhou, Wang & Xie, (2007)	Quantitative	259	-	-	-	-	-	-	-	-
Ma, et al. (2006)	Quantitative	22,493: M: 11,255 F: 11,238	M: 3,950 (35.1) F: 809 (7.2)	M: 855 (7.6) F: 56 (0.5)	-	-	-	-	-	-
Zhang, et al. (2004)	Mixed Methods	1,874	>1,499 (> 80)		-	-	-	-	-	-

*M = Male
*F = Female

Discussion

As previously described, supporting factors for the transmission of HIV infection among Chinese students are complex. This review provides a number of risk factors for the transmission of the virus among them, which can be clustered into proximal, intermediate and distal determinants (Underwood, Skinner, Osman, & Schwandt, 2011). Proximal determinants refer to personal factors through which the virus can be instantly transmitted from one person to another. They include high-risk sexual behaviours, such as sex with multiple sexual partners (casual and commercial partners), and with partners who are HIV positive, transactional sex, and engagement in unprotected sexual intercourse, including unprotected anal intercourse (Li, *et al*., 2013; Ma, *et al.*, 2009a; Sun, *et al*., 2013; Underwood, *et al*., 2011; Xu, *et al*., 2011). This is in line with the report from UNAIDS (2009) that places heterosexual and homosexual acts as two of the main routes of HIV transmission in the country at 42% and 11% respectively.

However, the studies reviewed in this paper have not addressed another proximal factor, that is, HIV transmission through injecting drug use (IDU). IDU has been proven in several studies and reports to be the supporting factor and instantaneous route of the transmission of the virus in many population groups and communities. The 2009 UNAIDS report on AIDS in China revealed that IDU is the second major route of HIV spread in the country, and accounts for 38% of all transmissions. For example, the report denotes that the majority of HIV positive individuals identified in the south-western and north-western parts of the country came from drug-injecting populations (UNAIDS, 2009). IDU plays a central role in HIV transmission, not only among the users themselves, but also among the general population as the users often engage in high-risk sexual activities with partners outside of their group (Gu *et al*., 2010; Gu *et al*., 2009; Lau *et al*., 2009).

Intermediate determinants comprise factors that promote risky sexual behaviour for HIV infection amongst students, including lack of HIV/AIDS knowledge especially of HIV transmission and prevention, STIs, pornography, substance use, and social relation (peer pressure) (Albrektsson, *et al*., 2009; Li, *et al*., 2013; Ma, *et al*., 2006; Sun, *et al*., 2013; Zhang, *et al*., 2004). Low perceived personal risk to HIV infection is another intermediate determinant missing from the studies reviewed. It is considered as a significant risk factor for risky sexual

behaviours as it reduces motivations to take necessary precautions (Eatona, Flishera, & Aar, 2003; Xiao, Palmgreen, Zimmerman, & Noar, 2010). In contrast, a number of studies have pointed out that higher perceived personal susceptibility to the infection links to greater motivation for behaviour change (Huang, Bova, Fennie, Rogers, & Williams, 2005; Lönn, Sahlholm, Maimaiti, Abdukarim, & Andersson, 2007).

Limited availability of and accessibility to health services are other supporting factors playing a vital role in HIV transmission. Both can increase susceptibility of individuals to the infection, as in such situations people are highly unlikely to know their HIV status or, once infected, to access medical treatment in order to boost their immune system (ADB, 2008; UNAIDS, 2013). Moreover, these can also be the co-factors for raising many other health-related problems.

Interestingly, illicit drug use and alcohol drinking are also pointed out to be determinants of HIV transmission among students in China (Li, *et al*., 2013; Zheng, *et al*., 2012). However, none of studies clearly indicates an association between the use of such substances and unprotected sexual intercourse among students. The association, as described in two previous studies, is claimed because it decreases the awareness of individuals who abuse such substances to avoid unsafe sex or to use condoms during sexual intercourse (NIDA, 2006; Xiao, *et al*., 2010). Alcohol consumption in particular can as well engender sexual violence including sexual coercion and rape, which is also a significant risk factor for HIV transmission (Underwood, *et al*., 2011).

Distal determinants include economic and cultural factors, which are often considered as the driving forces behind risky sexual behaviours for HIV transmission. Dire economic condition including poverty is an influencing factor that leads students to exchanging sex for money and for off-campus jobs. Such practice increases their susceptibility to the infection as they are in a less powerful position to bargain for safe sex (Eatona, *et al*., 2003; Kissezounnon, 2008; Underwood, *et al*., 2011). Cultural norms and views, particularly as regards premarital sex, can also be reinforcing factors for high-risk sexual behaviours leading to HIV transmission among students (Zhang, *et al*., 2004). Gender inequality, for example, which is socially and culturally constructed in terms of gender norms and expectations, has limited the rights of young women in

many societies and communities to manage control over how, when and where sexual intercourse takes place, and to negotiate for safer sex with their sexual partners (J. Higgins, Hoffman, & Dworkin, 2010; Makoae & Mokomane, 2008; Quarraisha, Sengeziwe, & Cheryl, 2010; UNAIDS, 1999). The prominent reason why most women are unable to practice safe sex with their sexual partners is the fear of violence. Condom use often becomes a trigger for physical and sexual violence by men (Eatona, *et al*., 2003; Kissezounnon, 2008; Türmen, 2003; UNAIDS, 1999; WHO, 2000).

Male-dominated sexual relationship amongst students is another cultural factor that has not been covered in the studies. Other studies with university students in China and youth in South Africa emphasise that such relationship is a significant risk factor for HIV transmission as it often leads to coercion and violence against girls to engage in unprotected sex that predisposes them to the epidemic (Eatona, *et al*., 2003; L. T. Higgins & Sun, 2007).

Environmental factor is another influencing factor for HIV transmission. A study by (Kissezounnon, 2008) finds out that the surrounding situations where students live, including the proximity of female students and male teachers' dormitories, and the existence of dark spaces during the night such as classrooms, bush, palm field, and sport areas, are the supporting factors for individuals' engagement in risky sexual behaviours. Other studies have also indicated that the spread of HIV infection amongst population groups and communities has greater links to the existence of public-sexualised places and unsafe spaces, including market places, streets, bars, lodges and dance halls, within communities (Kuhanen, 2010; Underwood, *et al*., 2011).

Conclusion

The determinants of HIV transmission are complex. Behavioural, economic, cultural and socio-environmental factors contribute to the susceptibility of HIV infection in high schools and amongst college and university students in China. Recognition of these factors is imperative, since it provides pivotal evidence and information that can best be employed to tailor interventions for students in addressing the HIV epidemic amongst them. However, it is also important to recognise other HIV risk factors for the infection. For instance, needle sharing among students using injected drugs (UNAIDS, 2009), accessibility to HIV/AIDS-related health

services (UNAIDS, 2013), and perceived personal vulnerability to HIV infection, need to be addressed (Eatona, *et al*., 2003). Likewise, the identification of gender inequality, which is rooted in economic inequality, is required. This is critical as part of any effort to restrain the spread of HIV (J. Higgins, *et al*., 2010; Makoae & Mokomane, 2008; Quarraisha, *et al*., 2010) because it places women in a disadvantaged position which in turn pushes and pulls them towards engaging in high-risk sexual practices, including prostitution and the commercialization of sex. Moreover, pattern of sexual relationship amongst students and environmental factors for HIV transmission need to be identified (Eatona, *et al*., 2003; L. T. Higgins & Sun, 2007; Kissezounnon, 2008; Kuhanen, 2010). In short, more research focusing upon factors previously described, but which have not yet been studied, needs to be conducted with high school and college/university students. This is to further explore the challenges and identify intervention needs against HIV to protect these students, both in China and across the globe.

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