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Chapter 48

**Descriptive profiles and correlates
of substance use in Hong Kong Adolescents:
A longitudinal study**

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Abstract

Utilizing longitudinal data collected from secondary school students in Hong Kong (N = 7,975 at Wave 1 and N = 6,962 at Wave 6), the present study examined the prevalence of different substance use behaviors among Hong Kong adolescents and identified several psychosocial correlates of adolescent drug abuse. Results showed that drug use was not uncommon amongst adolescents in Hong Kong, with alcohol, tobacco, and organic solvent being the most frequently used substance. Being male and non-intact family status were risk factors for adolescent substance use. Consistent with our expectation, good academic and school performance as well as positive youth development constructs generally decreased the likelihood of using drugs.

Keywords: Adolescent drug abuse, longitudinal study, positive youth development, Project P.A.T.H.S.

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Introduction

In recent years, youth substance abuse gains increasing recognition as not only a health issue but a social problem. According to the National Institute on Drug Abuse, substance use is associated with unintentional injuries, homicide and suicides, which are the leading cause of death among U.S. teenagers (1). It has also been reported that regular use of substance during adolescence increases the likelihood of developing drug addiction in adulthood (2). The issue of drug use has also posed a financial constraint on the economy of different countries across the world (3).

With the heightened awareness of the issue worldwide, questions of how severe the problem of adolescent substance abuse is, what factors contribute to the occurrence of this behavior, and what preventive strategies should be taken are being asked more frequently. As Shek (4) claimed, there is an urgent need to develop systematic mechanisms related to early identification and prevention for adolescents with high risk for substance use in the family, school, and community contexts. To this end, methodologically sound research studies on adolescent substance use must be carried out.

For the last several years, the prevalence and trends of substance use among adolescents in different countries have been examined through nationally representative surveys by a few international organizations (e.g. Office on Drugs and Crime of the United Nations, National Institute of Drug Abuse in the United States, and European Monitoring Center for Drugs and Drug addiction). The results generally show that the epidemic of substance use in young people varies across countries. For example, in the United States, the Substance Abuse and Mental Health Services Administration (SAMHSA) recently reported that, between 2008 and 2009, while use of alcohol and tobacco among adolescents remained stable, illicit drug use increased from 9.3% in 2008 to 10% in 2009, indicating that illicit drug use may be increasing (1). However, another study in Iceland based on a large sample of adolescents showed that the prevalence of adolescents' use of different types of substance declined substantially from 1995 to 2006. For example, the percentage of daily smoking decreased from 23% in 1998 to 12% in 2006.

With specific reference to Hong Kong, Shek (4) reviewed the reports (from 1997 to 2006) of the Central Registry of Drug Abuse (CRDA) maintained by the Narcotics Division of the Hong Kong Government and pointed out that there was a growing trend of psychotropic substance abuse problem in Hong Kong. In the recent school survey of substance abuse among students in Hong Kong (5), while the proportions of lifetime alcohol- and tobacco-taking secondary students dropped from 66.5% and 15.6% in 2004/05 to 64.9% and 12.2% in 2008/09, the percentages of psychotropic drug-taking students increased from 3.3% to 4.3%. Moreover, amongst 112 secondary schools that were selected to participate in the 2008/09 survey, drug-taking students were reported in 111 schools. These figures suggest that the issue of adolescent substance abuse cannot be ignored in the society although the present time may not be the worst for Hong Kong in terms of youth drug abuse.

To prevent adolescent drug abuse, the ecological perspective (6) that focuses on risk and protective factors has commonly been used to guide intervention strategies (4). While protective factors are characteristics that decrease an individual's risk for substance use, risk factors increase the likelihood of using drugs. Many prevention studies have attempted to identify the risk and protective factors for adolescent substance use (7,8), among which the

correlation between gender and substance use is well-documented. Overall, males are more likely to use different types of substance, including tobacco, alcohol, and other illicit drugs than females; they were also found to be more frequently involved in drug use than females (9,10). For example, in SAMHSA's annual survey, 10.6% of males reported past month illicit drug use, compared to 9.4% of females. Moreover, the percentage of males using illicit drugs significantly increased from 9.5% in 2008 to 10.6% in 2009 while the percentage of female users remained fairly stable (1). In Hong Kong, although drug abuse is also found to be more common in males than in females, two new trends on substance use among females are worrying. First, the proportion of female in the total number of drug abusers increased from 18.1% in 2007 to 20.5% in 2008. Second, reported female drug abusers were generally younger than male drug abusers (5).

Family factors are also important predictors of youth involvement in substance use. In the context of Hong Kong, Shek (4) proposed several main factors on the family level that are most relevant to adolescent substance abuse based on a comprehensive literature review. First, both physical and psychological parental absence in non-intact families may contribute to adolescent drug abuse. Research findings have shown that adolescents growing up in non-intact families are more likely to take drugs than in intact families (11,12). Second, family poverty may be a risk factor for adolescent drug use. As adolescents with low family economic status often live in a poor community and have limited resources for personal development, they are more prone to academic underachievement and developing pessimistic values and beliefs about having upward social mobility, which may further lead to substance abuse behaviors.

Positive youth development is another important protective factor for adolescent substance use. A number of studies have evidenced that youth problematic behaviors including substance abuse could be more effectively prevented by promoting positive youth development, such as pro-social behaviors, trusting relationships, positive self-identity, a sense of hope, social competence, academic performance, and resilience (13-16). For example, in the Communities That Care (CTC) program, researchers examined the long-term effects of an intervention that incorporate parental education, teacher training, and social competence training on adolescent health risk behaviors for elementary school students living in high-crime communities. By age 18, students who received the full CTC intervention reported fewer numbers of problem behaviors including substance abuse (17). Besides, good academic and school performance was found to reduce adolescent substance abuse.

In the context of Hong Kong, Shek and researchers from five Universities designed and implemented a large-scale youth enhancement program entitled the Project P.A.T.H.S. (Positive Adolescent Training through Holistic Social Programmes), which is perhaps the largest positive youth program in Asia (18,19). The aims of the program are to promote holistic development among Hong Kong adolescents and reduce their risk/problem behaviors. To evaluate the effectiveness of the program, comprehensive evaluations have been conducted (20-22). The present study utilizes data collected from a longitudinal study conducted as part of the project. The database consists of six waves of data, with more than 6,000 Hong Kong secondary school students participated in the survey at each wave.

There are two major purposes of the present study. The first is to provide descriptive profiles of different types of substance use among Hong Kong adolescents based on a longitudinal sample of Hong Kong adolescents. Given that existing reports on youth drug abuse in Hong Kong are mostly based on cross-sectional surveys, longitudinal study that

monitors the prevalence of adolescent substance use behaviors across years would help to draw a more complete picture about this issue. Second, risk and protective factors for youth substance use in Hong Kong are examined, with particular reference to gender, family factors (including family economic status, family life satisfaction, and parental marital status), positive youth development, and academic and school performance. Based on the above literature review, the following hypotheses are proposed: 1) boys would be more likely than girls to report using substance; 2) family economic status would be positively related to substance use; family life satisfaction would be adversely related to substance use; adolescents who live in non-intact families would be more likely to take drugs than in intact families; 3) different positive youth development attributes would be negatively correlated with substance use; 4) perceived academic and school performance would be negatively related to adolescent substance abuse.

Methods

As part of the Project P.A.T.H.S., details about the procedures and criteria for recruiting the schools participating in this longitudinal study were described elsewhere (23,24). To iterate, 48 secondary schools were randomly selected in Year 1 (2006), during which Wave 1 and Wave 2 data were collected from Secondary 1 students. Among the 48 selected schools, one school dropped out after Wave 1 and three schools withdrew after Wave 2. In Year 2 (2007), Wave 3 and 4 data were collected from the same cohort who promoted to Secondary 2 by the time, with one school dropped out after Wave 4. In Year 3 (2008), Wave 5 and Wave 6 data were collected from the same cohort in Secondary 3 at that time. The numbers of schools and participants for each wave of data collection can be seen in Table 1.

Table 1. Number of collected questionnaires across waves

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6
N (School)	48	47 ^a	44 ^b	44	43 ^c	43
No. of participants	7,975	7,683	7,151	6,811	6,978	6,962
Male	4,169	4,062	3,707	3,500	3,556	3,591
Female	3,387	3,277	3,014	2,896	3,034	3,059
Not specified	419	344	430	415	388	312

^a 1 school (n = 207) had withdrawn after Wave 1

^b 3 schools (n = 629) had withdrawn after Wave 2

^c 1 school (n = 71) had withdrawn after Wave 4

At each measurement occasion, the purposes of the study were introduced and confidentiality of the data collected was repeatedly ensured to all participants in attendance on the days of survey. Parental and student consent forms had been obtained before data collection. Participants responded to the questionnaires in a self-administration format in classroom settings. Adequate time was provided for the participants to complete the questionnaire. A trained research assistant was present throughout the administration process.

Instruments

Consistent with procedures employed in previous studies, participants were required to respond to a questionnaire that included measures of substance abuse, basic family characteristics (i.e., family economic status, parental marital status, and family life satisfaction), positive youth development, and academic and school performance. The measures in the questionnaire are outlined in the following sections. Internal consistency and mean inter-item correlation of these scales at each wave are reported in Table 2.

Table 2. Internal consistency and mean inter-item correlations for academic and school competence and positive youth development indicators

	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	α	mean ^a	α	mean ^a	α	mean ^a	α	mean ^a	α	mean ^a	α	mean ^a
DRUG	0.76	0.56	0.81	0.58	0.77	0.56	0.82	0.61	0.79	0.59	0.83	0.63
ASC	0.70	0.44	0.72	0.46	0.72	0.46	0.73	0.47	0.73	0.47	0.74	0.48
CBC	0.91	0.38	0.92	0.42	0.93	0.45	0.93	0.45	0.93	0.46	0.93	0.46
PA	0.87	0.40	0.88	0.41	0.89	0.45	0.88	0.43	0.89	0.44	0.89	0.44
PIT	0.89	0.46	0.90	0.47	0.91	0.50	0.91	0.49	0.91	0.51	0.91	0.51
GPYDQ	0.95	0.32	0.95	0.33	0.96	0.37	0.96	0.37	0.96	0.39	0.96	0.38

Note: ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities.

^a Mean inter-item correlation.

All parameters were significant ($p < .05$).

Substance abuse scale

Eight items were used to assess the participants' frequency of using different types of substance in the past half a year, including alcohol, tobacco, ketamine, cannabis, cough mixture, organic solvent, pills (including ecstasy and methaqualone), and heroin. Participants rated the occurrence of these behaviors on a six-point Likert scale ("0" = "never"; "1" = "1-2 times"; "2" = "3-5 times"; "3" = "more than 5 times"; "4" = "several times a month"; "5" = "several times a week"; "6" = "everyday"). As the prevalence of different drug use behaviors is not the same, each item was used as an indicator. In addition, a composite score was calculated by averaging the eight item scores, which was considered a general indicator of drug use.

Basic family characteristics

Three items were designed to provide information about three basic characteristics of the participants' family. First, students were asked whether their family was currently receiving the Comprehensive Social Security Assistance (CSSA), which was used as an effective indicator of family economic status in previous studies (25,26), with "1" = "receive CSSA" and "0" = "not receive CSSA". Second, family life satisfaction was measured by asking students to rate the extent to which they perceive their family life as happy ("1" = "very

unhappy”, “2” = “unhappy”, “3” = “neutral”, “4” = “happy”, and “5” = “very happy”). The third item asked the students to indicate the marital status of their parents, including “divorced and not remarried” = “1”, “separate and not remarried” = “2”, “couple, first marriage” = “3”, “couple, second or above marriage” = “4”, and “others” = “5”. Participants’ scores on each item were used to reflect their family economic status, family life satisfaction, and parental marital status, respectively.

Chinese Positive Youth Development Scale (CPYDS)

The CPYDS consists of 15 subscales which are listed as follows:

- 1) Bonding Subscale (six items)
- 2) Resilience Subscale (six items)
- 3) Social Competence Subscale (seven items)
- 4) Emotional Competence Subscale (six items)
- 5) Cognitive Competence Subscale (six items)
- 6) Behavioral Competence Subscale (modified five items)
- 7) Moral Competence Subscale (six items)
- 8) Self-Determination Subscale (five items)
- 9) Self-Efficacy Subscale (modified two items)
- 10) Beliefs in the Future Subscale (modified three items)
- 11) Clear and Positive Identity Subscale (seven items)
- 12) Spirituality Subscale (seven items)
- 13) Prosocial Involvement Subscale (five items)
- 14) Prosocial Norms Subscale (five items)
- 15) Recognition for Positive Behavior Subscale (four items)

Based on factor analyses, Shek and colleague (27) proposed that the 15 subscales in the CPYDS could be further reduced to four dimensions:

- Cognitive Behavioral Competence (CBC): Scale score is calculated by averaging scores on Cognitive Competence Subscale, Self-Determination Subscale, and Behavioral Competence Subscale.
- Prosocial Attributes (PA): Scale score equals to the mean score of Prosocial Involvement Subscale and Prosocial Norms Subscale.
- Positive Identity (PIT): Scale score is computed by averaging scores of Beliefs in the Future Subscale and Clear and Positive Identity Subscale.
- General Positive Youth Development Qualities (GPYDQ): Scale score equals to the mean score of Resilience Subscale, Social Competence Subscale, Self-Efficacy Subscale, Moral Competence Subscale, Bonding Subscale, Recognition for Positive Behavior Subscale, Spirituality Subscale, and Emotional Competence Subscale.

These four composite indicators were used to assess participants' positive youth development in the present study. Internal consistency and mean inter-item correlation for each indicator at different waves are shown in Table 2. It should be noted that although the administered questionnaire includes other subscales of the CPYDQ, findings regarding the overall score of CPYDQ and its subscales were reported elsewhere (23). The present paper only focused on the predictive effects of the four second-order positive youth development constructs on adolescent drug abuse.

Academic and school competence scale

As a relatively independent positive youth development construct, participants' academic and school competence (ASC) were measured by three items. For the first item, participants were required to rate their perceived academic performance as compared to other peer students on a five-point Likert scale, with "1" = "very poor", "2" = "below average", "3" = "average", "4" = "above average", and "5" = "very good". The second item asked the extent to which the respondents were satisfied with their academic performance ("1" = "very dissatisfied", "2" = "dissatisfied", "3" = "neutral", "4" = "satisfied", and "5" = "very satisfied"). The last question asked the participants to rate their conduct in school on a five-point Likert scale ("1" = "very poor", "2" = "below average", "3" = "average", "4" = "above average", and "5" = "very good"). The ASC scale score is calculated by averaging the item scores and ranges from 1 to 5, with high scores representing for high academic and school competence.

Data analytic plan

The first purpose of the present study was to provide descriptive profiles of different types of substance use behaviors among adolescents across six waves of data collection. Therefore, numbers and percentages of adolescents who use a specific type of drug at different frequencies were first computed at each wave. To further show the proportion of participants who reported using substances at least once in the past half year, the percentages of non-zero values on each substance use item were also calculated.

Second, to investigate whether gender, family factors, and positive youth development are predictive of adolescent substance use behaviors, a series of logistic regression analyses were conducted both cross-sectionally and longitudinally, with the composite score of drug use as the dependent variable. It should be noted that although the relationship between age and substance use was not a major focus of the present study, age was also included as an independent variable throughout the analyses to control for its possible effects. In this study, the cross-sectional relationships between different predictors and substance use behaviors were examined at Wave 1 and Wave 6. Longitudinal relationships were investigated by using participants' characteristics at Wave 1 to predict their substance use behaviors at Wave 6.

Specifically, to examine the cross-sectional correlates of adolescent substance abuse behavior, demographic factors (age and gender) were entered in the first block; family characteristics, including family economic status, parental marital status, and family life satisfaction, were entered into the second block; youth development constructs including academic and school competence (ASC), cognitive behavioral competence (CBC), prosocial

attributes (PA), positive identity (PIT), and general positive youth development qualities (GPYDQ) were entered into the third block of the regression model. Such analyses were performed twice (at Wave 1 and Wave 6). For the longitudinal relationship, similar logistic regression analyses were conducted, except that 1) the independent variables were data collected at Wave 1 and for the dependent variables (i.e., drug use behaviors) Wave 6 data were used; 2) the composite score of drug abuse at Wave 1 was entered in the first block to control for the effects of initial status of substance abuse in the participants' later drug abuse behaviors.

There are mainly two reasons that logistic regression analyses, instead of general multiple regression, were employed in the present study. First, substance abuse behavior is not a normally distributed phenomenon, and thus cannot be directly used as dependent variable in general multiple regression analysis. Second, based on a normal youth population, the research interest of this study focuses more on what factors may contribute to whether an adolescent take drug or not than on the relationships between different predictors and the severity of drug abuse behaviors. As such, the composite score of drug abuse was recoded as a dichotomous variable with "0" representing for "never used any type of substance in the past half year" and "1" for "used at least one type of substance listed for at least once to twice in the past half year". In addition, because the variable of parental marital status was categorical in nature, four dummy variables were created: P1 ("1" = "divorced and not married"; "0" = "couple, first marriage"), P2 ("1" = "separate and not remarried"; "0" = "couple, first marriage"), P3 ("1" = "remarried"; "0" = "couple, first marriage"), and P4 ("1" = "other situations"; "0" = "couple, first marriage"). The four dummy variables were entered at the second block of the equation.

Results

In this part, descriptive profile of different types of drug use at each wave is presented first, followed by the results of logistic regression regarding cross-sectional relationships between different predictors and adolescent drug use behaviors. Finally, predictive effects of demographic characteristics, family factors, positive youth development constructs, and perceived academic and school competence of the participants at Wave 1 on their substance use behaviors at Wave 6 are reported.

Descriptive profiles

As mentioned, numbers and percentages of participants who used a specific drug at different frequencies were calculated for each wave of data collection. The results are shown in Tables 3 to 10.

Table 3. Numbers and percentages of adolescents who smoked at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N = 7906)	283 (3.6%)	79 (1.0%)	77 (1.0%)	25 (0.3%)	30 (0.4%)	56 (0.7%)	550 (7.0%)
Wave 2 (N = 7602)	385 (5.1%)	107 (1.4%)	142 (1.9%)	47 (0.6%)	70 (0.9%)	111 (1.5%)	862 (11.3%)
Wave 3 (N = 7107)	359 (5.1%)	121 (1.7%)	157 (2.2%)	51 (0.7%)	65 (0.9%)	98 (1.4%)	851 (12.0%)
Wave 4 (N = 6749)	397 (5.9%)	119 (1.8%)	148 (2.2%)	63 (0.9%)	90 (1.3%)	142 (2.1%)	959 (14.2%)
Wave 5 (N = 6940)	345 (5.0%)	96 (1.4%)	176 (2.5%)	56 (0.8%)	77 (1.1%)	170 (2.4%)	920 (13.3%)
Wave 6 (N = 6833)	370 (5.4%)	107 (1.6%)	180 (2.6%)	80 (1.2%)	98 (1.4%)	193 (2.8%)	1028 (15.0%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; “Non-Zero” means at least once in the past half year.

Table 4. Numbers and percentages of adolescents who drank alcohol at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N = 7887)	1090 (13.8%)	356 (4.5%)	330 (4.2%)	128 (1.6%)	41 (0.5%)	21 (0.3%)	1966 (24.9%)
Wave 2 (N = 7577)	1241 (16.4%)	458 (6.0%)	527 (7.0%)	213 (2.8%)	92 (1.2%)	41 (0.5%)	2572 (33.9%)
Wave 3 (N = 7075)	1095 (15.5%)	436 (6.2%)	548 (7.7%)	247 (3.5%)	84 (1.2%)	38 (0.5%)	2448 (34.6%)
Wave 4 (N = 6743)	1206 (17.9%)	515 (7.6%)	594 (8.8%)	298 (4.4%)	83 (1.2%)	54 (0.8%)	2750 (40.7%)
Wave 5 (N = 6913)	1176 (17.0%)	509 (7.4%)	639 (9.2%)	323 (4.7%)	94 (1.4%)	60 (0.9%)	2801 (40.6%)
Wave 6 (N = 6846)	1195 (17.5%)	555 (8.1%)	724 (10.6%)	372 (5.4%)	78 (1.1%)	60 (0.9%)	2984 (43.6%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday “Non-Zero” means at least once in the past half year.

Table 5. Numbers and percentages of adolescents who used ketamine at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7912)	20 (0.3%)	10 (0.1%)	4 (0.1%)	2 (0%)	1 (0%)	8 (0.1%)	45 (0.6%)
Wave 2 (N =7617)	24 (0.3%)	7 (0.1%)	15 (0.2%)	8 (0.1%)	3 (0%)	27 (0.4%)	84 (1.1%)
Wave 3 (N =7118)	23 (0.3%)	8 (0.1%)	16 (0.2%)	3 (0%)	4 (0.1%)	17 (0.2%)	71 (0.9%)
Wave 4 (N =6774)	24 (0.4%)	8 (0.1%)	14 (0.2%)	9 (0.1%)	4 (0.1%)	31 (0.5%)	90 (1.4%)
Wave 5 (N =6946)	32 (0.5%)	11 (0.2%)	11 (0.2%)	17 (0.2%)	3 (0%)	26 (0.4%)	100 (1.5%)
Wave 6 (N =6813)	32 (0.5%)	8 (0.1%)	26 (0.4%)	12 (0.2%)	3 (0%)	35 (0.5%)	116 (1.7%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; "Non-Zero" means at least once in the past half year.

Table 6. Numbers and percentages of adolescents who used cannabis at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7903)	8 (0.1%)	2 (0%)	11 (0.1%)	2 (0%)	1 (0%)	10 (0.1%)	34 (0.3%)
Wave 2 (N =7599)	17 (0.2%)	5 (0.1%)	15 (0.2%)	1 (0%)	1 (0%)	28 (0.4%)	67 (0.9%)
Wave 3 (N =7119)	9 (0.1%)	6 (0.1%)	7 (0.1%)	1 (0%)	3 (0%)	17 (0.2%)	43 (0.5%)
Wave 4 (N =6774)	17 (0.3%)	2 (0%)	12 (0.2%)	1 (0%)	0 (0%)	34 (0.5%)	66 (1%)
Wave 5 (N =6943)	18 (0.3%)	5 (0.1%)	4 (0.1%)	3 (0%)	3 (0%)	26 (0.4%)	59 (0.9%)
Wave 6 (N =6812)	22 (0.2%)	5 (0.1%)	13 (0.2%)	5 (0.1%)	3 (0%)	36 (0.5%)	84 (1.1%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; "Non-Zero" means at least once in the past half year.

Table 7. Numbers and percentages of adolescents who used cough medicine at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7800)	40 (0.5%)	15 (0.2%)	20 (0.3%)	4 (0.1%)	3 (0%)	10 (0.1%)	92 (1.2%)
Wave 2 (N =7614)	63 (0.8%)	17 (0.2%)	15 (0.2%)	4 (0.1%)	2 (0%)	6 (0.4%)	107 (1.7%)
Wave 3 (N =7118)	38 (0.5%)	20 (0.3%)	10 (0.1%)	7 (0.1%)	2 (0%)	17 (0.2%)	94 (1.2%)
Wave 4 (N =6774)	41 (0.6%)	11 (0.2%)	10 (0.1%)	4 (0.1%)	1 (0%)	31 (0.5%)	98 (1.5%)
Wave 5 (N =6951)	24 (0.3%)	11 (0.2%)	12 (0.2%)	3 (0%)	4 (0.1%)	25 (0.4%)	79 (1.2%)
Wave 6 (N =6819)	33 (0.5%)	9 (0.1%)	12 (0.2%)	6 (0.1%)	3 (0%)	34 (0.5%)	97 (1.4%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; “Non-Zero” means at least once in the past half year.

Table 8. Numbers and percentages of adolescents who used solvent at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7790)	104 (1.3%)	22 (0.3%)	18 (0.2%)	6 (0.1%)	3 (0%)	11 (0.1%)	164 (2%)
Wave 2 (N =7614)	191 (2.5%)	44 (0.6%)	25 (0.3%)	6 (0.1%)	5 (0.1%)	29 (0.4%)	300 (4%)
Wave 3 (N =7118)	114 (1.6%)	34 (0.5%)	29 (0.4%)	7 (0.1%)	4 (0.1%)	16 (0.2%)	204 (2.9%)
Wave 4 (N =6769)	110 (1.6%)	26 (0.4%)	31 (0.5%)	3 (0%)	6 (0.1%)	31 (0.5%)	207 (3.1%)
Wave 5 (N =6945)	89 (1.3%)	21 (0.3%)	29 (0.4%)	7 (0.1%)	3 (0%)	26 (0.4%)	175 (2.5%)
Wave 6 (N =6814)	97 (1.4%)	17 (0.2%)	25 (0.4%)	6 (0.1%)	2 (0%)	35 (0.5%)	182 (2.6%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; “Non-Zero” means at least once in the past half year.

Table 9. Numbers and percentages of adolescents who took pills (ecstasy or methaqualone) at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7810)	13 (0.2%)	3 (0%)	5 (0.1%)	3 (0%)	3 (0%)	11 (0.1%)	38 (0.4%)
Wave 2 (N =7620)	13 (0.2%)	5 (0.1%)	7 (0.1%)	6 (0.1%)	2 (0%)	27 (0.4%)	60 (0.9%)
Wave 3 (N =7125)	11 (0.2%)	7 (0.1%)	8 (0.1%)	3 (0%)	4 (0.1%)	18 (0.3%)	51 (0.8%)
Wave 4 (N =6769)	16 (0.2%)	2 (0%)	7 (0.1%)	3 (0%)	4 (0.1%)	33 (0.5%)	65 (0.9%)
Wave 5 (N =6954)	18 (0.3%)	6 (0.1%)	9 (0.1%)	6 (0.1%)	4 (0.1%)	27 (0.4%)	70 (1.1%)
Wave 6 (N =6817)	17 (0.2%)	2 (0%)	17 (0.2%)	8 (0.1%)	3 (0%)	33 (0.5%)	80 (1.0%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; "Non-Zero" means at least once in the past half year.

Table 10. Numbers and percentages of adolescents who used heroin at different frequencies

	1	2	3	4	5	6	Total Non-Zero
Wave 1 (N =7801)	6 (0.1%)	1 (0%)	4 (0.1%)	0 (0%)	3 (0%)	10 (0.1%)	24 (0.3%)
Wave 2 (N =7585)	4 (0.1%)	1 (0%)	2 (0%)	0 (0%)	2 (0%)	25 (0.3%)	34 (0.4%)
Wave 3 (N =7124)	2 (0%)	1 (0%)	4 (0.1%)	1 (0%)	2 (0%)	17 (0.3%)	27 (0.4%)
Wave 4 (N =6760)	5 (0.1%)	0 (0%)	2 (0%)	2 (0%)	2 (0%)	32 (0.5%)	43 (0.6%)
Wave 5 (N =6940)	3 (0%)	4 (0.1%)	2 (0%)	2 (0%)	2 (0%)	26 (0.4%)	39 (0.5%)
Wave 6 (N =6813)	9 (0.1%)	2 (0%)	8 (0.1%)	5 (0.1%)	1 (0%)	34 (0.5%)	59 (0.8%)

Note: 0 = never; 1 = once to twice in the past half year; 2 = 3 to 5 times in the past half year; 3 = more than 5 times in the past half year; 4 = several time per month; 5 = several times per week; 6 = everyday; "Non-Zero" means at least once in the past half year.

Table 11. Descriptive statistics of examined variables at Wave 1 and Wave 6

		Wave 1	Wave 6
Age ^a		3.26 ± 0.94	6.02 ± 1.08
Gender	Male	4169 (52.3%)	3591 (51.6%)
	Female	3387 (42.5%)	3059 (43.9%)
	Unspecified	419 (5.3%)	312 (4.5%)
FES	CSSA	2937 (36.8%)	2767 (39.7%)
	No CSSA	4548 (57.0%)	3759 (54.0%)
	Unspecified	490 (6.1%)	436 (6.3%)
PMS	Divorced but not remarried	532 (6.7%)	575 (8.3%)
	Separate	247 (3.1%)	179 (2.6%)
	Divorced and remarried	256 (3.2%)	309 (4.4%)
	Other situation	288 (3.6%)	252 (3.6%)
	First marriage	6028 (75.6%)	5474 (78.6%)
	Unspecified	624 (7.8%)	173 (2.5%)
FLS		3.75 ± 1.02	3.60 ± 0.96
ASC		3.23 ± 0.71	3.01 ± 0.75
CBC		4.64 ± 0.70	4.61 ± 0.68
PA		4.61 ± 0.80	4.51 ± 0.76
PIT		4.32 ± 0.92	4.27 ± 0.89
GPYDQ		4.62 ± 0.68	4.56 ± 0.67
DRUG		0.10 ± 0.31	0.23 ± 0.58
Zero values		5791 (72.6%)	3747 (53.8%)
Non-zero values		2147 (26.9%)	3133 (45.0%)
Missing value		37 (0.5%)	82 (1.2%)

Note: FES = Family Economic Status; PMS = Parental Marital Status; FLS = Family Life Satisfaction; ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities; DRUG = Composite score of substance use. For continuous variables (Age, FLS, ASC, CBC, PA, PIT, GPYDQ), values in the cells are means and standard deviations; for categorical variables (Gender, FES, PMS), values in the cells are numbers and percentages of participants. For the variable "DRUG", means and standard deviation based on the original score (continuous variable) are reported first, and then the percentages and numbers of zero versus non-zero values based on the recoded categorical variable are presented.

^a The reported means and standard deviations for "Age" were based on its original coding where "1" = "10 years old or below"; "2" = "11 years old"; "3" = "12 years old"; "4" = "13 years old"; "5" = "14 years old"; "6" = "15 years old"; "7" = "16 years old"; "8" = "17 years old"; "9" = "18 years old"; "10" = "19 years old"; "11" = "20 years old or above".

Several observations can be highlighted from the descriptive statistics. First, substance use behaviors were not rare among Hong Kong adolescents across six waves of data collection. For example, at Wave 2, 4% of the participants reported that they used organic solvent at least once to twice in the past half year; 1% of the participants at Wave 6 indicated that they took pills (ecstasy or methaqualone) in the latest six months. Second, alcohol was the most frequently used substance, followed by tobacco and organic solvent, with heroin being the least frequently used drug. Third, while most participants who reported smoking or drinking were occasional users (once to twice in the past half year), a large proportion of

adolescents who reported taking psychotropic drugs (such as ketamine, cannabis, and ecstasy) and heroin were frequent users. For example, at Wave 6, 33 out of 80 (41.25%) adolescents who reported ecstasy use behaviors expressed that they took pills everyday in the past half year.

Cross-sectional psychosocial correlates of substance use

Before reporting the relationships between different predictors and substance use, descriptive statistics of each variable under study are summarized in Table 11. For continuous variables, means and standard deviations are reported; for categorical variables, numbers and percentages of participants in each category are presented. Pearson's correlation coefficients among all continuous variables at each wave are also calculated and presented in Table 12.

Table 12. Pearson's correlation coefficients among continuous variables at Wave 1 and Wave 6

	Age	FLS	ASC	CBC	PA	PIT	GPYDQ	DRUG	Wave1 <--> Wave 6
Age K1	--	-0.13**	-0.12**	-0.05**	-0.09**	-0.08**	-0.07**	0.19**	0.01
FLS K8	-0.06**	--	0.36**	0.39**	0.37**	0.42**	0.51**	-0.15**	-0.08**
ASC	-0.01	0.32**	--	0.41**	0.36**	0.55**	0.45**	-0.09**	-0.10**
CBC	0.01	0.34**	0.31**	--	0.69**	0.72**	0.84**	-0.14**	-0.10**
PA	0.02	0.33**	0.28**	0.65**	--	0.63**	0.75**	-0.18**	-0.10**
PIT	-0.01	0.38**	0.49**	0.74**	0.60**	--	0.75**	-0.12**	-0.07**
GPYDQ	0.03*	0.47**	0.39**	0.84**	0.73**	0.77**	--	-0.19**	-0.12**
DRUG	0.08**	-0.11	-0.03*	-0.12**	-0.14**	-0.09**	-0.15**	--	0.19**

Notes: FES = Family Economic Status; FLS = Family Life Satisfaction; ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities; DRUG = Composite score of substance use.

Values above the diagonal are correlation coefficients at Wave 1; values below the diagonal are correlation coefficients for Wave 6.

Values in the last column represent for the correlation coefficient between Wave 1 predictors (i.e., Age, FLS, ASC, CBC, PA, PIT, GPYDQ, and DRUG at Wave 1) and the Wave 6 dependent variable (i.e., DRUG at Wave 6)

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

Cross-sectional relationships between participants' use of substance and different predictors were examined at both Wave 1 and Wave 6. Table 13 and Table 14 show the results of logistic regression coefficients, Wald test, p value, and odds ratio for each of the predictors. It can be seen that results obtained from the two waves of data are quite consistent.

Table 13. Predicting drug use from personal and family factors, and positive youth development (Wave 1 Cross-Sectional)

	Predictor	B	Wald X^2	p	Odds Ratio (OR)	95% C.I. for OR	
						Lower	Upper
First Block	Age	0.23	54.85	0.00	1.25	1.18	1.33
	Gender	0.17	7.96	0.01	1.18	1.05	1.32
Second Block	FES	-0.04	0.24	0.62	0.96	0.82	1.13
	PMS: P1	0.28	6.68	0.01	1.32	1.07	1.63
	P2	0.39	7.24	0.01	1.48	1.11	1.97
	P3	0.34	5.27	0.02	1.40	1.05	1.86
	P4	0.49	12.59	0.00	1.63	1.24	2.12
	FLS	-0.12	13.69	0.00	0.89	0.83	0.94
Third Block	ASC	-0.29	33.41	0.00	0.75	0.68	0.83
	CBC	0.10	1.80	0.18	1.11	0.95	1.29
	PA	-0.18	11.12	0.00	0.84	0.75	0.93
	GPYDQ	-0.36	14.93	0.00	0.70	0.58	0.84
	PIT	0.09	2.69	0.10	1.09	0.98	1.20

Note: For dependent variable, 0 = never used any type of substance in the past half year; 1 = used substance at least once or twice in the past half year.

N = 6902. Goodness of fit test: Hosmer and Lemeshow Test $X^2 = 9.51$, $df = 8$, $p = 0.30$. Variables marked in red are risk factors; variables marked in green are protective factors. FES = Family Economic Status; PMS = Parental Marital Status (P1 = Divorced but not remarried; P2 = Separate; P3 = Divorced and remarried; P4 = Other situations); FLS = Family Life Satisfaction; ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities.

For Wave 1 data, age ($B = 0.23$, $p = 0.00$), gender ($B = 0.17$, $p = 0.01$), parental marital status (P1: $B = 0.28$, $p = 0.01$; P2: $B = 0.39$, $p = 0.01$; P3: $B = 0.34$, $p = 0.02$; P4: $B = 0.49$, $p = 0.00$), family life satisfaction ($B = -0.12$, $p = 0.00$), academic school competence ($B = -0.29$, $p = 0.00$), positive attributes ($B = -0.18$, $p = 0.00$), and general positive youth development qualities ($B = -0.36$, $p = 0.00$) were significant predictors, with the first three variables increasing the probability of using substance (risk factors) while the last four variables decreasing the likelihood of taking drugs (protective factors). The odds ratios for the risk factors were 1.25 (age), 1.18 (gender), 1.32 (P1), 1.48 (P2), 1.40 (P3), and 1.63 (P4). This means that 1) while age increased one year, the participant would be 1.25 times more likely to take drugs; 2) male students were 1.18 times more likely to exhibit substance use behaviors than female students; and 3) the probability of taking drug in adolescents who had non-intact parental marital status was 1.32 to 1.63 times higher than that in adolescents with intact families. For the protective factors, odds ratios were 0.89 for family life satisfaction, 0.75 for

academic school competence, 0.84 for prosocial attributes, and 0.70 for general positive youth development qualities. These results suggest that participants who scored higher on the four positive youth development scales would be less likely to show substance use behaviors.

Table 14. Predicting drug use from personal and family factors, and positive youth development (Wave 6 Cross-Sectional)

	Predictor	<i>B</i>	Wald χ^2	<i>p</i>	Odds Ratio (OR)	95% C.I. for OR	
						Lower	Upper
First Block	Age	0.09	13.93	0.00	1.10	1.04	1.15
	Gender	0.11	4.12	0.04	1.11	1.00	1.24
Second Block	FES	-0.15	2.86	0.09	0.86	0.73	1.02
	PMS: P1	0.27	8.12	0.00	1.31	1.09	1.58
	P2	0.35	4.55	0.03	1.41	1.03	1.94
	P3	0.33	6.97	0.01	1.39	1.09	1.77
	P4	0.45	9.97	0.00	1.56	1.19	2.07
	FLS	-0.06	3.30	0.07	0.94	0.89	1.01
Third Block	ASC	-0.33	64.74	0.00	0.72	0.67	0.78
	CBC	0.12	2.45	0.12	1.12	0.97	1.30
	PA	-0.18	11.76	0.00	0.84	0.76	0.93
	GPYDQ	-0.15	2.71	0.10	0.87	0.73	1.03
	PIT	0.07	2.12	0.15	1.08	0.98	1.19

Note: For dependent variable, 0 = never used any type of substance in the past half year; 1 = used substance at least once or twice in the past half year.

$N = 6330$. Goodness of fit test: Hosmer and Lemeshow Test $\chi^2 = 12.39$, $df = 8$, $p = 0.13$. Variables marked in red are risk factors; variables marked in green are protective factors.

FES = Family Economic Status; PMS = Parental Marital Status (P1 = Divorced but not remarried; P2 = Separate; P3 = Divorced and remarried; P4 = Other situations); FLS = Family Life Satisfaction; ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities.

Similar results were obtained from the Wave 6 data. While old age, being male, and non-intact parental marital status predicted high probability of taking drug in the participants; higher scores on academic and school competence and prosocial attributes were related to decreased likelihood that the adolescent would display substance use behaviors.

Longitudinal correlates of substance abuse

To further examine whether individual characteristics, family factors, positive youth development constructs and perceived academic and school performance would contribute to adolescent substance use behaviors longitudinally, another logistic regression analysis was performed in which predictors measured at Wave 1 were used to predict the dependent variable (drug use behavior) measured at Wave 6. Participants’ drug use behavior measured at Wave 1 was also entered in the model in order to control for the effects of one’s initial drug use status on his/her later behaviors. Results of the logistic regression analysis are presented in Table 15.

Table 15. Predicting Drug use from personal and family factors, and positive youth development (Wave 1→ Wave 6 Longitudinal)

	Predictor	B	Wald X ²	p	Odds Ratio (OR)	95% C.I.for OR	
						Lower	Upper
First Block	Drug (Wave 1)	1.53	431.06	0.00	4.63	4.01	5.35
Second Block	Age	0.01	0.01	0.98	1.00	0.93	1.08
	Gender	0.05	0.64	0.42	1.05	0.93	1.19
Third Block	FES	-0.18	3.48	0.06	0.84	0.69	1.01
	PMS: P1	0.26	3.82	0.05	1.29	1.00	1.67
	P2	0.00	0.00	0.99	1.00	0.68	1.47
	P3	0.19	1.18	0.28	1.21	0.86	1.73
	P4	0.10	0.37	0.54	1.10	0.80	1.54
	FLS	-0.04	1.50	0.22	0.96	0.90	1.02
	Fourth Block	ASC	-0.23	16.30	0.00	0.80	0.71
	CBC	0.04	0.18	0.67	1.04	0.87	1.24
	PA	0.11	2.91	0.09	1.11	0.98	1.26
	GPYDQ	-0.37	11.51	0.00	0.69	0.56	0.86
	PIT	0.17	8.08	0.00	1.18	1.05	1.33

Note: For dependent variable, 0 = never used any type of substance in the past half year; 1 = used substance at least once or twice in the past half year.

N = 4738. Goodness of fit test: Hosmer and Lemeshow Test $X^2 = 3.80$, $df = 8$, $p = 0.88$ Variables marked in red are risk factors; variables marked in green are protective factors. FES = Family Economic Status; PMS = Parental Marital Status (P1 = Divorced but not remarried; P2 = Separate; P3 = Divorced and remarried; P4 = Other situations); FLS = Family Life Satisfaction; ASC = Academic and School Competence; CBC = Cognitive Behavioral Competence; PA = Prosocial Attributes; PIT = Positive Identity; GPYDQ = General Positive Youth Development Qualities; DRUG (Wave 1) = Composite score of substance use at Wave 1.

As shown in the table, adolescents who displayed substance use behaviors at Wave 1 were 4.63 times more likely to take drug at Wave 6 than those without such behavior at the initial status. Second, after controlling for the effects of initial substance abuse, participants' scores on academic and school competence and general positive youth qualities at Wave 1 significantly predicted the likelihood of taking drug at Wave 6. The higher the scores on the two high-order positive youth development constructs, the less likely the participants would display substance use behaviors. This finding further confirmed the cross-sectional results reported earlier that academic school competence and general positive youth development qualities were protective factors that prevent adolescents from using drugs. Third, participants whose parents were divorced and not remarried at Wave 1 were 1.29 times more likely than participants with parents who were in their first marriage to show substance use at Wave 6. Unexpectedly, the odds ratio was 1.18 for positive identity, meaning that adolescents who scored higher on positive identity scale at Wave 1 were more likely to take drug at Wave 6. Given that positive identity is an important construct of positive youth development, this finding was not consistent with the initial expectation.

Discussion

While the prevalence of substance use found in the present study is basically consistent with those in the school survey reports by CRDA (5), there are several distinguishing features of this study. First, a broad range of substances were investigated in the present study, including both legal substances (such as tobacco and alcohol) and illicit drugs (e.g., psychotropic drugs and heroin). Second, while most tobacco or alcohol users reported taking the substances occasionally (once to twice in the past half year), for those reported using psychotropic drugs or heroin, a large proportion of them appeared to be frequent users. This indicates that there might be important differences between adolescents who reported smoking or drinking and those who took illicit drugs. As such, it would be interesting to compare the characteristics of the two groups in future study. Third, the longitudinal design of the present study would make it possible to examine the developmental trajectory of different substance use behaviors over time, though the discussion of this issue is beyond the scope of this paper.

Consistent with our first hypothesis, the analyses based on cross-sectional data at both Wave 1 (odds ratio = 1.18) and Wave 6 (odds ratio = 1.11) suggested that male adolescents were more likely than female adolescents to take drugs. Several theories are often used to explain gender difference in drug use. For example, there are views suggesting that female adolescents have a higher perceived risk of substance abuse than male adolescents, and thus are less likely to use drug. More recently, Svensson (28) proposed that gender difference in adolescent substance abuse can be understood in terms of parental monitoring and peer deviance. While boys are more prone to the exposure of deviant peers than are girls, girls are often more highly monitored than boys. As male adolescents appear to be a more vulnerable group for drug use, more preventive strategies that target at this population are in need.

With regard to the relationships between different family factors and drug use behaviors, the hypothesis that non-intact family status may serve as a risk factor for youth substance use was supported by the present results. Analyses based on both cross-sectional and longitudinal data showed that adolescents who lived in non-intact family (i.e., marital status of parents was

divorced, separate, remarried or other situations) were more likely to report drug use behaviors than adolescents with intact family (i.e., parents were in their first marriage). As noted, adolescents living in the non-intact families may experience parental absence, both psychologically and physically. Besides, lack of parental supervision and dysfunctional family process are more often observed in non-intact families than in intact families. All these factors may contribute to adolescent substance use.

On the other hand, family economic status failed to predict substance use, meaning that poor adolescents did not show more substance use behaviors than adolescents from rich families. There are three possible reasons. First, adolescents living in poverty may not be able to afford the money to buy cigarette, alcohol, or other illicit drugs. Second, although poverty may produce negative beliefs, attitudes, and conditions that linked to drug use, poverty itself may not be directly associated with drug use. Third, while poverty is a multidimensional conception (e.g., income, education attainment; employment, and neighborhood), only one item was used to measure family economic status in the present study. In fact, another factor, family life satisfaction, was also assessed by one item asking the participants to rate their perceived satisfaction about family life on a Likert scale. It was found that although family life satisfaction significantly predicted drug use behavior at Wave 1, this relationship was found to be non-significant at Wave 6 and also in the longitudinal model. Obviously, the use of single item in measuring complicated constructs may decrease the power of the analyses.

As with prior research, the current study also found that adolescents who scored higher on different positive youth development constructs (academic social competence, prosocial attributes, and general positive youth development qualities) were less likely to take drugs than those with lower scores. These findings not only suggest that positive youth development is a protective factor for adolescent drug use, but also provide evidence for the effectiveness of the Project P.A.T.H.S. Based on the same sample of students, previous studies have reported that participants who attended the Project P.A.T.H.S. displayed higher levels of positive youth development while less problem behaviors (including substance use), as compared to students without joining the project (23,24). However, the question of whether the reduction of risk behaviors in the project participants is due to the enhancement of different positive youth development constructs in these students is not thorough addressed. The significant relationship between positive youth development constructs and the likelihood of taking substances found in the present study provides a preliminary but positive answer to this question. To further examine the role of different positive youth development constructs in preventing adolescent substance use, more in-depth studies are needed, although there are some initial findings suggesting that life satisfaction mediates the effect of positive youth development on adolescent problem behavior.

Nevertheless, the positive association between positive identity and substance use behavior found in this study was unexpected. In the present study, "positive identity" was measured by twelve items that capture both the participant's self identity and their future expectations. Previous research has demonstrated that both "clear and positive identity" and "positive belief in the future" predict better social and emotional adjustment and act as a protective factor in reducing the negative effect of high stress on self-rated competence (13,29). However, the longitudinal results in this study showed that participants who scored higher on positive identity at Wave 1 were more likely to report substance use behaviors than those scored lower on this construct. There are several possible explanations for this finding. The first explanation may be related to the measurement of substance use. Although different

types of substance use were measured in this study, only the composite score (by averaging item scores) was employed in the regression analyses. This made it impossible to differentiate legal substance users (e.g., drinking alcohol) and illicit drug users. While it is obvious that using illicit drugs in Hong Kong society are viewed negative, alcohol use is perceived as basically normal and often accompanying with happy events. Therefore, for adolescents, occasional drinking may be considered as simply an attempt for new things. Compared to students with less positive views about themselves, students with clear and positive identity usually have more confidence in trying new things, and thus they may also be more willing to try alcohol or tobacco. This possibility may be examined in future studies by testing the relationships between positive identity and different substance use behaviors.

A second factor that could explain the unexpected finding may be that those youth who had high positive identity were those reaching puberty before other students. There are research findings showing that early pubertal timing is associated with the initiation of substance use (30-32). For example, Weisner and Ittel found that early maturing students reported a higher frequency of substance use (especially cigarette smoking) than did other students within the following years (19). The third possible explanation is related to studies that show aggressive children have inflated self-perception relative to non-aggressive children, and this inflated self-perception serves as a risk factor for increased problem behavior (33). It is possible that delinquent youth are overly confident in themselves, and this overconfidence leads to increases in aggression, delinquency, and substance use. Future studies may employ other indirect measures of positive identity, such as implicit association test, to avoid the influence of such bias in self-reported data.

Consistent with the literature, the present findings showed that perceived academic and school competence was negatively related to adolescent substance use. Theoretically, this finding gives support to the positive youth development literature that good academic and school performance is an internal asset which protects young people from risk behavior. Practically, how to help students with poor academic and school performance to stay away from drugs is an important issue to be considered. This is a particular thorny question for Hong Kong people because morbid emphasis on academic excellence is a significant characteristic of Hong Kong parenting.

In summary, the present study examined the current status of substance use among Hong Kong adolescents based on a large longitudinal sample of secondary school students. Several correlates of youth substance use in terms of gender, family factors, and positive youth development were also identified. The current results may inform further study on preventing youth substance abuse in Hong Kong. As Shek (4) noted, it is important to understand how different ecological factors may lead to adolescent substance abuse behaviors. Based on this ecological view, a "holistic development" approach that considers both risk and protective factors must be adopted in developing prevention strategies and programs for adolescents. In addition, as part of the Project P.A.T.H.S., the present study provides further evidence for the effectiveness of the program and suggests that promoting positive youth development could be a direction for the prevention of adolescent substance use in the future. The present results echo those findings suggesting that positive youth development reduces adolescent problem behavior, possibly via the impact of life satisfaction (34).

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