計畫編號：DOH88-TD-1161

行政院衛生署八十八年度科技研究發展計畫

青少年藥物濫用之追蹤研究(二)

研究報告

執行機構：中央研究院生物醫學科學研究所

計畫主持人：鄭泰安

研究人員：鄭泰安

執行期限：87 年 7 月 1 日至 88 年 6 月 30 日

目　錄

頁　碼

共（43）頁

中文摘要

關鍵詞： 藥物濫用、世代研究、危險因子、發生率

本計劃以世代研究追蹤法，探討青少年藥物濫用之發生率與成因,研究世代為高雄市及高雄縣二所國中，由國一新生世代追蹤至國三並進行以下之分析與探討，

1. 利用一般線性方程模式(GEE) 探討相關之危險及預後因子。
2. 應用貝氏定理(Baye's theorem)估計篩檢工具之敏感度及精確度。
3. 應用三階段可回溯性馬可夫鏈模式(Two-stage reversible Markov Chain model)估計藥物濫用之發生及轉移之變化。
4. 建立各種危險因子與物質濫用之可能因果關係模型。

結果：

1. 其盛行率若以 DSM-IV做為診斷依據，國一至國三分別為 0.93% (95%CI：0.36%-1.51%)，1.53%（0.95%CI：0.71%-2.27%）及 3.56% (95%CI：2.22%-4.91%)，隨年級增加之趨勢，以趨勢分析(Cochran Armitage Trend Test)測試後，其統計上達顯著意義（X^2=5.62，P<0.001）。
2. 由 GEE 發現對課業期望可能是相當重要影響因子，課業期望低是課業期望高得藥物濫用 3.29 倍(95%CI：1.10-9.81)統計上達顯著意義。
3. 藥物濫用自然病史探討（正常→第一階段陽性→藥物濫用）本研究首次利用馬可夫鏈探討由正常→第一段陽性→藥物濫用自然病史轉移，其中考慮陽性→正常之情況下若使用世代追蹤資料則約 30%是第一階段陽性個案而陽性個案中僅 4%會進展至藥物濫用其餘 96%維持返回正常，若用 Panel data 來看則 6%會進展至藥物濫用其餘 94%會返回正常。如果以進展速率來看，對課

業期望高者其第一階段陽性變成藥物濫用為 2%，而對課業期望低者其速率為 7%。

結論與結論：

本計畫利用國一新生世代追蹤至國三發現盛行率逐漸升高，馬可夫鏈模式發現其第一階段篩檢為陽性者其變成藥物濫用約為 5%，GEE 模式及馬可夫鏈模式分析發現課業滿意程度可能是引起藥物濫用前身，因此提出一個可能引起藥物濫用之模式，在將來研究中應針此模式再做確定以提供青少年藥物濫用預防之參考。

Abstract

A prospective study of substance abuse disorders (including alcohol, cigarette, betel nut, glue) was conducted in Kaoushing areas, the southern part of Taiwan. A total of 1070 seventh grade students were sampled from two junior high schools. This cohort was followed over eight grade and ninth grade with the sizes of 1047 and 1038, respectively.

In order to study the effect of risk or prognostic factor on substance abuse, a general estimation equation (GEE) will be employed to estimate relevant parameters. To ascertain the validity of screening tool used in this study, probability formula based on Baye's theorem will be performed to estimate sensitivity and specificity. A Two-Stage reversible Markov Chain models with the incoporation of covariate will be applied to this cohort data to estimate transition rates for substance abuse. The final step is to to build up a causal relationship between risk factors and substance abuse.

The estimated life-time prevalence according to DSM-IV in seventh grade, eight grade and ninth grade are 0.93% (95% CI: 0.36-1.51), 1.53% (95% CI: 0.79-2.27), 3.56 (95% CI: 2.22-4.91), respectively. The corresponding odds ratios for eight grade and ninth grade against seventh grade are 1.65 (95% CI: 0.75-3.61), 3.92 (95% CI: 1.97-7.76), respectively. Results based on a trend analysis show the life-time prevalence significantly increases with grade ($x2=5.62$, $P < 0.01$). Results based on GEE model suggests that the low expectation with respect to study was three times likely to be susceptible to substance abuse than high expectation.

Elucidation of the disease natural history from normal, positive at first

stage of screen and finally to substance abuse found that approximately 30% cohort was screened as positive cases at the first stage. Of these subjects, only 4% subjects will progress to substance abuse and the remaining 96% subjects will revert to normal. The corresponding figures for panel data were 6% and 94%, respectively. As regards covariates, subjects with high expectation with respect to study (2%) is less likely to progress to substance abuse than those with respect to low expectation.

The above results suggest that expectation with respect to study may be an antecedent event before substance abuse. A pathway model with respect to relevant risk factors on substance abuse was proposed in this study.

一、前言

近幾年來,青少年藥物的濫用,已成社會大眾關注的焦點,各種反毒活動及對毒品之衛生教育及防治工作,如火如荼地在各種媒體及學校推廣。但基於台灣過去相關資訊的不足,各種反毒活動多僅限於嚇阻(fear approach)及資訊提供等基於知識-態度-行為模式上(knowledge-attitude-behavior model)的方式，希望藉著對藥物濫用所造成後果之知識增加後,能進而改變青少年對藥物濫用的態度,及降低青少年藥物濫用的發生。但近年來,美國作預防研究者,已發現藉這兩種方式所設計的青少年藥物濫用預防計劃,並未能有效減低青少年藥物濫用的問題。新一代較有效的預防課程乃是根據藥物濫用流行病學所調查出來的危險因子, 針對這些危險因子,進而設計預防計劃的內容,改變這些危險因子及其對藥物濫用之影響性。這類計劃以'拒絕同儕壓力訓練'(peer resistance training)及'社會能力訓練'(social competence training)之設計為代表。

鑑於藥物濫用是具文化特異性的問題,其牽涉的層面包括了個人、心理、家庭、社會各層面。所以,單僅靠國外的資訊及藥物濫用後果的威嚇性資訊，並無法有效地預防這個問題。國內目前對藥物濫用預防投注大量經費，卻對青少年藥物濫用者的特性及發生欠缺研究，而僅憑固有印象來設計預防計劃，致花大筆經費下,卻沒有一個可評估成效的基準。為了有效預防青少年藥物濫用的問題,我們必需由這個問題的發生來著手,以流行病學之方法來找出青少年藥物濫用之危險因子,針對危險因子,對症下藥,才能達最大之預防效果。

青少年是人生重要的轉型期,由依賴的孩童蛻變為成熟獨立的成人,這段期間，對其人格及生活習慣的養成,價值觀的建立,可說是非常重要。有鑑於此,本研究鎖定國中生為目標,以期能達到最大之成效。

藥物濫用會造成嚴重社會後果,像是家庭問題、失學失業；為了取得買藥的金錢導致竊盜，結夥搶劫等嚴重犯罪行為,甚至因為用藥而得不到社會認可,以致於加入偏差的同儕團體 (deviant peer group),而使藥物濫用情形更加惡化。鑑於青少年藥物濫用的這些後果與危險性,青少年各種藥物濫用的問題,實是當前公共衛生的重要課題。

根據國內外的研究，青少年藥物濫用的危險因子包括家庭、學校、同儕等社會因素以及個人精神狀態與人格特質。例如研究顯示,非常低社經地位的年輕人確有較高的藥物濫用率,但其他社經地位,則沒有顯著差別（Vicary, & Lerner, 1986）。一般說來,與社會所不接受行為(non-conformity)相關之青少年，像沒有宗教信仰、經常缺席、成績不佳、與父母關係不佳、違反校規者較易成為藥物濫用者。其他相關因素包括:12歲前即有醉酒經驗者、認識用藥的成人及同儕數目多者、本身認為同儕對藥物使用的認同度高、高缺席率、低學業成就、未來不願再接受高等教育、不從事宗教活動、情緒沮喪、對生活不滿者（Bukstein, Brent, & Kaminer, 1992; Newcomb, et al., 1987; Sarvela, & McClendon, 1988; Thomas, 1992; Vicary, & Lerner, 1986）。酗酒及藥物濫用的家族史經常見於青少年藥物濫用者,是基因遺傳或是後天教養的原因，仍不清楚。追蹤研究証實偏差性行為通常發生於藥物濫用之前（Boyle, & Offord, 1991）。通常,青少年的行為在早期受父母的影響最大,其後,同儕的影響力漸增（Huba, & Bentler, 1980）。父母的管教方式與對青少年子女的監測,都與青少年的用藥有相關（Baumrind, 1991; Bernardi, Fones, & Tennant, 1987）。青少年的生活方式常受同儕團體的影響,隸屬於正向或偏差的同儕團體,對青少年的用藥影響甚鉅。

為了有效預防青少年各種藥物濫用的問題,相關藥物危險因子流行病學的研究,是刻不容緩的。藉由危險因子的研究分析,可幫助我們了解青少年藥物濫用問

題發生的路徑(path),及早介入預防。時下的預防計劃,都沒有良好的理論與科學基礎,有鑑於此,本計畫之主持人等在衛生署專題補助下，完成了三年計畫「青少年藥物濫用之流行病學研究」(83-86年)，該計畫先以橫斷面(cross-sectional)個案對照研究評估國三學生藥物濫用的盛行率與危險因子,次再以世代研究法,建立國一新生世代,評估其危險因子之基線資料(baseline data),然後追蹤其至國三以了解藥物濫用的演變情形,以及危險因子與藥物濫用之因果關係,進而發展學說,幫助我們進一步發展有效的預防計劃。

整個計劃的執行皆由與青少年有豐富接觸經驗的臨床人員(兒童精神科專科醫師,護理人員，臨床心理師，精神科社工師),及經嚴格訓練的訪視員來訪談。診斷方面採標準化的半結構性臨床診斷工具the Schedule for Affective Disorders and Schizophrenia for school age children (Kiddie-SADS; Puig-Antich & Chambers, 1978)進行訪談診斷；K-SADS是針對學齡青少年的精神疾病所發展的診斷工具，它被廣泛應用於國外青少年精神疾病的研究上，經研究者修訂後可涵括最新的DSM-Ⅳ及ICD-10的診斷，故採用此工具亦可兼顧研究結果在國內及國際的可比較性。在上述計畫中K-SADS的中文翻譯及參與研究的精神科醫師們之信度評估皆已完成，危險因子的測量工具亦已發展出來，其內容包括 (1) 社會人口學資料：父母婚姻狀況、父母教育程度、家庭收入、宗教信仰、宗教活動參與程度、父母對子女的教育期望、零用錢等；(2) 家族精神疾病史、家人使用合法及非法藥物的情形；(3) 學校資料：學校成績記錄、出缺席及獎懲記錄、個案對學校成績的滿意度、教育期望 (educational aspiration)、與學校的聯結 (school bond)、教師支持等；(4) 同儕資料：同儕團體的聯結(peer bond)、同儕適應(peer adjustment)、同儕傳統性(conventional activities of friends)等；(5) 家庭資料：家庭聯結(family bond)、父母間的情感、家庭互動等；另外並包括了請導師填寫的教師評估問卷；以及學生自填的父母教養問卷(parenting)、人格特質問卷，包括了內外控(internal/external locus of

control)、傳統價值觀 (conventional value)、易衝動性 (impulsiveness)、及好危險、好刺激(risk taking and sensation seeking)等。這些問卷的測量特性(psychometric property)，包含效度、信度都已予以檢定 (DOH84-TD-089)，可繼續在本世代研究中使用。

目前國內對藥物濫用的流行病學研究,都只限於不合法藥物的使用,但如上所述，煙酒及檳榔等合法藥物對青少年健康的危害,實不容我們忽略這個問題。國內對此類問題,目前都僅只限於「使用」盛行率的研究,本研究是第一個應用診斷標準來診斷青少年的藥物濫用及依賴，並據此得濫用及依賴的盛行率和發生率,以及瞭解影響其發生與變化的因素為何。

過去有關藥物濫用研究均使用橫斷性研究，因此，對於因果時序性(Temporal Sequence)相當薄弱，例如：藥物濫用和空閒時經常去 KTV 有關，可能是因為其他原因造成藥物濫用而使得後著行為發生，證實這樣因果關係必須依靠長期追蹤資料，本研究自國一新生世代(N=1070)，追蹤至國二(N=1047)，最後追蹤至國三(N=1038)，這樣世代追蹤(Cohort study)資料，提供了檢視上述時序性之機會，如此在尋找引起藥物濫用因果關係相當有助益。

然而在長期追蹤資料當中因為其依變項測量是屬於重覆測量(repeated measurement)，所以依變項間不如過去分析方法是屬於獨立假設，而且因變項在測量上不同時間點也可能有不同測量值，例如：小學行為可能至國一會改變，而國一至國二，國二至國三也會改變，在此情況下必須考慮這些特性，利用較複雜統計方法來探討影響青少年藥物濫用因子，一般方法有 3 種，即使用邊際模式(Marginal model)，條件式模式(Conditional models)及轉移模式(Transition models)而因為本研究是一個前瞻性研究，樣本較大，用此條件式模式可能不太適合，因此考慮使用邊際模式(Marginal models)及轉移模式(Transition models)

而邊際模式一般是使用 Liang(1986)等人所發展一般線性估計模式(Generalized estimation equation model, GEE)來探討整個族群相關因子對於依變項影響，其方法見材料與方法而轉移模式則一般使用所謂馬可夫鏈模式(Markov models)來描述疾病狀態在不同時間點變化情形，由於青少年藥物濫用定義可以根據

所關心之主題定義，若以終生盛行率(life-time prevalence)來定義，則一旦得到藥物濫用即為個案，不過在臨床及流行病學上，一般除了終生盛行率之外，可能對於其點或一段時間變化有興趣，如此藥物濫用之結果便有可能因不同時間點而有變化。

如此便會牽涉到個案會由藥物濫用變成正常，這在一般統計方法處理相當複雜，不過利用馬可夫模式，狀態與狀態間轉移則相當適合。再進一步而言，如果吾人關心家庭、學校、同學等社會因子變項如何影響藥物濫用，則可考慮使用迴歸式馬可夫鍊模式(Markov Regression model)，這些因子如何影響疾病狀態轉移，吾人也可以用 GEE 方法來探討這樣問題。不過一般而言，GEE 是適用於二分變項重覆測量而對於多分變項則較難處理，在此情況下，馬可夫模式可能較適合。

使用馬可夫鍊最大好處是可以描述疾病在不同時間點轉移，進而了解疾病自然病史，例如在藥物濫用研究中，研究者使用第一階段篩檢陽性所找到陽性個案，再經由 KADS 精神診斷問卷確定是否為藥物濫用，如此可以定義三種疾病狀態，即正常，第一階段篩檢為陽性個案，藥物濫用三階段利用馬可夫鍊量化三種狀態轉移狀況，這種研究在過去文獻上相當缺乏，主要是方法上較為複雜，不過這樣對於描述疾病進展變化有相當大的助益。

二、研究材料與方法

國一新生的世代研究

1.研究樣本

本研究以立意取樣方式在高雄市及高雄縣各選取一所國中，分別以 A 國中及 B 國中代稱，代表都會區、鄉鎮地區、針對其一年級新生世代為研究抽樣母群體。以班級為單位，使用亂數表自 A 國中一年級總共 34 班學生抽出 18 班，B 國中一年級 10 班學生抽出 8 班，各得 725 位和 345 位國一新生共計 1070 人為研究樣本。且為增加樣本的代表性，避免少數特殊班級影響結果的推論，乃將若干特殊班級排除於抽樣的族群中，如特殊才藝班、體育班或智能肢體障礙班等，各學校學生樣本男女比率分佈見下表。

表　兩校學生男女比率

	男 N（%）	女 N（%）	總人數 N（100%）
A 國中	356（49.17）	368（50.83）	724（100）
B 國中	171（49.42）	175（50.58）	346（100）
總人數	527（49.25）	543（50.75）	1070（100）

2.研究方法

本研究為兼顧篩檢效度與效率，採二階段個案鑑定法。第一階段由精神醫療從業人員以一對一直接面談方式以篩檢問卷施測於全體抽樣樣本 1070 人。再依藥物使用將樣本分為曾使用任何藥物超過篩檢定義量者（陽性）及低於篩檢定義量者（陰性）。篩檢定義為：喝酒頻率達到一星期至少一次，或喝酒的量通常超過二個單位，或曾喝醉過;抽菸頻率達一星期至少一次或抽菸量通常超過一支;吃檳榔的頻率達一星期至少一次或吃檳榔的量通常超過一粒;曾經使用過上述以外之藥物者。篩檢陽性者及十分之一篩檢陰性者再進入第二階段。第二階段由兒童青少年精神科專科醫師依中文版 Kiddie -SADS 診斷問卷做確定診斷。經確定為藥物濫用及依賴者為個案組，非藥物濫用及依賴且藥物使用未達篩檢定義量者為控制組，施以危險因子（包括精神疾病診斷、人格特質、家庭、學校、同儕因素及社會人口學資料）的訪談，進行與藥物濫用及依賴相關危險因子的個案對照研究。

3. 過去追蹤結果

先建立國中一年級新生之世代，評估其物質使用情形以及各項危險因子。此世代之建立仍依據第一年橫斷研究之發現，採都會與鄉村地區二群體為樣本，共收集 1070 名國中一年級生（顏等,1996），並針對其社會人口、同儕、家庭、學校、休閒活動、藥物使用態度和經驗以及精神病等多項危險因子加以探討。結果發現國一新生之藥物濫用（DSM-Ⅲ-R）盛行率為 0.93%（總共只有十名個案），包含菸品，檳榔及酒精，但尚未有重大違禁藥品（安非他命、海洛因）之發現（顏等,1996），此盛行率與國三生者（第一年研究對象）相差極大。與藥物濫用有關之因子含不喜歡和家庭相處等 6 項家庭因子；對學校課業期待較低等 3 項課業因子；同儕中有使用者等 8 項同儕因子；常到電玩店等不良之 3

項休閒活動因子；不排斥朋友使用，父母親或兄弟姊妹中有使用及罹患精神疾病等各大因素（顏等,1996）。

該研究之第二年則展開前瞻性世代研究，先建立國中一年級新生之世代，評估其物質使用情形以及各項危險因子。此世代之建立仍依據第一年橫斷研究之發現，採都會與鄉村地區二群體為樣本，共收集 1070 名國中一年級生（顏等,1996），並針對其社會人口、同儕、家庭、學校、休閒活動、藥物使用態度和經驗以及精神病等多項危險因子加以探討。結果發現國一新生之藥物濫用（DSM-Ⅲ-R）盛行率為 0.93%（總共只有十名個案），包含菸品，檳榔及酒精，但尚未有重大違禁藥品（安非他命、海洛因）之發現（顏等,1996），此盛行率與國三生者（第一年研究對象）相差極大。與藥物濫用有關之因子含不喜歡和家庭相處等 6 項家庭因子；對學校課業期待較低等 3 項課業因子；同儕中有使用者等 8 項同儕因子；常到電玩店等不良之 3 項休閒活動因子；不排斥朋友使用，父母親或兄弟姊妹中有使用及罹患精神疾病等各大因素（顏等,1996）。
第三年為此 1070 名樣本一年後之追蹤調查（國二上）。 有 45 位遷移其中含 6 名移居國外，及 2 名失蹤，其餘 39 名遷移至全省各地。其藥物濫用（DSM-Ⅲ-R）之盛行率增為 1.53%，初步危險因子之分析和國一新生有相似之結果。

統計分析方法

本研究在探討社會學人口因子、家庭因子、對於物質使用之態度和認知，及其他共存之精神疾病對藥物濫用之影響採用一般線性估計模式(Generalised estimation equation model, GEE)，這是屬於邊際模式(Marginal model)的一種，有關 GEE 的估計方法請參照 Liang 等人,這個模是用來估計整個族群其上述相關因子對於藥物濫用之影響，若在分析中透過危險因子太多層面之危險因子則先使用分類之統計方法，如因素分析(factor analysis)或叢聚分析(Cluster

analysis)，將變項減為幾個較大之成份，然後進入 GEE 之模中分析。

Marginal model 其實是一種 population-averaged approach，以 regression 觀點來看就是探討 $E(Y_{ij})\ (=\mu_{ij})$（Y_{ij} 是長期追蹤資料之 outcome）和 covariates 之關係，而這樣之關係建立可以使用 generalized liner model 中某種 link function h 來聯結，也就是

$$g(\mu_{ij})=x_{ij}^{T}\beta$$

其 Variance 依據 generalized linear model 必定和 $v(\mu_{ij})$ 和 ϕ (是一個 scale parameter)有關，寫為

$$Var(Y_{ij})=v(\mu_{ij})\phi$$

而且 Y_{ij} 和 Y_{ik} 之 correlation 是 μ_{ij},μ_{ik} 及 α 之一個函數，也就是

$$Corr(Y_{ij},Y_{ik})=\rho(\mu_{ij},\mu_{ik};\alpha)$$

(1) 篩檢工具敏感度（sensitivity）及特異性（specificity）之估計

因本研究為台灣地區首次用兩階段方法找出青少年藥物濫用個案，其追蹤年代中發現某些個案在第 2 次追蹤所確定者，實際上於第一年篩檢時就可確定，實屬偽陰性個案，基於此兩個考量有必要估計工具之敏感度及特異性以提供做為將來推廣本研究篩檢工具於其他族群之效度參考數據，其估計之方法如下：

假使 D 代表實際有藥物濫用及依賴，而 D 代表實際無藥物濫用及依賴

K 代表經 Kiddie-SADS 確定為個案，$\bar{K}$ 經 Kiddie-SADS 確定為非個案

F 代表第一階段篩檢定義量為陽性，$\bar{F}$ 代表陰性

令 P（K | D）代表敏感度，P（$\bar{K}$ | D）為偽陰性（false negative）

P（$\bar{K}$ | $\bar{D}$）代表特異性，P（K | $\bar{D}$）為偽陽性（false positive）

$$P(K \mid D) = P(K \mid D,F)\, P(D \mid F)\, P(F) +$$

$$P(K \mid D,F)\, P(D \mid \bar{F})\, P(\bar{F})$$

$$= P(D \mid K,F) \times P(K \mid F) \times P(D \mid F)$$

$$\times P(F)$$

$$P(D \mid K,F) \times P(K \mid F) + P(D \mid \bar{K},F) \times P(\bar{K} \mid F)$$

$$+ P(D \mid K, \bar{F}) \times P(K \mid \bar{F}) \times P(D \mid \bar{F}) \times (1 - P(F))$$

$$P(D \mid K,\bar{F}) \times P(K \mid \bar{F}) + P(D \mid \bar{K},\bar{F}) \times P(\bar{K} \mid \bar{F})$$

----------(1)

（1）式等號右邊之第一項其個別之機率分別為

P（D | K,F）為第一階段篩檢為陽性，經 Kiddie-SADS 確定為個案中實際是藥物濫用或依賴之機率

P（K | F）為第一階段篩檢為陽性，其經 Kiddie-SADS 確診為個案之機率

P（D | F）為第一階段為陽性，其實際為藥物濫用者之機率

P（F）為第一階段篩檢之陽性率

P（D | $\bar{K}$,F）為第一階段陽性，經 Kiddie-SADS 確定為非個案，但實際上卻是藥物濫用或依賴者（如於第二次追蹤發現但實際於第一次即可診斷為個案）

之機率。

$P(\overline{K} \mid F)$ 為第一階段陽性，經 Kiddie-SAS 診斷為非個案之機率。

上述各項機率均可從第一階段陽性者經 Kiddie-SADS 診斷加上日後追蹤資料到估計。

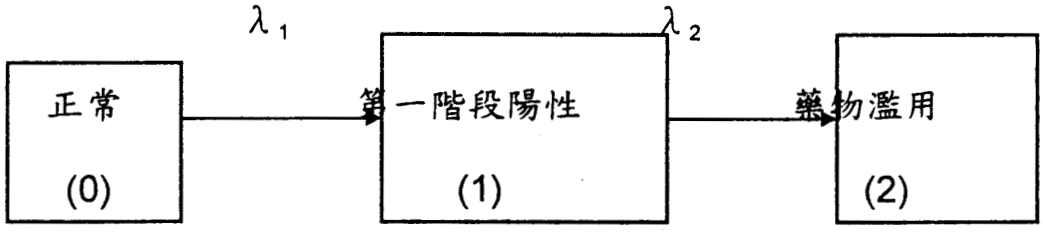
同理(1)式等號右邊第二項之各項機率均可從十分之一之第一階段篩檢為陰性經 Kiddie-SADS 確診，加上日後追蹤資料得到估式。

(2) Three-Stage Markov 模式

1) 青少年藥物濫用從國一至國三之疾病自然病史發生及轉移速率(transition rate)如何變化：

本研究因屬世代追蹤資料，且其依變項（青少年藥物濫用）之性質屬重覆測量資料，假設藥物濫用之確定個案其確定為藥物濫用個案之前為使用某些藥物超過一定之定量標準，稱這樣之個案為第一階段陽性個案，如此對於藥物濫用之自然病史即可用三階段之馬可夫鏈來描述如下：

若不考慮陽性→正常，



進入 λ_1 代表自正常進入第一階段陽性之發生率，而 λ_2 代表由第一階段陽性進入藥物濫用之轉移率，上述之自然病史可利用矩陣表示如下：

$$\begin{array}{c} \\ 0 \\ 1 \\ 2 \end{array}\begin{array}{c} \begin{array}{ccc} \text{正常} & \text{第一階段陽性} & \text{藥物濫用} \\ 0 & 1 & 2 \end{array} \\ \begin{pmatrix} -\lambda_1 & \lambda_1 & 0 \\ 0 & -\lambda_2 & \lambda_2 \\ 0 & 0 & 0 \end{pmatrix} \end{array}$$

轉移矩陣若利用隨機過程模式可導出其轉移機率如下：

$$\begin{array}{c} \\ 0 \\ 1 \\ 2 \end{array}\begin{array}{c} \begin{array}{ccc} \text{正常} & \text{第一階段陽性} & \text{藥物濫用} \\ 0 & 1 & 2 \end{array} \\ \begin{pmatrix} P_{00}(t) & P_{01}(t) & P_{02}(t) \\ 0 & P_{11}(t) & P_{12}(t) \\ 0 & 0 & 0 \end{pmatrix} \end{array}$$

$$P_{00}(t) = e^{-\lambda_1 t}$$

$$P_{01}(t) = \int_0^t \lambda_1 e^{-\lambda_1 t} e^{-\lambda_2 (t-s)} ds$$

$$P_{02}(t) = \int_0^t \lambda_1 e^{-\lambda_1 t} \int_0^{t-s} \lambda_2 e^{-\lambda_2 u} du ds$$

$$P_{11}(t) = e^{-\lambda_2 t}$$

$$P_{12}(t) = 1 - e^{-\lambda_2 t}$$

若考慮陽性，可以使用 Proportional hazard model，模式如下，

$$\begin{array}{c} \\ 0 \\ 1 \\ 2 \end{array}\begin{array}{c} \begin{array}{ccc} \text{正常} & \text{第一階段陽性} & \text{藥物濫用} \\ 0 & 1 & 2 \end{array} \\ \begin{pmatrix} -\lambda_1 & \lambda_1 & 0 \\ \lambda_2 & -\lambda_2 + \lambda_3 & \lambda_3 \\ 0 & 0 & 0 \end{pmatrix} \end{array}$$

$$\lambda_{k_1} = \lambda_1 \times Exp(k_1 \times x)\ ,\ \lambda_{k_2} = \lambda_2 Exp(k_2 \times x)$$

根據上述轉移機率及世代追蹤資料，可以建立 likelihood function 進而估計$\lambda_j(t)$

2)分析各種危險因子包括社會人口學因子、家庭因子。

三、結果

一、 國一至國三藥物濫用盛行狀況

表 1(a)列出國一世代其歷經國二及國三各年級藥物濫用盛行率，若以 DSM-IV 做為診斷依據，分別為 0.93%(95%C1：0.36%-1.51%)，1.53% (0.79%-2.27%)及 3.56%(2.22%-4.91%)，若以 ICD-10 為依據則為 0.84% (95%CI：0.29%-1.39%)，3.64% (95%CI：2.22-5.07%)，4.52% (3.01%-6.03%)。若以國一做為基礎族群(Reference group)，則國二/國一及國三/國二之盛行對比值(Prevalence Odd ratio)若以 DSM-IV 為診斷依據分別為 1.65 (95%CI：0.75-3.61)及 3.92(95%CI：1.97-7.76)，若以 ICD-10 為依據，則分別為 3.84(95%CI：1.92-7.66)及 5.58（95%CI：2.87-10.84），若依 DSM-IV 來看，此表示國二得藥物濫用之危險性約為國一之兩倍，而國三得藥物濫用則為 4 倍，這樣隨年級增加之趨勢，以趨勢分析(Cochran Armitage Trend Test)測試後，其統計上達顯著意義（X^2=5.62，P<0.001）。

表 1(b)顯示 Panel data 國一陽性及國一陰性其藥物濫用變化情形，由其非藥物濫用進展至藥物濫用比例，無論在陽性及陰性皆高情況下，支持國一至國三其藥物濫用增加應是有意義的(Kappa=0.3780, P=0.001，陽性；Kappa=0.42, P=0.05，陰性)。

二、 因素分析結果

由於影響藥物濫用之社會因子相當複雜數目繁多，本研究將這些因子依鄭泰安（1997）等人分成四個主要成份，包括家庭因素，學校因素，行為因素及同儕因素，而在每個成份中利用因素分析將變項特質相同歸為同一項目，表 7

至表 18 列出國一至國三因素分析之結果。用因素分析中之負荷（Factor Loading），可以將這些成份中之變項歸類。

以國一而言，上述四主要成份可依因素負荷及固有值（λ）之大小（依上 Scree test）歸類如下：

（一）家庭因素（表 7）

1. 零用錢（λ=2.01）

2. 父母間感情（λ=1.52）

3. 家庭凝聚力（λ=1.45）

其中零用錢解釋 18%，父母親感情 15%，家庭凝聚力解釋 11%。

（二）學校因素（表 8）

1. 課業關心程度（λ=3.85）

2. 課後智育科目補習（λ=2.66）

3. 課後才藝科目補習（λ=2.05）

4. 與小學老師之互動（λ=1.90）

5. 在學校的個性（λ=1.46）

6. 在學校的偏差行為（λ=1.41）

7. 課後技能科目補習（λ=1.33）

8. 對學校成績滿意度（λ=1.25）

其中課業關心程度解釋 11.3%，課後智育科目補習解釋 7.8%，課後才藝科目補習解釋 6.0%，與小學老師之互動解釋 5.6%，在學校的個性解釋 1.46%，在學校的偏差行為解釋 1.41%，課後技能科目補習解釋 1.33%，對學校成績滿意度解釋 1.25%。

（三）同儕因素（表 9）

1. 男女朋友（λ=1.55）

2. 同學相處（λ=1.39）

3. 朋友相處時間（λ=1.15）

4. 朋友年齡（λ=1.05）

其中男女朋友解釋 15.5%，同學相解釋 13.9%，朋友相處時間解釋 11.5%，朋友年齡解釋 10.5%。

（四）行為因素（表 10）

1. 小學偏差行為（λ=5.42）

2. 空閒活動（λ=3.99）

3. 小學規矩行為（λ=1.94）

4. 空閒時自己一人（λ=1.58）

5. 空閒時覺得無聊（λ=1.40）

6. 空閒時參加才藝活動（λ=1.36）

其中小學偏差行為解釋 17.5%，空閒活動解釋 12.6%，小學規矩行為解釋 7.3%，空閒時自己一人解釋 5.0%，空閒時覺得無聊解釋 4.7%，空閒時參加才藝活動解釋 3.8%。

以國二而言：

（一）家庭因素（表 11）

1. 家庭凝聚力（λ=1.65）

2. 兄弟姊妹凝聚力（λ=1.49）

3. 零用錢（λ=1.41）

4. 父母對小學成績滿意度（λ=1.31）

其中家庭凝聚力解釋 17.1%，兄弟姊妹凝聚力解釋 12.8%，零用錢解釋 11.3%，父母對小學成績滿意度解釋 8.3%。

（二）學校因素（表 12）

1. 課後補習（λ=11.62）

2. 課業努力（λ=3.84）

3. 學校偏差行為（λ=1.60）

4. 導師對成績滿意度（λ=1.47）

5. 在學校的負向個性（λ=1.31）

6. 與小學老師互動（λ=1.04）

7. 對小學成績滿意度（λ=1.03）

其中課後補習解釋 33.25%，課業努力解釋 11.0%，學校偏差行為解釋 4.6%，導師對成績滿意度解釋 4.2%，在學校的負向個性解釋 3.7%，與小學老師互動解釋 3.0%對小學成績滿意度解釋 2.9%。

（三）同儕因素（表 13）

1. 同學相處（λ=1.03）

2. 同儕朋友（λ=1.03）

3. 朋友種類及相處時間（λ=1.03）

其中同學相處解釋 20.2%，同儕朋友解釋 15.7%，朋友種類及相處時間解釋 10.9%。

（四）行為因素（表 14）

1. 空閒活動（λ=3.98）

2. 課業偏差行為（λ=2.89）

3. 偏差行為（λ=2.70）

4. 空閒時對活動不感興趣（λ=1.68）

5. 空閒時覺得無聊（λ=1.48）

6. 空閒時看電視（λ=1.46）

7. 空閒時參加才藝活動（λ=1.25）

8. 空閒時看書、玩樂器（λ=1.23）

其中空閒活動解釋 14.7%，課業偏差行為解釋 12.0%，偏差行為解釋

5.8%，空閒時對活動不感興趣解釋 5.1%，空閒時覺得無聊解釋 4.5%，空閒時看電視解釋 4.4%，空閒時參加才藝活動解釋 3.6%，空閒時看書、玩樂器解釋 3.3%。

以國三而言：

（一）家庭因素（表 15）

1. 家庭凝聚力（λ=1.59）

2. 期望教育程度（λ=1.06）

其中家庭凝聚力解釋 32.44%，期望教育程度解釋 20.63%。

（二）學校因素（表 16）

1. 課後補習（λ=3.41）

2. 學校行為偏差（λ=2.11）

3. 上課專心（λ=1.79）

4. 補作文及音樂（λ=1.53）

5. 個性內向（λ=1.46）

6. 補英語及體育（λ=1.34）

7. 導師對成績滿意度（λ=1.26）

8. 與老師互動（λ=1.23）

其中課後補習解釋 12.2%，學校行為偏差解釋 7.5%，上課專心解釋 6.4%，補作文及音樂解釋 5.5%，個性內向解釋 5.2%，補英語及體育解釋 4.8%，導師對成績滿意度解釋 4.5%，與老師互動解釋 4.4%。

（三）同儕因素（表 17）

1. 朋友相處時間（λ=1.23）

2. 男/女朋友（λ=1.23）

3. 同學及朋友相處（λ=1.23）

其中朋友相處時間解釋 29.9%，男/女朋友解釋 17.5%，同學及朋友相處解釋 15.2%。

（四）行為因素（表 18）

1. 朋友行為乖張（λ=4.92）

2. 傷害別人行為（λ=2.06）

3. 空閒時覺得無聊（λ=1.86）

4. 娛樂場所（λ=1.61）

5. 益智場合（λ=1.52）

其中朋友行為乖張解釋 13.7%，傷害別人行為解釋 5.7%，空閒時覺得無聊解釋 5.2%，娛樂場所解釋 4.5%，益智場合解釋 4.2%。

三、 馬可夫鏈模式

馬可夫模式探討藥物濫用由正常→第一階段陽性→藥物濫用自然病史。表 14 列出國一世代追蹤資料，其由國一進展至國二再至國三，其正常、陽性及藥物濫用三種狀態轉移數目。表 14 亦列出國一至國三 Panel 資料三種狀態轉移。表 15 則列出國一至國二至國三 1038 人三種狀態轉移。根據馬可夫模式表 16-18 列出不考慮陽性→正常、考慮陽性→正常及 Panel data 之下，在考量終身盛行率其所對應馬可夫模式之轉移模式，人數及轉移機率。

表 19 列出不考慮陽性→正常加入學校因素中對課業期望因子(高及低)，其所對應轉移機率及人數。表 20 則是相同地表，但考慮陽性→正常情況下，加入學校因素中課業期望因子之轉移機率及人數。

表 21 列出其參數估計結果，若不考慮陽性→正常情況下，由正常至陽性每年為 0.1669(95%CI：0.1613-0.1725)，而第一階段，為陽性變成藥物濫用為 0.0970（95%CI：0.0688-0.1252），若考慮陽性→正常情況下，其正常→第一階段為陽性為 0.2917(95%CI：0.2427-0.3408)，而第一階段為陽性→正常為 1.2322(95%CI：1.0663-1.3982)，而第一階段為陽性至藥物濫用則為 0.0521(95%CI：0.0316-0.0726)(見表 22)。表 23 出 Panel 資料估計結果由正常至第一階段陽性為 0.3558(95%CI：0.2472-0.4645)，第一階段陽性至正常為 1.1944(95%CI：0.9956-1.3932)，而第一階段至藥物濫用為 0.0811(95%CI：0.0545-0.1177)。

由於對課業期望高是造成藥物濫用重要危險因子，因此將其視為自變項，也就是共變數(covariates)，可利用上述提及的馬可夫迴歸模式(Markov regression model)來探討其影響。根據上述馬可夫歸模式得到估計結果參數如表 24，對課業期望低者，其正常→第一階段陽性(λ_1)每年為 0.1267(95%CI：0.1209-0.1325)，而第一階段陽性至藥物濫用(λ_2)為 0.0328(95%CI：0.00-0.0799)，而對課業期望者其估計參數可經由下述公式得到

$$\lambda_{k1}=\lambda_1 \exp(k_1)=0.2329$$

$$\lambda_{k2}=\lambda_2 \exp(k_2)=0.1120$$

其中 k_1 及 k_2 是課業期望高／課業期望低迴歸係數

表 25 則為考慮陽性變成正常之下之估計結果，正常→第一階段為陽性為 0.2250(95%CI：0.1684-0.2817)，而第一階段陽性→正常則為 1.2916(95%CI：1.0335-1.5496)，而第一階段為陽性至藥物濫用為 0.0215(95%CI：0.0004-0.0426)，以上是針對課業期望高者於課業期望低者其相對應參數值（λ_{k1}，λ_{k2}及λ_{k3}）分別計算為

$\lambda_{k1}=\lambda_1$*exp(0.6723)=0.4407

$\lambda_{k2}=\lambda_2$*xp(0.0001)=1.2916

$\lambda_{k3}=\lambda_3$*exp(1.1909)=0.0707

一般性線性模式(Generalized linear estimation)估計結果

表 26 列出利用 GEE 模式探討家庭因素、學校因素、行為因素及同儕因素如何影響藥物濫用單變項分析，其中家庭因素中，父母對課業期望具有統計上相關(P<0.0001)，父母對課業期望愈／父母對課業期望低之危險對比值為 0.65（exp(-0.34)），學校因素中具有統計相關因子為小學（國一）破壞行為（P<0.0001），其中小學（國一）前一年破壞行為其引起藥物濫用是沒有破壞行為之 1.70 倍(95%CI：1.31-2.20)在行為因素方面若交往朋友有破壞行為其引起藥物濫用是交往朋友沒有破壞行為之 1.70 倍(95%CI：1.27-2.24)顯著意義，同儕因素中交往朋友狀況具有顯著意義。

表 27 列出調整性別後之結果其中只有對課業滿意度，行為因素中交往朋友，有人破壞行為及違警行為達統計上有意義相關，及同儕因素中交往朋友狀況具有統計上顯著相關。

表 28 列出不假定終身盛行率多變項分析結果，其中性別具有統計上有意義相關，男性是女性得藥物濫用 10 倍(95%CI：2.59-42.50)，其他統計上達顯著相關因子僅包括對課滿意程度，而課業補習及努力程度，對小學（國一）其他科目滿意程度達計上邊緣相關，表 29 加入調整不同國中之變項，也僅有對課業滿意度達統計上有意義相關。

表 30 是在假設藥物濫用是終身盛行率情況下各危險因子對於藥物濫用單

變項估計結果其統計上達有意義相關因子包括對課業滿意程度，課業補習及力程度，交往朋友有破壞行為，交往朋友有違警行為及交往朋友狀況調整性別後仍有相之結果(表 31)。表 32 是多變項分析果除了性別之外，對引藥物濫用相關因子包括對課業滿意程度及對課業補習及力程度，交往朋友有違警行為。調整了國中別之後則僅有對課業滿意程度及交往朋友有違警行為達統計上顯意義(表 33)。

四、討論

本計畫是一追蹤性世代研究由國一，國二追蹤至國三探討其藥物濫用盛行狀況及其影響危險因子其重要發現如下：

1. 其盛行率若以 DSM-Ⅳ做為診斷依據分別為 0.93%(95%CI:0.36%-1.51%)，1.53%（0.95%CI：0.71%-2.27%）及 3.56%(95%CI：2.22%-4.91%)，若以 ICD-10 為依據則為 0.84%(95%CI：0.29%-1.39%)，3.64%(95%CI：2.22%-5.07%)，4.52%(3.01%-6.03%)。
2. 藥物濫用自然病史探討（正常→第一階段陽性→藥物濫用）本研究首次利用馬可夫鏈探討由正常→第一段陽性→藥物濫用自然病史轉移，其中考慮陽性→正常之情況下若使用世代追蹤資料則約 30%是第一階段陽性個案而陽性個案中僅 4%會進展至藥物濫用其餘 96%維持返回正常，若用 Panel data 來看則 6%會進展至藥物濫用其餘 94%會返回正常。

由 GEE 發現對課業期望可能是相當重要影響因子，因此，利用馬可夫鏈歸模式探討其如何影響藥物濫用其結果發現在考慮陽性→正常情況下其第一階段陽性→藥物濫用，課業期望低是課業期望高的藥物濫用 3.29 倍(95%CI：1.10-9.81)統計上達顯著意義。

如果以進展速率來看，對課業期望高者其第一階段陽性變成藥物濫用為 2%，而對課業期望低者其速率為 7%。

由 GEE 結果可以得知在考藥物濫用為終身盛行定義之下，對課業滿意度、課業補習及努力程度、交往朋友有違警行為因素具有統計上顯著相關，而若不考慮藥物濫用為終身盛行定義下，其和藥物濫用具有相關因子僅有課業滿意程度。

由上述可知課業滿意程度無論在定義為終身盛行率或不是終身盛行情況皆是有意義危險因子，此顯示課業滿意程度可能是引起藥物濫用之前身，若以課業滿意程度做為依變項，其他因子做為自變項得表 34，發現父母對課業期望、學校因素中小學(國一)時孤立不安、對小學(國一)其他科目滿意程度、交往朋友有破壞行為及與同學朋友相處情形，具統計上顯著意義，再根據一系列模式選擇，因此我們提出下列引起藥物濫用模式，但這個模式之合理性必須經過因徑分析(Path analysis)來確定，在未來研究應針對此方向繼續發展。

在利用馬可夫鏈模式探討自然病史，我們允許陽性返回正常不但可以真正模式返回正常之機率，也可以克服因為測量誤差(measurement error)，由於這兩種可能發生的情況互為高度相關，若單獨分開估計恐怕會造成共線性問題。

國一至國三 Panel 資料(Panel data)，本研究除上述世代追蹤資料另針對國一接受第二階段確定個案(N=477)，至國三再施予第一階段陽性篩檢及第二階段確定診斷，這樣資料因為是針對同一個人做兩次不同時間測量形成一個 Panel 資料，這個 Panel 資料更可以讓我們檢視篩檢工具正確性，而且其因果關係也相當準確，因為不管第一階段篩檢及第二階段確診皆針對同一個人實施二次，有關 Panel data 所得到第一階段陽性→藥物濫用之轉移速率為 8%，較世代追蹤來得高，主要是因為 Panel data 所有第一次陽性者至國三皆接受第二階段確診，所以所得到藥物濫用盛行率較高(見圖 5)。

模式診斷(Model diagnosis)

表 35 至表 39 列出所有模式期望值與觀察值適合度檢定(goodness-of-fit)，由於檢定結果皆不具統計相關，表示馬可夫鏈模式應相當適合。

五、結論

本計畫利用國一新生世代追蹤至國三發現盛行率逐漸升高，馬可夫鏈模式發現其第一階段篩檢為陽性者其變成藥物濫用約為 5%，GEE 模式及馬可夫鏈模式分析發現課業滿意程度可能是引起藥物濫用前身，因此提出一個可能引起藥物濫用之模式，在將來研究中應針此模式再做確定以提供青少年藥物濫用預防之參考。

六、參考文獻

Anasagast, JL. and Denia, M.: Opiate addicts and their perceived parental rearing. Acta Psychiatr Scand 1988, 78: 121-126.

Arjungi, K.N.: Areca nut; A review. Arzneimittelforschung, 1976, 26: 951-956.

Baumrind, D.: The influence of parenting style on adolescent competence and substance use. Journal of Early Adolescence. 1991, 11(1): 56-95.

Bernardi E., Jones M., Tennant C.: Quality of parenting in alcoholics and narcotic addicts. Br J Psychiatry, 1987, 154: 677- 682.

Boyle, M.H., and Offord, D.R.: Psychiatric disorder and substance use in adolescence. Canadian Journal of Psychiatry. 1991, 36, 699-705.

Boyle, M.H., Offord, D.R. et al.: Evaluation of the original Ontario Child Health Study Scales. Canadian Journal of Psychiatry. 1993, 38, 397-405.

Boyle, P., Macfarlane, G.J., Maisonneuve, P., Zheng, T., Scully, C., and Tedesco, B.: Epidemiology of mouth cancer in 1989: A review. J. R. Soc. Med. 1990, 83(11): 724-30.

Brown, J., Kranzler, H.R., & Boca, F.K. Self-reports by alcohol and drug abuse inpatients: factors affecting reliability and validity. Br. J. Addict. 1992, 87, 1013-1024.

Bukstein, O.g., Brent, d.A. & Kaminer, Y.: Comorbidity of substacne abuse and other psychiatric disorders in adolescents. American Journal of Psychiatry, 146, 1131-1141.

Cadoret, r.J., Troughton, E., O'Gorman, T.W. et al.: An adoption study of genetic and environmental factors in drug abuse. Archives of General Psychiatry. 1986, 43, 1131-36.

Chan K.W, Chong M.Y & Cheng T. A.: Prevalence of Substance Abuse Among High School Children in Taiwan. (Paper Submitted for Publication). 1996.

Chong, M.Y, Chan K.W & Cheng T.A: Psychiatric Comorbidity Among Adolescence Substance Abuses. Paper Presented At the VII Congress of the International Federation of Psychiatric Epidemiology. Santiago de Compostela , 29 Aug-1 Sep , 1996 : Spain

Chiang CL. An introduction to stochastic processes and their applications. Wiley New York. 1980

Cloninger, C.R.: Genetic and environmental factors in the develpment of alcoholism. Journal of Psychiatric Treatment and Evaluation. 1983, 5, 487-496.

Cox DR and H.D. Miller. The theory of stochastic process. Wiley New York. 1965

Diggle PJ, Liang KY, Zeger SL. Analysis of longitoclinal data. Oxford Press. 1994

Fleiss, J.L., and Cuzick, J.: The reliability of dichotomous judgements: unequal numbers of judges per subject. Appl. Psychol. Measurement, 1979, 3: 357-367.

Glynn, T.J.: From family to peer: A review of transitions influence among drug-using youth. 1981, Journal of Youth and Adolescence. vol. 10, 5, pp 363-381.

Gupta, P.C.: Betel quid and oral cancer: prospects for prevention. IARC-Sci-Publ. 1991(105): 466-70.

Howden, G.F.: The carcigenic effect of betel nut chewing. P. N. G. Med. J. 1984, 27(3-4): 123-31.

Huba, G.J., and Bentler, P.M.: The role of peer and adult models for drug taking at different stages in adolescence. 1980, J of Youth and Adolescence. Vol 9, No. 5. pp 449-465.

JHHS facts 1988, Insurance Institute for Highway Safety, Washionington D.C.

John D., Hundleby, G., Mercer, W.: Family and friends as social environments and their relationship to young adolescents' use of alcohol, tobacco, and marijuana. 1987, Journal of Marriage and the Family 49: 151-164.

Kandel, d.B.: Processes of adolescent socialization by parents and peers. International Journal of the Addictions. 1987, 22(4): 319-342.

Kokkevi, A. and Stefanis, C.: The epidemiology of licit and illicit substance use among high school students in Greece. American Journal of Public Health. 1991, Vol. 81, No. 1. 48-52.

Liang KY and Zeger SL. Longitudinal data analysis using generalised linear models. Biometrika 1986; 73: 113-22.

Lillie-Blanton, M., Anthony, J.C., and Schuster, C.R.: Probing the Meaning of Racial/Ethnic Group Comparisons in Crack Cocaine Smoking. JAMA, 1993. Vol 269, No. 8. pp 993-997.

Loehlin JC. Latent variable models: An introduction to factor, path and structural analysis. New Jersey: Eilbaum Associates.

Marissa, A.M., & Kozel, N.J.: Methamphetamine abuse: Epidemiologic issues and implicaitons. NIDA Research Monograph 115, 1991. USHHS, Washington, DC.

McBride, W.J., Murphy, J.M., and Lumeng, L.: Serotonin, dopamine, and GABA involvement in alcohol drinking of selectively bred rats. Alcohol. 1990, 7, 199-205.

Meller, WH, Rinehart, R., Cadoret, R.J., Troughton E: specific familial transmission in substance abuse. Int J Addict 1988, 23:1029-1040.

Meltzer, L.T., and Rosecrans, J.A.: Tolerance to the disruptive effects of arecoline on schedule-controlled behavior. Psychopharmacology, 77, 85-93.

Morgan TM, Aneshensel CS, Clark UA. Parameter estimation for Mover-Stayer Models: analyzing depression over time. Social Methods & Research 1983; 11: 345-366.

Newcomb, M.d., Maddahian, E., Skager, R., et al.: Substance abuse and psychosocial risk factors among teenagers: Associations with sex, age, ethnicity, and type of school. American Journal of Drug and Alcohol Abuse. 1987, 13(4): 413-433.

Oakley, R., Ksir, C.: Drugs, Society and Human Behavior. Time Mirror/Mosby College Publishing. 1992, Fifth Edition.

Puig-Antich, J., Chambers, W. : The Schedule for Affective Disorders and Schizophrenia for School -age Children (Kiddie-SADS). New York: New York State Psychiatric Institute, 1978.

Sarvela, P.D., and McClendon, E.J.: Indicators of rural youth drug use. 1988, Journal of Youth and Adolescence. Vol. 17, No. 4. pp 335-347.

The ICD-10 Classification of Mental and Behavioural Disorders- Clinical Descriptions and Diagnostic Guidelines. World Health Organizations, Geneva, 1993.

Thomas, B.S.: Patterns of alcohol and other drug use in an Iowa community. J of School Health.1992, Vol. 62, no. 10. 454-458.

鄭泰安：青少年藥物濫用之流行病學研究（一）。行政院衛生署 84 年度委託研究計畫報告書。

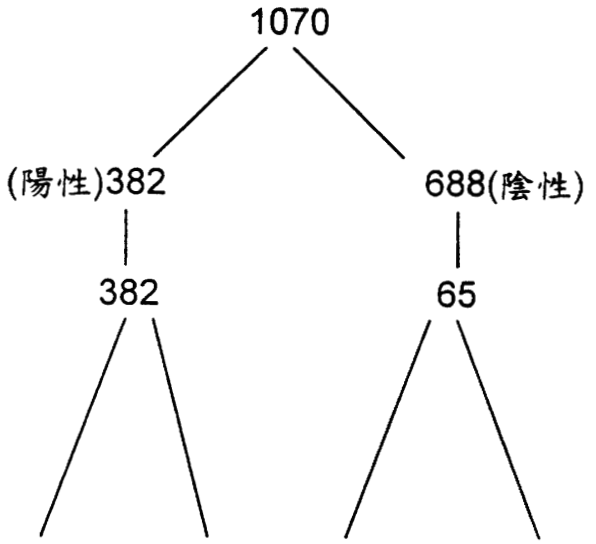
鄭泰安：青少年藥物濫用之流行病學研究（二）。 行政院衛生署 85 年度委託研究計畫報告書。

顏正芳、張明永、鄭泰安、陳建煒、洪嘉雯：青少年藥物使用之世代追蹤研究：第一年世代之建立。中華民國精神醫學會 85 年度年會兼學術研討會：Nov 23-24,1996：台中。

顏正芳、張明永、鄭泰安、陳建煒、洪嘉雯：青少年藥物使用之危險因子分析。中華民國精神醫學會 85 年度年會兼學術研討會：Nov 23-24,1996：台中。

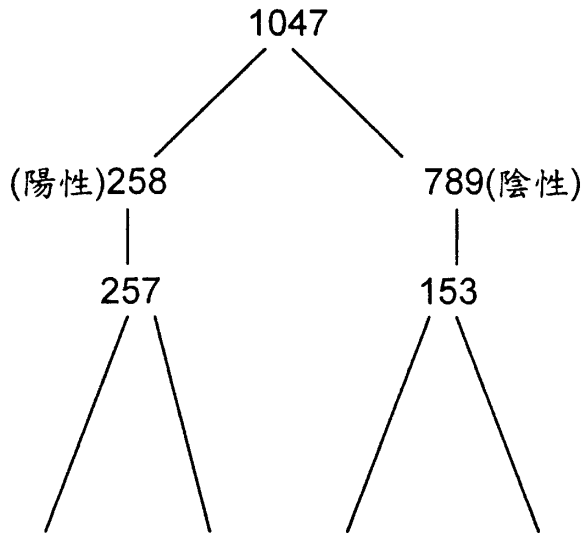
七、表格

圖 1　國一青少年藥物濫用兩階段篩檢其描述性結果



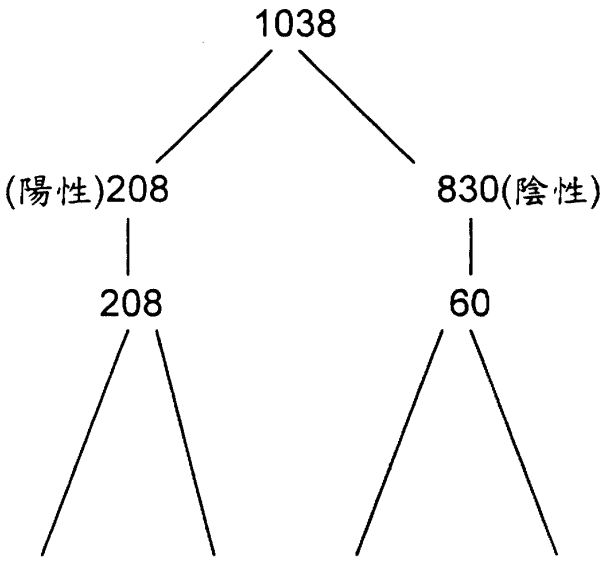
藥物濫用				
DSM IV	10	372	0	65
ICD-10	9	373	0	65
comorbidity				
DSM IV	70	312	1	64
ICD-10	68	314	2	63

圖 2　國二青少年藥物濫用兩階段篩檢其描述性結果



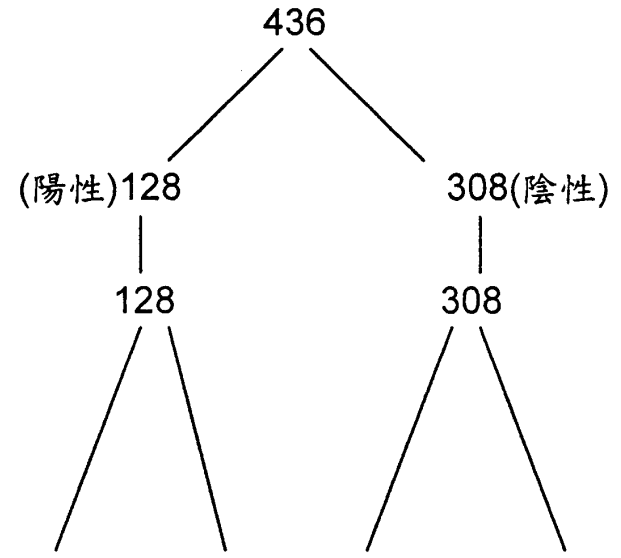
藥物濫用				
DSM IV	16	242	0	153
ICD-10	33	225	1	152
comorbidity				
DSM IV	69	189	15	138
ICD-10	52	206	10	143

圖 3　國三青少年藥物濫用兩階段篩檢其描述性結果(第一階段)



藥物濫用				
DSM IV	26	181	0	60
ICD-10	33	175	0	60
comorbidity				
DSM IV	49	160	0	60
ICD-10	47	161	0	60

圖 4　國三青少年藥物濫用兩階段篩檢其描述性結果(第二階段)



藥物濫用				
DSM IV	21	107	12	296
ICD-10	25	103	16	291
comorbidity				
DSM IV	35	93	21	286
ICD-10	33	95	24	283

圖 5

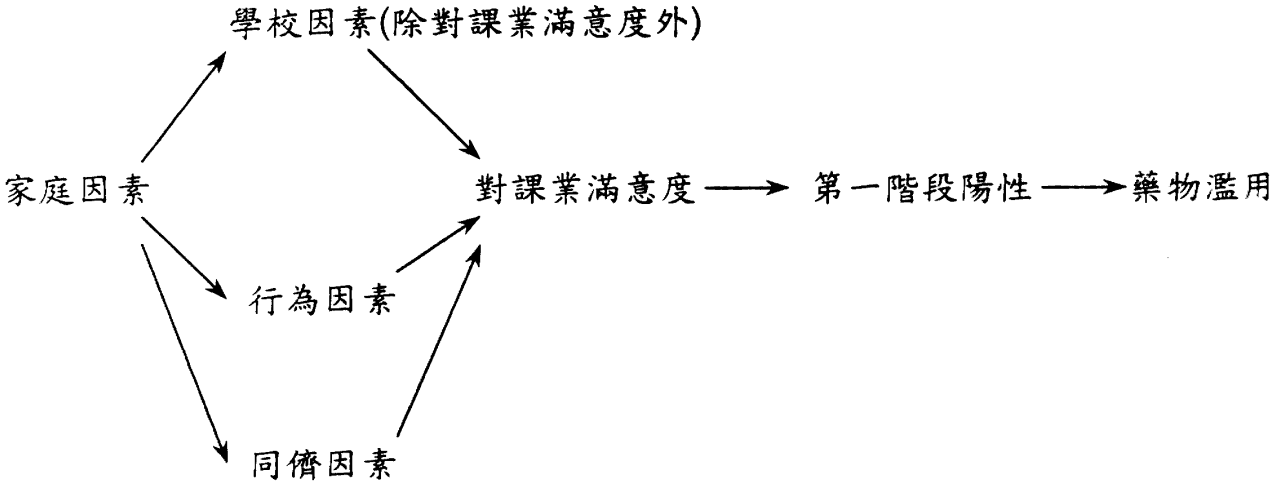


表 1(a)　國中生二階段藥物濫用篩檢其終身盛行率與發生率之估計

	國一	國二	國三
1. 接受調查起始人數	1070	1047	1038*
2. 第一階段篩檢			
(1) 陽性	382 (35.7%)	258 (24.6%)	208
(2) 陰性	688 (64.3%)	789 (75.4%)	522
接受第二階段(K-SADS)確診	65	153	60
3. 第二階段 K-SADS 之確定診斷			
(1) 第一階段篩檢陽性藥物濫用者			
DSM-IV	10	16	26
ICD-10	9	33	33
(2) 第一階段篩檢陰性藥物濫用者			
DSM-IV	0	0	0
ICD-10	0	1	0
4. 藥物濫用盛行率			
DSM-IV	0.93% (0.36%-1.51%)	1.53% (0.79%-2.27%)	3.56% (2.22%-4.91%)
ICD-10	0.84% (0.29%-1.39%)	3.64% (2.22%-5.07%)	4.52% (3.01%-6.03%)

* 扣除 308 個人是屬於國一進入第二階段篩檢(447 人)，而至國三經第一階段再篩檢後為陰性，因並非屬於隨機抽樣，故於計算盛行率時將其去除，其有關 447 人於國三之篩檢流程見圖 4

表 1(b)

第一階段為陽性者：

		國三 藥物濫用	國三 非藥物濫用	合計
國一	藥物濫用	6	1	7
國一	非藥物濫用	15	106	121
	合計	21	107	128

Kappa=0.378, P=0.001

第一階段為陰性者：

		國三 藥物濫用	國三 非藥物濫用	合計
國一	藥物濫用	3	0	3
國一	非藥物濫用	8	296	304
	合計	11	296	307

Kappa=0.420, P=0.005

表 2　國一家庭因素相關變項之因素分析負荷(Factor loading)

	零用錢	父母親間感情	家庭凝聚力
零用錢			
進國中前零用錢	0.76088	-0.04883	0.08399
現在零用錢	0.85056	0.07801	0.01492
使用多少零用錢	0.82351	0.08809	-0.07497
父母親間感情			
和父親相處情況	0.04562	0.77292	0.21301
父母感情好不好	0.03277	0.85490	-0.11779
家庭凝聚力			
和兄弟姊妹相處情況	0.00836	0.08950	0.83827
為何不太好	0.02679	-0.00354	0.77464

表 3　國一學校因素相關變項之因素分析負荷(Factor loading)

	課業關心程度	課後智育科目補習	課後才藝科目補習	與小學老師互動程度	在學校的個性	在學校的偏差行為	課後技能科目補習	對學校成績滿意度
課業關心程度								
希望自己學歷	**0.65096**	0.18259	0.07827	-0.1188	0.09010	-0.12027	-0.00962	-0.19497
喜歡上學	**0.56040**	0.05035	-0.01684	0.31321	-0.13374	0.07076	-0.01415	0.22981
小學畢業成績	**0.66940**	0.00958	0.05117	0.19536	0.01129	-0.17619	0.12883	0.01034
上課專心	**0.58144**	0.00649	0.12520	0.21204	-0.06412	-0.29370	0.02715	0.01501
發揮能力	**0.58146**	0.19754	0.06318	-0.02532	-0.05200	0.09854	-0.18475	0.24959
課後智育科目補習								
花多少時間做功課	0.21530	**0.60322**	0.12533	0.04254	0.12672	-0.22675	0.07782	0.08900
補英文	0.08634	**0.64318**	0.11251	0.03119	-0.063938	-0.10636	-0.15755	-0.03500
補學業科目	0.01726	**0.69556**	-0.03977	0.16576	0.01242	-0.03343	0.02555	-0.03200
補智育科目(小時/週)	0.00422	**0.84931**	-0.03115	-0.03042	-0.01824	0.09846	0.19377	0.05292
課後才藝科目補習								
補音樂	0.14430	0.02142	**0.71477**	0.06288	0.02608	-0.08166	-0.00478	0.03886
補美術	0.00543	0.05022	**0.67287**	-0.04299	-0.02585	-0.00134	0.21926	-0.02388
補其他才藝(小時/週)	0.06314	0.01099	**0.82853**	-0.06476	0.03391	-0.00182	0.04216	0.06223
與小學老師互動程度								
與小學老師相處	0.13672	0.12064	0.01250	**0.72560**	-0.10181	-0.09338	-0.08257	0.09548
有困難會找老師幫助	0.02990	0.10758	-0.04139	**0.78368**	0.07148	-0.04936	-0.05350	-0.01902
在小學的個性								
被孤立	-0.00343	0.02953	-0.15101	-0.06208	**0.60729**	-0.07486	0.00866	-0.01463
犯錯被批評會生氣	-0.15920	0.01884	0.00930	0.06101	**0.66299**	0.04345	-0.04076	-0.09423
引人注意	0.26095	-0.06299	0.07172	-0.13412	**0.60902**	0.16498	0.00924	0.04953
因遵守規而不安煩躁	-0.12710	0.00767	0.12522	0.00921	**0.50535**	0.31392	-0.11594	0.14791
在學校的偏差行為								
打架	-0.26886	0.00394	-0.07587	-0.15737	-0.02025	**0.63062**	0.03086	-0.06783
破壞物品	-0.09045	-0.19689	0.12983	-0.00639	0.16552	**0.52418**	-0.04054	-0.14122
課後技能科目補習								
補珠心算	0.11444	0.14252	-0.00901	-0.08116	0.00324	0.21446	**0.51822**	-0.03583
補電腦	-0.02229	0.11616	0.05282	-0.02057	-0.04643	-0.03661	**0.76189**	-0.01279
補速讀	-0.05704	-0.05566	0.17647	-0.05972	-0.03125	-0.07573	**0.76026**	0.05494
對學校成績滿意度								
對小學其他科表現滿意度	0.09197	0.10131	0.00841	0.26984	-0.11302	-0.05053	0.03794	**0.71869**
導師對其他科目	0.05219	-0.07084	0.04694	-0.11324	0.08721	-0.13215	0.00289	**0.75868**

表 4　國一同儕因素相關變項之因素分析負荷(Factor loading)

	男/女朋友	同學相處	同學相處時間	朋友年齡
男/女朋友				
單獨和男生/女生出去	0.77346	0.02264	-0.02753	0.15185
有男/女朋友	0.71342	0.01723	0.00700	0.03907
同學相處				
和同學相處	0.08209	-0.73228	0.01640	0.21963
被同學欺負	0.07634	0.68586	-0.11887	0.03787
喜歡跟朋友來往	-0.00059	0.59057	0.07446	0.22450
同學相處時間				
小六時,和朋友出去玩一個月有幾個	0.18854	-0.07470	0.56989	-0.21869
小六時,花多少時間和朋友在一起	-0.08432	0.10052	0.51873	0.26009
朋友年齡				
朋友年齡多大	0.14788	0.00575	0.06557	0.82689

表 5 國一行為因素相關變項之因素分析負荷(Factor loading)

	小六朋友偏差行為	空閒活動	小學朋友規矩行為	閒時自己一人	閒時覺得無聊	閒時參加才藝活動
小六朋友偏差行為						
服裝儀容不整說髒話	0.50461	-0.07171	-0.43512	0.19873	0.11672	-0.00187
威脅恐嚇勒索	0.78850	0.01589	0.03608	-0.02945	-0.07749	-0.04973
不按時交作業	0.60510	0.02196	-0.33189	0.16769	-0.01860	-0.03062
破壞公物打架	0.66474	0.03222	-0.29359	0.16640	-0.03065	0.02838
休學	0.88334	0.05429	0.10925	-0.04248	0.04728	-0.01580
離家出走	0.88499	0.07334	0.15257	-0.02458	0.03742	0.03327
曠課	0.78642	-0.00415	-0.07319	0.03506	0.04139	0.05869
參加幫派	0.85015	0.03618	0.13966	0.00070	0.05586	0.04161
違警行為	0.86874	0.04935	0.15419	-0.02470	0.05839	-0.04232
空閒活動						
空閒時逛書局	0.04094	0.98228	0.07879	-0.00917	-0.00535	-0.02091
空閒時在家裡	0.05425	0.98712	0.04619	-0.00991	-0.01281	-0.02691
空閒時在圖書館	0.04747	0.98957	0.06213	-0.01601	-0.01437	-0.01991
空閒時在學校	0.04637	0.98371	0.04340	-0.01620	0.00175	-0.01900
小學朋友規矩行為						
都用功讀書	0.12295	0.11009	0.78290	-0.01562	0.03822	0.04524
都守規則	0.06590	0.06979	0.80853	-0.00838	-0.09918	-0.00360
閒時自己一人						
自己一人在外閒逛	0.03581	-0.14878	-0.10004	0.66844	-0.03158	-0.01616
對事對活動不感興趣	0.07738	0.11324	-0.04960	0.50078	0.31281	0.05222
花很多時間做白日夢	-0.02592	0.00490	0.03593	0.64168	0.17496	0.03564
閒時覺得無聊						
覺得無聊	0.07871	0.02672	-0.10890	0.28907	0.71669	-0.03252
不喜歡/無法自己玩	0.03275	-0.06093	0.01891	-0.04165	0.78058	-0.00399
閒時參加才藝活動						
玩樂器	-0.00041	0.03039	-0.07390	-0.04104	0.03372	0.59173
才藝班，社團	-0.00261	-0.01702	-0.01564	0.04376	0.00124	0.65772
做家事，打工	0.02775	-0.07319	0.10004	-0.02301	-0.05029	0.68764

表 6　國二家庭因素相關變項之因素分析負荷(Factor loading)

	家庭凝聚力	兄弟姊妹凝聚力	零用錢	父母對小學成績滿意度
家庭凝聚力				
和父親相處情況	0.76941	0.06437	0.22580	0.06127
父母親感情好不好	0.80666	-0.05493	-0.04267	0.05444
兄弟姊妹凝聚力				
和兄弟姊妹相處情況	0.14984	0.79366	-0.08227	0.04687
不好的原因為何	-0.01474	0.82792	0.15216	0.02442
零用錢				
每個月有多少零用錢	0.01013	0.22388	-0.67425	0.15683
有無出外賺零用錢	-0.03024	0.20172	0.57913	0.10061
父母對小學成績滿意度				
父母對小學學校成績滿意度	-0.11897	0.11104	0.20932	0.77161
父母對小學其他科目滿意度	0.07184	-0.01969	-0.20447	0.78650

表 7　國二學校因素相關變項之因素分析負荷(Factor loading)

	課後補習	課業努力	學校偏差行為	導師對成績滿意度	在學校的負向個性	與小學老師互動	對小學成績滿意度
課後補習							
補學業科目	0.69750	0.10171	-0.01596	0.04831	0.00269	0.01826	-0.02655
補英語會話	0.94654	-0.03070	-0.01273	0.00566	-0.02857	0.01905	-0.03013
補珠心算	0.99217	-0.04622	-0.01273	-0.00160	-0.01830	0.00279	-0.01786
補電腦	0.97479	-0.04039	0.00545	-0.01841	-0.00712	-0.00525	0.00679
補作文	0.97422	-0.03091	-0.01952	-0.00730	-0.02459	0.00841	-0.00485
補速讀	0.99443	-0.04539	-0.00718	-0.00634	-0.01313	-0.00353	-0.00519
補音樂	0.95213	-0.00603	-0.02085	0.01518	-0.01857	0.00035	-0.00049
補體育	0.99443	-0.04539	-0.00718	-0.00634	-0.01313	-0.00353	-0.00519
補美術	0.97236	-0.02596	-0.01351	-0.01044	-0.02883	0.00032	0.01908
補下棋	0.99443	-0.04539	-0.00718	-0.00634	-0.01313	-0.00353	-0.00519
補其他	0.97032	-0.01381	-0.00110	-0.01833	-0.02572	-0.01398	-0.00380
補智育科每週幾小時	0.72294	0.04145	-0.03009	0.02988	-0.02804	0.01815	0.04869
補其他才藝每週幾小時	0.95251	-0.06335	-0.01391	-0.00109	-0.04434	0.01024	0.02444
課業努力							
對自己小學成績滿意度	0.01034	0.58684	0.28819	0.21686	-0.10033	0.00189	0.11915
小學畢業成績	-0.05567	0.64278	-0.15806	0.20686	0.19097	-0.01965	-0.10691
上課專心	0.01186	0.69107	-0.27270	-0.06677	-0.13278	0.11129	-0.02603
發揮能力	-0.10791	0.57469	-0.11785	-0.00454	-0.09256	0.13076	0.00034
學校偏差行為							
製造噪音打擾人	-0.03205	-0.07805	0.73323	-0.00877	0.12802	-0.05407	-0.00922
打架	-0.04217	-0.26403	0.70845	-0.01926	-0.02266	-0.06404	-0.08951
破壞物品	-0.01345	-0.11194	057422	-0.14214	0.04437	-0.17041	0.19774
導師對成績滿意度							
導師對學校成績滿意度	0.00365	0.08834	-0.00998	0.83586	-0.04653	0.04719	-0.04433
導師對其他科目	-0.02046	-0.04788	-0.07730	0.82927	-0.11419	-0.03291	0.09298
在學校的負向個性							
犯錯被批評會生氣	-0.04944	0.02227	0.05189	-0.16702	0.62898	-0.18711	0.05329
半途而廢	-0.06237	-0.27597	-0.06734	0.00856	0.56488	-0.09533	-0.06050
因遵守規定而不安煩躁	-0.01996	0.24032	0.12863	0.07252	0.38539	-0.03313	0.41305
與小學老師互動							
與小學老師相處	0.05644	0.05747	-0.18941	-0.01977	-0.11224	0.70749	0.14415
有困難時會找老師幫助	-0.03793	0.15876	-0.04231	0.03282	0.01233	0.76301	0.00277
對小學成績滿意度							
對小學其他科表現滿意度	-0.01363	-0.15273	0.00029	0.00660	-0.00752	0.04598	0.77789
小學畢業成績	0.02339	0.38953	-0.04327	0.03995	-0.22288	0.26042	0.53696
引人注意	-0.01996	0.24032	0.12863	0.07252	0.38539	-0.03313	0.41305

表 8　國二同儕因素相關變項之因素分析負荷(Factor loading)

	同學相處	同儕朋友	朋友種類及相處時間
同學相處			
被同學欺負	0.57550	0.20159	-0.21871
喜歡跟朋友來往	0.73405	-0.01831	-0.02790
同儕朋友			
有麻煩但仍跟著同學做	0.09226	0.45530	0.12644
小六時，和朋友出去玩一個月有幾個	-0.28881	0.42434	0.37171
單獨和男生/女生出去	0.08350	0.73295	0.13186
朋友種類及相處時間			
朋友年齡	-0.08854	0.01792	0.66254
小六時一起玩的朋友	0.33942	0.13899	0.55696
小六時，花多少時間和朋友在一起	-0.02692	0.12049	0.61942

表 9　國二行為因素相關變項之因素分析負荷(Factor loading)

	空閒活動	朋友課業偏差行為	朋友偏差行為	閒時對活動不感興趣	閒時覺得無聊	閒時看電視	閒時參加才藝活動	閒時看書、玩樂器
空閒活動								
閒時逛書店	0.98144	-0.07107	-0.02192	0.01382	-0.00422	0.01120	-0.00769	0.03816
閒時待在家裡	0.98642	-0.04182	-0.02447	0.01086	-0.01504	0.00191	0.00483	0.00707
閒時在圖書館	0.99270	-0.03731	-0.01840	0.01971	-0.01817	0.00020	0.00411	0.00578
閒時在學校	0.98915	-0.03993	-0.01760	0.02421	-0.02278	0.00431	0.00905	-0.01285
朋友課業偏差行為								
朋友服裝儀容不整說髒話	-0.09073	0.72472	0.07746	0.01037	0.15502	0.00734	0.01097	-0.01631
不按時交作業	-0.06357	0.63245	0.17807	0.02325	-0.00207	0.10046	0.13324	-0.02171
破壞公物打架	-0.05016	0.50116	0.45994	-0.03099	0.01523	-0.09188	0.13752	-0.04565
曠課	-0.02791	0.56955	0.51370	-0.01542	0.05789	0.02070	0.04731	-0.06541
朋友偏差行為								
威脅恐嚇勒索	0.00011	0.15064	0.59308	0.09337	-0.08748	0.05721	0.10069	0.03691
休學	-0.04074	0.18332	0.70376	0.10662	0.07504	-0.11060	-0.03301	-0.14987
離家出走	-0.05013	0.15873	0.73902	0.01387	0.00711	-0.05289	-0.06503	-0.05313
參加幫派	0.03136	0.02874	0.58038	0.09180	-0.17029	-0.02228	-0.01321	0.15762
違警行為	0.02180	0.35671	0.46098	0.01796	0.11694	-0.01989	-0.00939	0.00715
閒時對活動不感興趣								
自己一人在外閒逛	-0.02630	0.13407	0.06156	0.63210	0.11047	-0.12026	0.14698	0.01655
對事對活動不感興趣	0.04932	0.06801	0.02909	0.70934	0.11041	-0.07198	0.05084	-0.00889
花很多間做白日夢	0.02847	0.04025	0.11680	0.63004	0.08886	0.26317	-0.20621	0.00476
閒時覺得無聊								
覺得無聊	-0.01964	0.06328	0.02479	0.25038	0.69485	0.05645	-0.01574	0.05285
不喜歡/無法自己玩	-0.02199	0.03944	-0.06251	0.11891	0.75718	0.04518	-0.06123	0.02296
閒時看電視								
閒時看電視	0.03400	-0.03724	-0.13023	0.00334	0.14684	0.75191	0.01353	0.04544
閒時參加才藝活動								
才藝班、社團	-0.06343	-0.27035	0.11709	-0.11448	0.20080	0.02953	0.45117	-0.16001
做家事、打	0.02443	-0.07223	0.27750	-0.17894	0.22618	0.13680	0.44529	-0.11038
閒時看書、玩樂器								
看書	0.04836	-0.20110	-0.03743	0.06853	0.03772	-0.01027	0.03341	0.73125
玩樂器	-0.00239	-0.05188	-0.02727	-0.03965	0.12260	-0.56670	-0.16959	0.46239

表 10 國三家庭因素相關變項之因素分析負荷(Factor loading)

	家庭凝聚力	期望教育程度
家庭凝聚力		
喜歡與家人在一起	0.51614	-0.02162
你的父母喜歡你嗎	0.51536	-0.11140
期望教育程度		
父母希望你可以讀到	-0.13605	0.79983

表 11 國三學校因素相關變項之因素分析負荷(Factor loading)

	課後補習	學校行為偏差	上課專心	補作文及音樂	個性內向	補英語及體育	導師對成績滿意度	與老師互動
課後補習								
國二有無補習	0.78605	-0.03113	-0.00895	-0.00655	-0.01670	0.04419	0.00901	-0.00130
國二有無補學業科目	0.78991	-0.04475	0.12305	0.01778	-0.05709	0.00633	0.01120	0.14138
補智育科每週時數	0.93393	-0.08478	0.09849	0.04346	-0.00629	0.01648	0.02862	0.01244
學校行為偏差								
製造噪音打擾人	-0.02507	0.52415	-0.05516	0.18327	-0.12822	-0.10115	-0.09941	-0.37874
打架	-0.09703	0.74842	-0.18096	-0.01884	0.11576	-0.02849	-0.00919	-0.10110
破壞物品	-0.06910	0.78035	0.08882	0.04032	0.14557	0.00946	0.01368	-0.03846
上課專心								
上課專心	0.20537	-0.13249	0.67629	0.06360	0.04707	0.07416	0.04902	0.35542
發揮能力	0.07271	-0.00658	0.74485	0.07221	-0.17468	0.05855	-0.11854	-0.07304
補作文及音樂								
國二有無補作文	-0.02455	0.13501	0.04121	0.77566	-0.11287	0.03298	-0.03659	0.09596
國二有無補樂	0.08824	-0.03551	0.08830	0.80649	0.08116	0.14054	0.00159	0.02608
個性內向								
內向害羞	-0.15717	0.01320	-0.17359	0.08866	0.59602	-0.04578	-0.15911	0.01630
被孤立	0.06892	0.21567	-0.02393	-0.11488	0.63008	-0.03479	-0.02273	-0.06772
補英語及體育								
國二有無補英語會話	0.00136	-0.13382	-0.03384	0.21776	0.32356	0.57981	0.06744	-0.01140
國二有無補體育	0.07198	0.07625	0.04377	-0.18562	-0.27388	0.62073	-0.12564	0.04262
國二有無補其他才藝時數	0.01571	-0.04191	0.07422	0.17747	-0.04419	0.81848	0.04140	-0.04101
導師對成績滿意度								
導師對學校成績滿意度	-0.03743	0.01562	-0.11361	0.00126	-0.21518	-0.04608	0.80362	0.04791
導師對其他科目滿意度	0.08311	-0.05258	0.05853	-0.03057	0.09025	0.03930	0.76678	-0.05229
與老師互動								
與國二老師相處情形	0.08012	-0.20976	0.01514	0.14923	-0.06705	-0.06440	-0.07800	0.66303

表 12　國三同儕因素相關變項之因素分析負荷(Factor loading)

	朋友相處時間	男/女朋友	同學及朋友相處
朋友相處時間			
國二時花多少時間和朋友在一起(一周幾天)	0.87615	0.07275	-0.11389
國二時花多少時間和朋友在一起(共幾小時)	0.87580	0.16052	-0.03625
男/女朋友			
單獨和男生/女生出去	0.16601	0.78150	0.01570
同學及朋友相處			
沒有興趣和同學相處	0.00701	-0.00969	0.77162

表 13　國三行為因素相關變項之因素分析負荷(Factor loading)

	朋友偏差行為	傷害別人行為	空閒時覺得無聊	娛樂場所	益智場合
朋友偏差行為					
來往朋友服裝儀容不整說髒話	0.70915	0.21243	0.07218	0.14855	-0.06183
來往朋友不按時交作業	0.52986	-0.02484	0.24251	0.05560	-0.05081
來往朋友破壞公物打架	0.50523	0.45816	0.10617	-0.01698	-0.09941
空閒時去撞球店	0.51302	0.02958	-0.14428	0.10587	-0.02624
傷害別人行為					
來往朋友威脅恐嚇勒索	0.20874	0.49176	0.03047	-0.07612	0.11787
來往朋友休學	0.28098	0.74545	0.09187	-0.00309	-0.05407
來往朋友離家出走	0.04284	0.75933	0.09470	0.12627	0.03052
來往朋友參加幫派	0.25316	0.54891	0.12454	-0.10224	0.00621
空閒時覺得無聊					
空閒時覺得無聊	0.00988	0.04490	0.62371	0.09318	-0.13540
不喜歡/無法自己玩	0.07570	0.01303	0.51993	0.20456	-0.14586
自己一人在外閒逛	0.10776	0.07897	0.41282	-0.00383	-0.03160
對事對活動不感興趣	0.21027	-0.05196	0.60970	-0.04821	0.17541
花很多間做白日夢	0.00485	0.18279	0.62339	0.05932	0.04554
破壞東西	0.19280	0.14791	0.53017	-0.13353	-0.01236
娛樂場所					
空閒時去逛街	-0.016327	0.11624	0.10006	0.48858	0.14762
空閒時去 MTV/KTV	0.19351	-0.01240	0.00712	0.65248	-0.03126
空閒時去學校，速食店	0.02621	-0.13612	0.10864	0.64706	0.24246
空閒時去保齡球場	0.21176	0.14389	-0.14346	0.58032	-0.14348
益智場合					
空閒時去書局	-0.15839	-0.06291	0.03008	0.13307	0.65360
空閒時去公園	0.01817	0.14573	-0.09824	-0.02753	0.57747
空閒時去圖書館	-0.06377	-0.03132	0.00961	0.05841	0.63070

表 14　國一世代(N=1070)，其經國二至國三藥物濫用狀態轉移

時間點	轉移狀況	人數
一、世代追蹤資料		
國一至國二	正常→正常	565
	正常→陽性	108
	正常→藥物濫用	1
	陽性→正常	221
	陽性→陽性	129
	陽性→藥物濫用	11
	藥物濫用→正常	1
	藥物濫用→陽性	5
	藥物濫用→藥物濫用	4
國二至國三(1038 人)	正常→正常	663
	正常→陽性	106
	正常→藥物濫用	6
	陽性→正常	143
	陽性→陽性	81
	陽性→藥物濫用	12
	藥物濫用→正常	2
	藥物濫用→陽性	4
	藥物濫用→藥物濫用	9
二、Panel data		
國一至國三(447 人)	正常→正常	53
	正常→陽性	10
	正常→藥物濫用	0
	陽性→正常	243
	陽性→陽性	96
	陽性→藥物濫用	15
	藥物濫用→正常	0
	藥物濫用→陽性	1
	藥物濫用→藥物濫用	6

表 15　國一、國二至國三(N=1038)追蹤世代藥物濫用轉移狀況

時間點	轉移狀況	人數
國一至國二國三(1038 人)	正常→正常→正常	487
	正常→正常→陽性	64
	正常→正常→藥物濫用	3
	正常→陽性→正常	82
	正常→陽性→陽性	21
	正常→陽性→藥物濫用	2
	正常→藥物濫用→正常	0
	正常→藥物濫用→陽性	0
	正常→藥物濫用→藥物濫用	1
	陽性→正常→正常	176
	陽性→正常→陽性	42
	陽性→正常→藥物濫用	2
	陽性→陽性→正常	61
	陽性→陽性→陽性	58
	陽性→陽性→藥物濫用	7
	陽性→藥物濫用→正常	2
	陽性→藥物濫用→陽性	2
	陽性→藥物濫用→藥物濫用	6
	藥物濫用→正常→正常	0
	藥物濫用→正常→陽性	0
	藥物濫用→正常→藥物濫用	1
	藥物濫用→陽性→正常	0
	藥物濫用→陽性→陽性	2
	藥物濫用→陽性→藥物濫用	3
	藥物濫用→藥物濫用→正常	0
	藥物濫用→藥物濫用→陽性	2
	藥物濫用→藥物濫用→藥物濫用	2

表 16　不考慮陽性→正常情況下，藥物濫用為終身盛行定義下之轉移模式、其對應人數及轉移機率

Transition type	Transition mode ($state$ i → state j, time)	Number	Transition Probability
正常→正常	(0→0,1)	663	$P_{00}(1)$
正常→第一階段陽性	(0→1,1)	106	$P_{01}(1)$
正常→藥物濫用	(0→2,1)	6	$p_{02}(1)$
第一階段陽性→第一階段陽性	(1→1,1)	81	$p_{11}(1)$
第一階段陽性→藥物濫用	(1→2,1)	12	$p_{12}(1)$

表 17　考慮陽性→正常情況下，藥物濫用為終身盛行定義下之轉移模式、其對應人數及轉移機率(國三 1038 人)

Transition type	Transition mode ($state$ i → state j, time)	Number	Transition Probability
正常→正常	(0→0,1)	1217	$P_{00}(1)$
正常→第一階段陽性	(0→1,1)	211	$P_{01}(1)$
正常→藥物濫用	(0→2,1)	6	$p_{02}(1)$
第一階段陽性→正常	(1→0,1)	363	$P_{10(1)}$
第一階段陽性→第一階段陽性	(1→1,1)	205	$p_{11}(1)$
第一階段陽性→藥物濫用	(1→2,1)	19	$p_{12}(1)$

表 18　考慮陽性→正常情況下，藥物濫用為終身盛行定義下之轉移模式、其對應人數及轉移機率(國三 447 人)

Transition type	Transition mode ($state$ i → state j, time)	Number	Transition Probability
正常→正常	(0→0,1)	276	$P_{00}(1)$
正常→第一階段陽性	(0→1,1)	58	$P_{01}(1)$
正常→藥物濫用	(0→2,1)	4	$p_{02}(1)$
第一階段陽性→正常	(1→0,1)	292	$P_{10(1)}$
第一階段陽性→第一階段陽性	(1→1,1)	182	$p_{11}(1)$
第一階段陽性→藥物濫用	(1→2,1)	25	$p_{12}(1)$

表 19　不考慮陽性→正常情況下，藥物濫用為終身盛行定義下，並加入學校因素中對課業期望因子二分下之轉移模式、其對應人數及轉移機率

Transition type	Transition mode (*state* i → state j, time)	Number	Transition Probability
對課業期望高			
正常→正常	(0→0,1)	664	$P_{00}(1)$
正常→第一階段陽性	(0→1,1)	88	$P_{01}(1)$
正常→藥物濫用	(0→2,1)	2	$P_{02}(1)$
第一階段陽性→第一階段陽性	(1→1,1)	68	$P_{11}(1)$
第一階段陽性→藥物濫用	(1→2,1)	2	$P_{12}(1)$
對課業期望低			
正常→正常	(0→0,1)	405	$P_{00}(1)'$
正常→第一階段陽性	(0→1,1)	102	$P_{01}(1)'$
正常→藥物濫用	(0→2,1)	2	$P_{02}(1)'$
第一階段陽性→第一階段陽性	(1→1,1)	114	$P_{11}(1)'$
第一階段陽性→藥物濫用	(1→2,1)	15	$P_{12}(1)'$

表 20　考慮陽性→正常情況下，藥物濫用為終身盛行定義下，並加入學校因素中對課業期望因子二分下之轉移模式、其對應人數及轉移機率(國三 1038 人)

Transition type	Transition mode (*state* i → state j, time)	Number	Transition Probability
對課業期望高			
正常→正常	(0→0,1)	664	$P_{00}(1)$
正常→第一階段陽性	(0→1,1)	88	$P_{01}(1)$
正常→藥物濫用	(0→2,1)	2	$P_{02}(1)$
第一階段陽性→正常	(1→0,1)	164	$P_{10}(1)$
第一階段陽性→第一階段陽性	(1→1,1)	68	$P_{11}(1)$
第一階段陽性→藥物濫用	(1→2,1)	2	$P_{12}(1)$
對課業期望低			
正常→正常	(0→0,1)	405	$P_{00}(1)'$
正常→第一階段陽性	(0→1,1)	102	$P_{01}(1)'$
正常→藥物濫用	(0→2,1)	2	$P_{02}(1)'$
第一階段陽性→正常	(1→0,1)	160	$P_{10}(1)'$
第一階段陽性→第一階段陽性	(1→1,1)	114	$P_{11}(1)'$
第一階段陽性→藥物濫用	(1→2,1)	15	$P_{12}(1)'$

表 21　利用非線性迴歸模式，在不考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式，估計結果

參　數	估計值	95%信賴區間	
		下限	上限
λ_1：正常→第一階段陽性	0.1669	0.1613	0.1725
λ_2：第一階段陽性→藥物濫用	0.0970	0.0688	0.1252

表 22　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式，估計結果(國三 1038 人)

	估計值	95%信賴區間	
		下限	上限
λ_1：正常→第一階段陽性	0.2917	0.2427	0.3408
λ_2：第一階段陽性→正常	1.2322	1.0663	1.3982
λ_3：第一階段陽性→藥物濫用	0.0521	0.0316	0.0726

表 23　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式，估計結果(國三 447 人)

	估計值	95%信賴區間	
		下限	上限
λ_1：正常→第一階段陽性	0.3558	0.2472	0.4645
λ_2：第一階段陽性→正常	1.1944	0.9956	1.3932
λ_3：第一階段陽性→藥物濫用	0.0811	0.0545	0.1177

表 24　利用非線性迴歸模式，在不考慮陽性→正常情況下，藥物濫用為終身盛行定義下，並加入學校因素中對課業期望因子二分下之三階段馬可夫鏈模式，估計結果

參　數	估計值	95%信賴區間	
		下限	上限
λ_1：正常→第一階段陽性	0.1267	0.1209	0.1325
λ_2：第一階段陽性→藥物濫用	0.0328	-0.0143	0.0799
K_1：第一階段陽性→藥物濫用之迴歸係數 (對課業期望低/對課業期望高)	0.6089	0.5473	0.6705
K_2：第一階段陽性→藥物濫用之迴歸係數 (對課業期望低/對課業期望高)	1.2282	-0.2268	2.6832

表 25　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下，並加入學校因素中對課業期望因子二分下之三階段馬可夫鏈模式，估計結果(國三 1038 人)

參　數	估計值	95%信賴區間	
		下限	上限
λ_1：正常→第一階段陽性	0.2250	0.1684	0.2817
λ_2：第一階段陽性→正常	1.2916	1.0335	1.5496
λ_3：第一階段陽性→藥物濫用	0.0215	0.0004	0.0426
K_1：第一階段陽性→藥物濫用之迴歸係數 (對課業期望低/對課業期望高)	0.6723	0.2971	1.0474
K_2：第一階段陽性→正常之迴歸係數 (對課業期望低/對課業期望高)	0.00001	-0.3046	0.3047
K_3：第一階段陽性→藥物濫用之迴歸係數 (對課業期望低/對課業期望高)	1.1909	0.0985	2.2834

表 26 假設藥物濫用為終身盛行定義之一般線性方程模式(GEE)單變項分析(自變項為前一年度各項因素分析變項)之估計結果

變項	估計值	95% 信賴區間		P 值
		下限	上限	
家庭因素				
與家人相處情形	-0.2750	-0.7202	0.1702	0.2261
零用錢	-0.3326	-0.9931	0.3280	0.3237
父母對課業期望	-0.4304	-0.7904	-0.0705	0.0191
學校因素				
對課業滿意度	-0.9241	-1.2498	-0.5985	0.0000
課業補習及努力程度	-0.3540	-0.7294	0.0214	0.0646
小學(國一)時孤立、不安	-0.1226	-0.5587	0.3134	0.5815
對小學(國一)其他科目滿意度	0.2262	-0.0700	0.5224	0.1345
小學(國一)時之破壞行為	0.5305	0.2720	0.7890	0.0001
行為因素				
交往朋友有破壞行為	0.5205	0.2354	0.8055	0.0003
交往朋友有違警行為	0.2440	0.0993	0.3887	0.0010
閒時喜歡自己一人閒逛或做白日夢	-0.1007	-0.5555	0.3541	0.6643
閒時喜歡看書、上圖書館或書局	0.0255	-0.2164	0.2674	0.8362
閒時易覺得無聊，不喜歡自己玩	0.1100	-0.2557	0.4757	0.5555
同儕因素				
交往朋友狀況	0.5044	0.2889	0.7199	0.0000
與同學朋友相處情形	0.2310	-0.1582	0.6203	0.2448

表 27　不假設藥物濫用為終身盛行定義之一般線性方程模式(GEE)單變項分析(自變項為前一年度各項因素分析變項)之估計結果(調整性別)

變項	估計值	95% 信賴區間		P 值
		下限	上限	
家庭因素				
與家人相處情形	-0.3322	-0.8843	0.2199	0.2382
零用錢	-0.2466	-0.8709	0.3777	0.4388
父母對課業期望	-0.3229	-0.6994	0.0335	0.0750
學校因素				
對課業滿意度	-0.8973	-1.2607	-0.5339	0.0000
課業補習及努力程度	-0.3183	-0.6759	0.0393	0.0810
小學(國一)時孤立、不安	-0.0076	-0.4509	0.4358	0.9734
對小學(國一)其他科目滿意度	0.3173	-0.0081	0.6428	0.0560
小學(國一)時之破壞行為	0.3052	-0.0204	0.6308	0.0662
行為因素				
交往朋友有破壞行為	0.4764	0.2018	0.7510	0.0007
交往朋友有違警行為	0.2110	0.0582	0.3639	0.0068
閒時喜歡自己一人閒逛或做白日夢	-0.0808	-0.5236	0.3620	0.7206
閒時喜歡看書、上圖書館或書局	0.1078	-0.1641	0.3797	0.4371
閒時易覺得無聊，不喜歡自己玩	0.1049	-0.2601	0.4699	0.5732
同儕因素				
交往朋友狀況	0.4471	0.2166	0.6775	0.0001
與同學朋友相處情形	0.2889	-0.0935	0.6714	0.1386

表 28　不假設藥物濫用為終身盛行定義之一般線性方程模式(GEE)多變項分析(自變項為前一年度各項因素分析變項)之估計結果

變項	估計值	95%信賴區間		P 值
		下限	上限	
截距	-7.3767	-8.5892	-6.1642	0.0000
性別	2.3507	0.9519	3.7494	0.0010
父母對課業期望	-0.1009	-0.7062	0.5304	0.7438
對課業滿意度	-1.1320	-1.7293	-0.5347	0.0002
課業補習及努力程度	-0.6468	-1.3438	0.0502	0.0690
對小學(國一)其他科目滿意度	0.6726	-0.0698	1.1419	0.0758
小學(國一)時之破壞行為	0.0767	-0.6102	0.7636	0.8267
交往朋友有破壞行為	-0.0654	-0.6497	0.5190	0.8264
交往朋友有違警行為	0.2732	-0.4114	0.9577	0.4341
交往朋友狀況	0.1783	-0.4463	0.8028	0.5759

表 29　不假設藥物濫用為終身盛行定義之一般線性方程模式(GEE)多變項分析(自變項為前一年度各項因素分析變項)之估計結果

變項	估計值	95%信賴區間		P 值
		下限	上限	
截距	-8.2906	-10.5375	-6.0437	0.0000
性別	2.2853	0.9060	3.6646	0.0012
大樹國中	1.8302	-0.9555	4.6160	0.1979
五福國中	0.0000	0.0000	0.0000	0.0000
父母對課業期望	-0.0119	-0.6437	0.6200	0.9706
對課業滿意度	-0.9264	-1.5857	-0.2671	0.0059
課業補習及努力程度	-0.4790	-1.1510	0.1929	0.1623
對小學(國一)其他科目滿意度	0.5219	-0.1358	1.1797	0.1199
小學(國一)時之破壞行為	-0.0037	-0.8881	0.8808	0.9935
交往朋友有破壞行為	-0.0005	-0.7292	0.7282	0.9989
交往朋友有違行為	0.3093	-0.3680	0.9866	0.3707
交往朋友狀況	0.2512	-0.3978	0.9002	0.4481

表 30　定義藥物濫用為終身盛行下之一般線性方程模式(GEE)單變項(自變項為前一年度各項因素分析變項)估計結果

變項	估計值	95% 信賴區間		P 值
		下限	上限	
家庭因素				
與家人相處情形	-0.3865	-0.7630	-0.0101	0.0441
零用錢	-0.2679	-0.6898	0.1539	0.2132
父母對課業期望	-0.2100	-0.5017	0.0817	0.1583
學校因素				
對課業滿意度	-0.7194	-0.9669	-0.4719	0.0000
課業補習及努力程度	-0.4493	-0.7539	-0.1448	0.0038
小學(國一)時孤立、不安	0.0527	-0.2815	0.3868	0.7574
對小學(國一)其他科目滿意度	0.0757	-0.1682	0.3195	0.5432
小學(國一)時之破壞行為	0.5795	0.3885	0.7706	0.0000
行為因素				
交往朋友有破壞行為	0.3827	0.0766	0.6887	0.0143
交往朋友有違警行為	0.2593	0.0836	0.4349	0.0038
閒時喜歡自己一人閒逛或做白日夢	-0.1277	-0.4176	0.1623	0.3881
閒時喜歡看書、上圖書館或書局	0.0616	-0.0925	0.2157	0.4332
閒時易覺得無聊，不喜歡自己玩	0.0504	-0.2205	0.3213	0.7155
同儕因素				
交往朋友狀況	0.6012	0.3861	0.8164	0.0000
與同學朋友相處情形	0.1972	-0.1631	0.5575	0.2834

表 31　定義藥物濫用為終身盛行下之一般線性方程模式(GEE)單變項(自變項為前一年度各項因素分析變項)估計結果(調整性別)

變項	估計值	95% 信賴區間		P 值
		下限	上限	
家庭因素				
與家人相處情形	-0.4104	-0.8570	0.0542	0.0842
零用錢	-0.2114	-0.5465	0.1236	0.2161
父母對課業期望	-0.1628	-0.4297	0.1041	0.2319
學校因素				
對課業滿意度	-0.7373	-1.0165	-0.4582	0.0000
課業補習及努力程度	-0.4861	-0.7887	-0.1834	0.0016
小學(國一)時孤立、不安	0.1081	-0.2323	0.4484	0.5338
對小學(國一)其他科目滿意度	0.1184	-0.1277	0.3645	0.3457
小學(國一)時之破壞行為	0.4415	0.2523	0.6306	0.0000
行為因素				
交往朋友有破壞行為	0.3963	0.1319	0.6607	0.0033
交往朋友有違警行為	0.2941	0.0744	0.5138	0.0087
閒時喜歡自己一人閒逛或做白日夢	-0.1174	-0.4007	0.1659	0.4167
閒時喜歡看書、上圖書館或書局	0.0932	-0.0829	0.2693	0.2997
閒時易覺得無聊，不喜歡自己玩	0.0478	-0.2018	0.2973	0.7076
同儕因素				
交往朋友狀況	0.5707	0.3510	0.7905	0.0000
與同學朋友相處情形	0.2720	-0.0904	0.6343	0.1413

表 32　定義藥物濫用為終身盛行下之一般線性方程模式(GEE)多變項(自變項為前一年度各項因素分析變項)估計結果

變項	估計值	95%信賴區間		P 值
		下限	上限	
截距	-7.8823	-9.9296	-5.8350	0.0000
性別	3.0104	1.1320	4.8889	0.0017
與家人相處情形	0.1176	-0.4428	0.6780	0.6808
對課業滿意度	-0.8663	-1.3405	-0.3921	0.0003
課業補習及努力程度	-0.6939	-1.3530	-0.0348	0.0391
小學(國一)時之破壞行為	0.1661	-0.4005	0.7328	0.5655
交往朋友有破壞行為	0.5528	-0.1509	1.2565	0.1237
交往朋友有違警行為	0.6272	0.2002	1.0542	0.0040
交往朋友狀況	0.3840	-0.0276	0.7956	0.0675

表 33　定義藥物濫用為終身盛行下之一般線性方程模式(GEE)多變項(自變項為前一年度各項因素分析變項)估計結果

變項	估計值	95%信賴區間		P 值
		下限	上限	
截距	-9.0621	-11.2855	-6.8387	0.0000
性別	2.9237	1.2720	4.5754	0.0005
大樹國中	2.2428	0.2222	4.2635	0.0296
五福國中	0.0000	0.0000	0.0000	0.0000
與家人相處情形	-0.0314	-0.5320	0.4691	0.9020
對課業滿意度	-0.6957	-1.2189	-0.1725	0.0092
課業補習及努力程度	-0.4506	-1.1371	0.2358	0.1982
小學(國一)時之破壞行為	0.2008	-0.3941	0.7958	0.5082
交往朋友有破壞行為	0.3492	-0.2568	0.9552	0.2587
交往朋友有違警行為	0.6544	0.1565	1.1523	0.0100
交往朋友狀況	0.3960	-0.0146	0.8066	0.0587

表 34 家庭因素、學校因素、行為因素及同儕因素對於課業期望因素(低/高)之多變項邏輯斯特迴歸分析結果

變項	估計值	95% 信賴區間		P 值
		下限	上限	
性別				
男	0.98	0.68	1.42	0.9228
女	1.00			
家庭因素				
與家人相處情形	0.90	0.75	1.07	0.2328
零用錢	1.14	0.96	1.35	0.1379
父母對課業期望	0.40	0.33	0.50	0.0001
學校因素				
課業補習及努力程度	1.07	0.90	1.27	0.4588
小學(國一)時孤立、不安	0.74	0.61	0.90	0.0025
對小學(國一)其他科目滿意度	1.58	1.32	1.90	0.0001
小學(國一)時之破壞行為	0.89	0.73	1.08	0.2353
行為因素				
交往朋友有破壞行為	1.29	1.04	1.59	0.0192
交往朋友有違警行為	1.08	0.87	1.34	0.5023
閒時喜歡自己一人閒逛或做白日夢	1.15	0.96	1.37	0.1394
閒時喜歡看書、上圖書館或書局	0.74	0.62	0.89	0.0000
閒時易覺得無聊，不喜歡自己玩	1.06	0.88	1.26	0.5517
同儕因素				
交往朋友狀況	1.03	0.85	1.25	0.7800
與同學朋友相處情形	1.28	1.28	1.07	0.0087

表 35　利用非線性迴歸模式，在不考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式內部驗証結果

Mode	Observed	Expected
正常→正常	663	1226.27
正常→第一階段陽性	106	211.98
正常→藥物濫用	6	10.75
第一階段陽性→第一階段陽性	81	211.46
第一階段陽性→藥物濫用	12	21.54

$X^2 = 1.4374$

表 36　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式內部驗証結果(國三 1038 人)

Mode	Observed	Expected
正常→正常	1217	1217.10
正常→第一階段陽性	211	210.04
正常→藥物濫用	6	3.86
第一階段陽性→正常	363	363.15
第一階段陽性→第一階段陽性	205	205.69
第一階段陽性→藥物濫用	19	18.15

$X^2 = 0.0395$

表 37　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下之三階段馬可夫鏈模式內部驗証結果(國三 447 人)

Mode	Observed	Expected
正常→正常	276	275.891
正常→第一階段陽性	58	58.902
正常→藥物濫用	4	3.207
第一階段陽性→正常	292	291.884
第一階段陽性→第一階段陽性	182	181.338
第一階段陽性→藥物濫用	25	25.777

表 38　利用非線性迴歸模式，在不考慮陽性→正常情況下，藥物濫用為終身盛行定義下並加入學校因素中對課業期望因子二分下之三階段馬可夫鏈模式內部驗証結果

Mode	Observed	Expected
正常→正常	1069	1067.47
正常→第一階段陽性	190	188.13
正常→藥物濫用	4	7.41
第一階段陽性→第一階段陽性	182	183.08
第一階段陽性→藥物濫用	17	15.92

$\chi^2_{(1)}$=1.6691

表 39　利用概似函數法，在考慮陽性→正常情況下，藥物濫用為終身盛行定義下並加入學校因素中對課業期望因子二分下之三階段馬可夫鏈模式內部驗証結果(國三 1038 人)

Mode	Observed	Expected
正常→正常	1069	1067.17
正常→第一階段陽性	190	189.96
正常→藥物濫用	4	5.87
第一階段陽性→正常	324	326.23
第一階段陽性→第一階段陽性	182	181.77
第一階段陽性→藥物濫用	17	15.01

$\chi^2_{(1)}$=0.2649

[Word count: 4086] (not including Abstract, references, and tables)

Substance use disorders among adolescents in Taiwan

Prevalence, sociodemographic Correlates and psychiatric comorbidity

MIAN-YOON CHONG, KIN-WEI CHAN AND ANDREW T.A. CHENG[1]

From Institute of Biomedical Sciences, Academia Sinica, Taipei;
Department of Psychiatry, Kaohsiung Medical College, Kaohsiung and
Institute of Epidemiology, National Taiwan University, Taipei, Taiwan

Running Title: Adolescent substance use disorders in Taiwan

January, 1999

[1]Address for correspondence: Professor Andrew T.A. Cheng, Division of Epidemiology and Public Health, Institute of Biomedical Sciences, Academia Sinica, Taipei, Taiwan. Fax: 886-2-2785-3569; e-mail: bmandrew@ccvax.sinica.edu.tw

ABSTRACT

Background This paper reports prevalences, sociodemograghic correlates and psychiatric comorbidity of substance use disorders (SUDs) among adolescents in Taiwan.

Methods A random sample of ninth grade students (n=774) was selected from an urban, a suburban, and a rural community. Two-stage case identification was employed with a brief screening tool and a modified Chinese version of the Kiddie-SADS conducted by child psychiatrists.

Results The overall prevalence of any SUD was 11.0%, with nicotine (96.0%) as the most prevalent substance. The prevalences of SUDs were significantly higher in boys, rural community, and classes with poor academic performance. Sixty-two percent of all SUD cases suffered from other concurrent psychiatric disorders. The most common comorbid conditions were conduct disorder, Attention deficit hyperactivity disorder, and mood disorders.

Conclusions High prevalences of SUDs were found among adolescent school children in Taiwan. Effects of urbanization, selective migration and the availability of substances are possible explanations for the urban-rural difference on the risk for SUDs. Psychiatric comorbid conditions for SUD among adolescents in Taiwan were similar to those in Western societies.

INTRODUCTION

Epidemiological research has revealed that adolescents are at risk for substance use, and it has been postulated that they usually progress from beer or wine to cigarettes or hard liquor, then to marijuana, and finally to hard drugs in a chronological fashion (Kandel, 1975). Recent studies suggested that different weights of genetic and socioenvironmental factors might contributed to the initiation, frequency, amount, maintenance, and the development of dependence of substance use (Plomin *et al.* 1997).

High prevalences of other psychiatric conditions among substance abusers have been reported in recent epidemiological studies (e.g., Reiger *et al.* 1990; Kessler, 1994). The most common comorbid psychiatric conditions were anxiety disorders, depressive disorders and antisocial personality disorder in adults (Merikangas *et al.* 1996), and conduct disorder, hyperkinetic disorders (ADHD), anxiety and depressive disorders in children (Bukstein *et al.* 1989; DeMilio, 1989). Differences in rates can be attributed to different study substances and populations, case definition and case finding method In spite of the discrepancies, it has been well demonstrated that the prevalence of all substance use disorders (SUDs) was higher than other psychiatric disorders in the general population. Furthermore, the prevalence of psychiatric comorbidity for SUDs in psychiatric patients was generally higher than that in other populations (Hall & Farrell, 1997).

Subjects with SUDs identified in adult populations have often undergone a long complicated psychiatric history. It is therefore difficult to investigate the early developmental process of SUDs and psychiatric comorbidity and their possible temporal relationships. Only a longitudinal cohort study among early adolescents can lead to the elucidation of these issues (Christie *et al.* 1988; Bukstein *et al.* 1989), as well as the roles and interaction of gene and environment for the different aspects of substance use and abuse. In order to conduct this type of study, standardised assessment on detailed history of substance use and clinical diagnosis of SUDs is essential. Many of earlier studies, however, only applied self-report questionnaire rather than standardised clinical interview.

The prevalence, patterns and risk factors of SUDs may vary across different cultures and societies. However, few studies on SUDs and psychiatric comorbidity have been conducted in developing or newly industrialized countries (Teichman *et al.* 1987; Kokkei & Stefinis, 1991; Singh & Mustapha, 1994), where different rates of anxiety and depressive disorders were often reported (Smith & Weissman, 1992). It is not known whether or not the prevalence and types of comorbidity and their relationships with SUDs in this part of the world would be similar to that reported in most Western surveys. This paper reports findings from an epidemiological study of SUDs in Taiwan.

Project on Adolescent Substance use disorders in Taiwan (PAST)

The PAST has been started from 1994, aiming at the identification of risk factors of SUDs for early prevention among adolescents in Taiwan, where rapid industrialization and urbanization have taken place in recent years accompanied with a rapid increase of SUDs and drug offenders. A substantial proportion of these offenders was found to be the juvenile (Ministry of Law, 1995).

The PAST consists of both a cross-sectional and a three-year longitudinal survey. The former, conducted among the third-year (9th grade) junior high school students (N=774), attempts to develop cross-culturally valid and reliable case finding instruments, and to assess the prevalence of SUDs, their psychiatric comorbidity and socioenvironmental correlates, and to estimate the sample size for the longitudinal study. The later, conducted among the new junior high school students (N=1070), aims to investigate the incidence of SUDs and the temporal relationship between SUDs, other psychiatric morbidities and significant environmental risk factors.

The PAST cross-sectional survey has been completed and its longitudinal study is to be finished soon. This report will focus on the research methodology, prevalence of SUDs, their sociodemographic correlates and psychiatric comorbidity in the cross-sectional survey.

METHOD

The sample

There are nine years of elementary education in Taiwan, extending from primary (1st to 6th grade) to junior high (7th to 9th grade) schools. In this cross-sectional survey, sample subjects were drawn from grade 9th junior high school students. They were selected from one urban (Taipei City), one suburban (Pan-Chiao City located in Taipei County), and one rural area (Kaohsiung County). All junior high schools in each area were divided into three subgroups according to the passing rates of their previous-year graduates in the senior high school entrance examination (top, middle and lowest thirds). One school was then randomly selected from each subgroup in each area, resulting in a total of nine schools. All ninth grade students of these nine schools were included for the sampling except those handicapped students in 'special education' program. A total of 18 classes were randomly selected with all their students included for the study (n=780).

The survey instruments

The study employed the two-stage case finding method. The screening tool for the first stage was a brief questionnaire which included items enquiring sociodemography, general physical health, and habits in daily living including any experience of using alcohol, cigarette and betel, and use of other drugs (both prescribed and illicit) and substances.

A Chinese version of The Kiddie Epidemiologic version of the Schedule for Affective Disorders and Schizophrenia (K-SADS-E) (Puig-Antich & Chambers, 1978) was used for the second stage clinical assessment. It is a semi-structured interview to be conducted by child psychiatrists for systematic assessment of both past and current episodes of psychopathology in children and adolescents (Orvaschel *et al.* 1982).

Modification of the K-SADS-E relevant to the Chinese culture with colloquial expressions of many items was done before the conduction of the study. An additional section regarding betel use disorder was designed for this research. Training for the conduction of both the K-SADS-E and screening interviews were carried out first.

In an *ad hoc* reliability study of the Chinese K-SADS-E, nine staff child psychiatrists who participated the study interviewed 25 subjects. The nine raters took turns to

interview a subject and the others rated simultaneously. The generalized kappa was 0.96 for alcohol use disorder, 0.87 for betel use disorder, and 0.73 for tobacco use disorder.

Validity of the brief screening questionnaire against the psychiatrists' diagnosis was examined among 127 subjects. Those found to have ever used any of the above substances, irrespective of their frequencies and amounts, were classified as 'screened positive'. This very low cut-off point is intended to screen-in the majority of SUD cases for our case-control study. The sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV) were then calculated to be 84.6%, 58.3%, 96.1% and 38.1% respectively with a very low false negative rate.

The field work

The field work was conducted at school following a time table arranged by the head masters of the study classes, who also help explain the purpose of the study to the students.

Informed consent was first obtained with assured confidentiality. The first stage screening was conducted by a research team consisted of 14 psychiatric clinical staffs (residents, nurses, social workers, and clinical psychologists). All screened positives and every one in three screened negatives immediately received the second stage clinical interview conducted by child psychiatrists who were blind to the screening results. There was no time-lag between the first and second stage interviews, and none of the respondents who received the screening interview refused the second stage interview. Socioenvironmental risk factors were then enquired by research assistants who did not know respondents' clinical status.

Case definition

In this study, the diagnosis of SUDs and other psychiatric disorders in adolescence was made by child psychiatrists according to the operational criteria in the revised third version of Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R; APA, 1989). Possible diagnoses include substance abuse and dependence of any illicit drugs,

hypnotics, stimulants, and other substances like alcohol, cigarette, and betel. Among them, betel is mainly seen in the South and Southeast Asian and the Pacific regions. It is a natural substance containing a potent cholinergic agonist, arecholine that has addictive properties.

Statistical analysis

The lifetime prevalence and 95% confidence intervals (CI) of any substance use disorder were calculated. Overall and stratified prevalence according to region, sex, school ranking ("high", "medium" or "low" passing rate in the senior high school entrance examination) and class status ("good" or "poor" academic performance) were also evaluated. A case-control analysis was employed to assess the risk for SUDs against comorbid psychiatric disorders via univariate and multivariate logistic regression analyses.

RESULTS

Response rate and characteristics of respondents

Seven hundred and seventy-four sample subjects completed the interview (response rate: 99.2%). Of the six who were not interviewed, one died before the interview, two transferred to other schools soon after the school course had started, and three were absent from school for a long period of time. Among those successfully interviewed, 411 (53.1%) were males and 363 (46.9%) were females. Their mean age were 15.23 years (s.d = 0.44, range 14-16 years). Two hundred and thirty-seven (30.6%) students were from Taipei City (urban area), 279 (36.0%) from Pan-Chiao City (suburban area), and 258 (33.3%) from Kaohsiung County (rural area).

At the first stage screening, 231 subjects (29.8%) reported to have ever used any psychoactive substances. Of the 400 subjects (231 screened positives and 169 screened negatives) interviewed by child psychiatrists at the second stage, 81 were found to have fulfilled the DSM-III-R criteria for SUDs. Nearly all of them came from the screened positives, and only two were from the screened negatives.

Prevalences of SUDs

The overall weighted prevalence of any SUD was 11.0% (95% CI, 8.7%-13.5%). As shown in Table 1, the most prevalent substance was tobacco, followed by betel, alcohol and illicit drugs. Of the two cases with illicit drug use, one used amphetamine and the other took both amphetamine and heroin.

The overall prevalence of SUDs was about six times higher in boys than in girls. The male preponderance was observed across all kinds of substances, with greater differences in betel and alcohol than in tobacco. The two cases with illicit drug use were boys.

[*Table 1 about here*]

Single and polysubstance abuse

Among the 81 cases with SUDs, 75.3% only used one substance, whereas 11% used two (2.5% used alcohol and tobacco and 8.6% used betel and tobacco), 11.1% used three (alcohol, betel and tobacco), and a further 2.5% used four or more substances. The two boys taking four or more substances used all the three "soft" substances and illicit drugs.

Effects of school and class

The prevalence of SUDs in the "good" classes (i.e., those with students of good academic performance who were expected to sit in the senior high school entrance examination) was significantly lower than that in the "poor" classes (i.e., those with students of poor academic performance who were not expected to pass the above examination) (Table 2).

Prevalences of SUDs between three groups of schools with different ranking were then compared. The rate in the lowest group was higher than those in the top and middle groups, between them the figures were very similar. The difference was however not statistically significant.

[*Table 2 about here*]

Urban-rural difference

The prevalence of overall SUDs was highest in the rural Kaohsiung County and lowest in

suburban Taipei County (Table 3), with Urban Taipei City in between. The urban-rural difference was significant, especially between the rural and suburban area. Such differences were mainly for tobacco and betel use disorders, but not for alcohol. The two cases with illicit drug use came from the suburban area.

[*Table 3 about here*]

Distribution of comorbid psychiatric disorders

Table 4 illustrates the distribution of other psychiatric disorders among SUD cases and controls. The total rates were much higher in cases than in controls. Among SUD cases, disruptive behavior disorders (including conduct disorder and attention deficit hyperactive disorder, ADHD) were the most common comorbid psychiatric disorders, followed by depressive disorders and anxiety disorders. They were more prevalent in cases than in controls. The most common type of disruptive behavior disorders in cases was conduct disorder (44.4%), which was five times more frequent in boys (n=30) than in girls (n=6). Other diagnoses, including adjustment disorder and psychosis, were similarly very rare in cases and controls. It is interesting to see that none of the controls suffered from conduct disorder.

Among the 36 SUD cases comorbid with conduct disorder, 10 (27.8%) co-existed with other disorders. Among the 10 SUD cases comorbid with ADHD, seven (70%) had two or more other psychiatric diagnoses, including five with conduct disorder, one with oppositional disorder, and one with conduct disorder and obsessive compulsive disorder. The three controls with ADHD had no other psychiatric disorders. Three out of the eight SUD cases with major depression also co-existed with conduct disorder or generalized anxiety disorders.

Association between SUD and psychiatric comorbidity

In univariate logistic regression analysis, the OR (odds ratio) of SUD was only significant for disruptive behavior disorders. The OR for any comorbid condition was ten times that for non-comorbid condition. ORs of SUD were increased with the number of comorbid

psychiatric conditions with a significant association trend ($x^2=60.5$, $P < 0.001$). The OR of SUD for one comorbid condition was eight times that for non-comorbid condition, and was nearly 20 times higher for two and more comorbid conditions.

(Table 4 about here)

The joint effect of two major psychiatric comorbid conditions and sex on the risk of SUD was assessed with multivariate logistic regression analysis. Disruptive behavior disorders, depressive disorders and sex all exerted significant independent effects, and there was no interaction between them. The OR of SUD was highest for disruptive behavior disorders, and was 13 times higher in males than in females (Table 5).

(Table 5 about here)

DISCUSSION

Methodological consideration

The PAST has included a cross-sectional survey to obtain a preliminary prevalence estimates and various potential risk factors for SUDs and a longitudinal cohort stucy to assess changes in individuals over time. Albeit time-consuming, our strategy will contribute to the understanding of both causal dynamic of drug use and the rapid changes in the scale and contours of the drug phenomenon. Most importantly, behavioral and health changes involving drugs use could also be assessed.

In epidemiological studies of SUDs, the identification of cases should be based on as many sources of information as possible. Under-reporting is not uncommon in the self-reported questionnaire survey and it is difficult to assess characteristic physical and psychological symptoms, clinical signs and behaviour attributed to the use of substances if such method was employed (Needle *et al.* 1989). In this study a standardized clinical interview was conducted by staff child psychiatrists who were at best in assessing clinical syndromes that may or may not be caused by any substance used. The use of the K-SADS-E with culturally-relevant modification in the Chinese version has further

ensured its cross-cultural validity in Taiwan.

Patterns and distribution of SUDs

This study has demonstrated that there is a high proportion of adolescent school children with SUDs in Taiwan. Three quarters of cases with SUDs were confined to only a single substance, with tobacco as the most prevalent substance that was similar to many other societies (Newcomb & Bentler, 1989). Among the remaining quarter with polysubstance use disorder, over half used more than two substances.

This initial pattern of SUD in young persons was different from that seen in Western societies where alcohol was generally the initiator with marijuana as the intermediator prior to the use of hard drugs (Kandel, 1975). Our findings have implied that Kandel's postulation may need some modifications in other societies, where attitudes towards the use of various substances, their availability, and the protective effects of alcohol metabolizing enzymes (Chen *et al.* 1996) are relatively different from Western societies.

Unlike in other Western societies, betel instead of alcohol was found to be the second most prevalent abused substance among adolescents in Taiwan, a finding similarly observed in another study (Lu *et al.* 1993). Majority of the betel abusers also abused other substances. Betel chewing has been introduced to the Han Taiwanese by the indigenous aborigines with a Malay-Polynesian origin. One major physical harm from betel chewing is oral cancer (Ko *et al.* 1995), while massive landslide and flooding had been accounted for severe soil erosion at the mountain region due to over land exploitation for growing betel trees. Betel has created not only a hazardous health condition of the Taiwanese people but also a serious environmental problem.

It is not unusual to find that 'hard drugs' formed only a very small proportion of the abused substances at this stage, while at the same time, they were only seen in those with polysubstance abuse. In addition, subjects in this study were randomly selected from a normal schooling adolescent and not from clinical or juvenile offenders. Psychostimulant drug of amphetamine was elicited instead of cocaine, cannabis or marijuana that were most commonly used illicit substance in most Western societies (Robinson *et al.* 1987).

This was again probably due to the differential availability of these substances in Taiwan and the West.

Alcohol consumption at this stage was mainly confined to the abuse of beer and the cheaper locally made rice wine. There were no significant alcohol dependence symptoms at this stage.

Gender difference

A male preponderance over the use of alcohol and other substances was observed among adolescent subjects in this study across all kinds of substances. A similar male excess in betel abuse was reported in another study in rural junior high school students (Lu *et al.* 1993). In traditional Chinese society, women were not recognized for drinking and smoking in public. Although betel is not considered as an illicit substance, it is not popular among women in Taiwan due to the unpleasant appearance of 'red mouth' resulted from betel chewing.

Urban-rural differences

The prevalence of SUD was higher in rural than in urban or suburban communities, a finding compatible to studies in other region (e.g., Farrell *et al.* 1992). One possible explanation for such difference comes from the effect of urbanization in the past few decades in Taiwan.

In a previous report, the prevalence of depression was higher in rural than in suburban and urban communities, and both the adverse rural environment with more chronic stressors and a selective migration to the cities were proposed to explain this urban-rural difference (Cheng, 1989a). It was found that about one-fifth of the study subjects' families in the rural region were single-parent or 'broken families'. Many young- and middle-aged rural parents have temporarily migrated to work in large cities, leaving their children at home to be looked after by their grandparents or relatives ('foster' parents). In addition, rural children from families of higher socioeconomic status with better academic performance move to urban cities for better educational opportunities, leaving

behind those who are more socioeconomically disadvantageous and less academically competent with a higher vulnerability to both psychological problems and substance use.

Another explanation lies in the higher availability of certain substances in the rural area of Taiwan. Betel is most prevalent in rural area where most betel trees were grown, and where betel chewing has been regarded as a normal habit for working class adults and their children.

Academic achievement

The Taiwanese families like all other ethnic Chinese families, have an overvalue on academics. School education unfortunately has become a competitive ground of their children. Most schools arbitrary divided their classes into so-called 'good' or 'poor' classes according to the academic performance of their students. Good classes received more attention from teachers and parents than the poor. In addition, peer and segregation effect is evident in such grouping. The higher risk of SUDs in students of poor classes with no urban-rural difference might thus be attributed at least in part to the educational neglect in family and school for those poor class students. In fact, failure in important school entrance examination has been found to be a major life event with longterm threat to teenagers and their parents in Taiwan (Cheng, 1989b).

Psychiatric comorbidity

It has been commented that specific comorbid psychiatric conditions may influence the risk, onset, and course of SUD (Hall & Farell, 1997). It is however inappropriate to investigate the temporal relationships between them in a cross-sectional retrospective survey. Previous work often employed clinical population where it involved with 'Berkon's fallacy', a condition refers to the apparent overstatement of the association between two disorders if each independently leads a person to seek medical care (Berkson, 1946; Roberts *et al.* 1978; Rutter, 1981). Our study is believed to be free from such bias.

In case-control analysis, this study has demonstrated that adolescents with other

psychiatric disorders are at high risk for SUDs, a finding consistent with previous work in Western societies. The main psychiatric disorders associated with SUDs reported in other studies among clinical populations were also found in this community population. They included disruptive behavior disorders and depressive disorders.

Disruptive behavior disorders

Conduct disorder

Many studies have demonstrated an association between substance abuse and conduct problems (Bukstein *et al.* 1989; Milin *et al.* 1991; Stowell *et al.* 1992; Bukstein *et al.* 1992), regardless in whatever settings. Some of the examples are summarized in Table 6. Prevalence rates of conduct disorder in SUD ranged from 45% to 91%, with highest rate among the juvenile offenders. Conduct disorder in this study, either alone or co-existed with other psychiatric disorders, was only found in subjects with any forms of SUD, including 'hard drugs' like amphetamine and heroin.

[*Table 6 about here*]

While patients with antisocial personality disorder frequently have prevailing substance abuse behavior, the latter often began at a much earlier adolescent stage frequently co-existed with conduct disorder. Findings in this study have lent support to this. Recently studies suggest that these disorders may share a common genetic vulnerability (Merikangas *et al.* 1985), or that they might have distinct etiology but strongly associated with each other (Goodwin *et al.* 1974; Lewis *et al.* 1983).

Attention-deficit hyperactive disorder (ADHD)

The relationship between ADHD and SUDs has been inconclusive (Alterman *et al.* 1985; Hechtman *et al.* 1984; Biederman *et al.* 1995). Evidence from retrospective studies of ADHD showed high risks for substance abuse (Alterman *et al.* 1985), but was confronted with serious methodological shortcomings of memory effects. Moreover, most prospective studies of ADHD did not show significantly more drug or alcohol abuse in adolescents who had been hyperactive than in controls (Hechtman *et al.* 1984; Weiss *et al.* 1985; Blouin *et al.* 1978).

Studies which demonstrated a high rate of ADHD among adolescents with SUDs have also revealed an increased risk of comorbid mood and anxiety disorders (Biederman *et al.* 1995) or conduct disorder (Gittelman *et al.* 1985; DeMilio, 1989). Among 10 cases of SUD with ADHD in this study, six (67%) were found to have coexisted with conduct disorder, a finding similar to other studies.

Mood disorders

Several studies revealed that adolescents suffering from mood disorders are vulnerable to substance abuse (Dilsaver, 1987; Greenbaum *et al.* 1991; Bukstein *et al.* 1992). Mood disorders have been identified among a list of psychosocial and personality correlates of drug use (Braught *et al.* 1973), or as risk factors in the initiation and maintenance of drug use (Newcomb *et al.* 1986). Subjects with SUDs in this study have a two times higher rate of depressive disorders (mainly major depression) than controls. Their abused substances, however, were mainly tobacco and/or betel rather than alcohol that was commonly found in Western studies (Martin *et al.* 1993). Half of our cases of SUDs with major depression also co-existed with conduct disorder, a finding that is also similar to other studies.

Studies related to SUDs with anxiety disorders were largely limited to alcoholism in adult patients. For example, in a study of outpatient with anxiety neurosis, it has been found that 25% were heavy drinkers, 15% were alcoholics and 10% had an illness dominated by phobic avoidance (Woodruff *et al.* 1972). In this study, the number of SUD cases with comorbidity of anxiety disorders was relatively smaller than that in Western surveys, and tends to have two or more other psychiatric diagnoses as well. It is thus difficult to verify their association.

Implications

This study has for the first time demonstrated a high risk of multiple other psychiatric conditions among adolescents with SUDs in a non-western community sample. Our ongoing longitudinal cohort study will help elucidate the roles and interaction of

psychosocial risk factors and psychiatric comorbid conditions in the development of SUDs. Such findings may lead to a fruitful crosscultural comparative study and important therapeutic and preventive implications for SUDs.

ACKNOWLEDGEMENT

The authors would like to thank all the child psychiatrists who participated this study. The Child Psychiatry Research Group in Taiwan has kindly provided the Chinese DSM-III-R version of the K-SADS-E for use in this study. We are grateful to the staffs of Kaohsiung Medical College Department of Psychiatry, who offered their invaluable help. Without the cooperation of the students and teachers, this study could never have been done. The study was supported by a grant from the Department of Health in Taiwan (ROC) (DOH-84-TD-089).

REFERENCES

Alterman, A.L., Tarter, R.E., & Baughman, T.G. (1985). Differentiation of alcoholic high and low in childhood hyperactivity. *Drug Alcohol Dependence* **15**, 111-121.

American Psychiatric Association (1987). *Diagnostic and Statistical Manual of Mental Disorders (3rd edn, revised) (DSM-III-R)*. APA: Washington, DC.

Berkson, J. (1946). Limitation of the application of the 4-fold table analysis to hospital data. *Biometrics* **2**, 47-53.

Biederman, J., Wilens, T., Mick, E., Milberger, S., Spencer, T.J. & Faraone, S.V. (1995). Psychoactive substance use disorders in adults with attention deficit hyperactivity disorder (ADHD): effects of ADHD and psychiatric comorbidity. *American Journal of Psychiatry* **152**, 1652-1658.

Blouin, A.G., Bornstein, R. & Trites, R. (1978). Teenage alcohol use among hyperactive children: a five year follow-up study. *Journal of Pediatric Psychology* **3**, 188-194.

Braught, G., Brakrash, D. & Follingstad, D. (1973). Drug use in adolescence: a review of psychosocial correlates. *Psychological Bulletin* **79**, 92-106.

Bukstein, O.G., Brent, D.A. & Kaminer, Y. (1989). Comorbidity of substance abuse and other psychiatric disorders in adolescents. *American Journal of Psychiatry* **146**, 1131-1141.

Bukstein, O.G., Glancy, L.J. & Kaminer, Y. (1992). Patterns of affective comorbidity in a clinical population of dually diagnosed adolescent substance abusers. *Journal of the American Academy of Child and Adolescent Psychiatry* **31**, 1041-1045.

Cheng, T.A. (1989a). Urbanization and minor psychiatric morbidity: a community study in Taiwan. *Social Psychiatry and Psychiatric Epidemiology* **24**, 309-316.

Cheng, T.A. (1989b). Psychosocial stress and minor psychiatric morbidity: a community study in Taiwan. *Journal of Affective Disorders* **17**, 137-152.

Chen, W.J., Loh, E.W., Hsu, Y.P.P., Chen, C.C., Yu, J.M. & Cheng, A.T.A. (1996). Alcohol-Metabolizing Genes and Alcoholism among Taiwanese Han Men: Independent

Effect of *ADH2*, *ADH3* and *ALDH2*. *British Journal of Psychiatry* **168**, 762-767

Christie, K.A., Burke, J.E., Regier, D.A., Rae, D.S., Boyd, J.H. & Locke, B.Z. (1988). Epidemiological evidence for early onset of mental disorders and higher risk of drug abuse in young adults. *American Journal of Psychiatry* **145**, 971-975.

DeMilio, L. (1989). Psychiatric syndromes in adolescent substance abusers. *American Journal of Psychiatry* **146**, 1212-1214.

Dilsaver, S.C. (1987). The pathophysiologies of substance abuse and affective disorders: an integrative model? *Journal of Clinical Psychopharmacology* **7**, 1-10.

Farrell, A.D., Anchors D.M., Danish S.J. & Howard, C.W. (1992). Risk factors for drug use in rural adolescents. *Journal of Drug Education* **22 (4)**, 313-328.

Gittelman, R., Mannuzza, S. & Shenker, R. (1985). Hyperactive boys almost grown up, I: psychiatric status. *Archives of General Psychiatry* **42**, 937-947.

Goodwin, D.W., Schulsinger, F., Moller, N., Hermansen, L., Winokur, G. & Guze, S.B. (1974). Drinking problems in adopted and non-adopted sons of alcoholics. *Archives of General Psychiatry* **31**, 164-169.

Greenbaum, P.E., Prange, M.E., Friedman, M.R. & Silver, S.E. (1991). Substance abuse prevalence and comorbidity with other psychiatric disorders among adolescents with severe emotional disturbances. *Journal of the American Academy of Child and Adolescent Psychiatry* **30**, 575-583.

Hall, W. & Farrell, M. (1997). Comorbidity of mental disorders with substance misuse. *British Journal of Psychiatry* **171**, 4-5.

Hechtman, L., Weiss, G. & Perlman, T. (1984). Hyperactives as young adults: past and concurrent antisocial behavior and moral development. *American Journal of Orthopsychiatry* **54**, 415-425.

Kandel, D.B. (1975). Stages in adolescent involvement in drug use. *Science* **190**, 912-914.

Kessler, R. (1994). The epidemiology of psychiatric comorbidity. In: *Textbook of Psychiatric Epidemiology* (eds M. Tsuang, M. Tohen, & G. Zahner), pp. 179-197.

John Wiley: New York.

Kokkei, A. & Stefinis, C. (1991). The epidemiology of licit and illicit substance use among high school students in Greece. *American Journal of Public Health* **81**, 48-52.

Ko, Y.C., Huang, Y.L., Lee, C.H., Chen, M.J., Lin, L.M. & Tsai, C.C. (1995). Betel quid chewing, cigarette smoking and alcohol consumption related to oral cancer in Taiwan. *Journal of Oral Pathology and Medicine* **24**, 450-453.

Lewis, C.E., Rice, J. & Helzer, J.E. (1983). Diagnostic interactions: alcoholism and antisocial personality. *Journal of Nervous and Mental Diseases* **171**, 105-113.

Lu, C.T., Lan, S.J., Hsieh, C.C., Yang, M.J., Ko, Y.C., Tsai, C.C. & Yen, Y.Y. (1993). Prevalence and characteristics of areca nut chewers among junior high school students in Changhua County, Taiwan. *Community Dentistry and Oral Epidemiology* **21**, 370-373.

Martin, C.S., Arria, A.M., Mezzich, A.C. and Bukstein, O.G. (1993). Patterns of polydrug use in adolescent alcohol abusers. *American Journal of Drug and Alcohol Abuse* **19**, 511-521.

Merikangas, K.R., Weissman, M.M., Prusoff, B.A., Pauls, D.L. & Leckman, J.F. (1985). Depressives with secondary alcoholism: psychiatric disorders in offspring. *Journal of Study of Alcohol* **46**, 199-201.

Merikangas, K.R., Angst, J., Eaton, W., Canino, G., Rubio-Stipec, M., Wacker, H., Wittchen, H.-U., Wittchen, L., Andrade, L., Essau, C., Kraemer, H., Robins, L.N. & Kupfer, D.J. (1996). Comorbidity and boundaries of affective disorders and substance misuse: results of an international task force. *British Journal of Psychiatry* **168** (suppl. 30), 58-67.

Milin, R., Halikas, J.A., Meller, J.E. & Morse, C. (1991). Psychopathology among substance abusing juvenile offenders. *Journal of American Academy of Child and Adolescent Psychiatry* **30**, 569-574.

Ministry of Law (1995). The Anti-Drug Report. *Anti-Drug Commission of the Executive Yuen*, Taiwan (ROC).

Needle, R.H., Jou, S.C. & Su, S.S. (1989). The impact of changing methods of data collection on the reliability of self-reported drug use of adolescents. *American Journal of Drug and Alcohol Abuse* **15(3)**, 275-289.

Newcomb, M.D. & Bentler, P.M. (1989). Substance use and abuse among children and teenagers. *American Psychologists* **44**, 242-248.

Newcomb, M.D., Maddahian, E. & Bentler, P.M. (1986). Risk factors for drug use among adolescents: concurrent and longitudinal analyses. *American Journal of Public Health* 76, 525-531.

Orvaschel, H., Puig-Antich, J., Chambers, W., Tabrizi, M.A. & Johnson, R. (1982). Retrospective assessment of prepubertal major depression with the Kiddie-SADS-E. *Journal of the American Academy of Child Psychiatry* **21**, 392-397.

Plomin, R., DeFries, J.C., McClearn, G.E. & Rutter, M (1997). Health psychology and aging. In *Behavioural Genetics* (eds R. Plomin, J.C. DeFries, G.E. McClearn & M. Rutter), pp. 217-232. New York: W.H. Freeman & Company.

Puig-Antich, J. & Chambers, W. (1978). *The Schedule for Affective Disorders and Schizophrenia for School Age Children (Kiddie-SADS)*. New York: New York State Psychiatric Institute.

Regier, D.A., Farmer, M.E., Rae, D.S., Locke, B.Z., Keith, S.J., Judd, L.L. & Goodwin, F.K. (1990). Comorbidity of mental disorders with alcohol and other drug abuse. *Journal of the American Medical Association* **264**, 2511-2518.

Roberts, R.S., Spitzer, W.G., Delmore, T. & Sackett, D.L. (1978). An empirical demonstration of Berkson's bias. *Journal of Chronic Disease* **31**, 119-128.

Robinson, T.N., Killen, J.D., Taylor, C.B., Telch, M.J., Bryson, S.W., Saylor, K.E., Maron, K.J., Maccoby N. & Farquar, J.W. (1987). Perspectives on adolescent substance use: a defined population study. *Journal of the American Medical Association* **258**, 2072-2076.

Rutter, M. (1981). Epidemiological/longitudinal strategies and causal research in child psychiatry. *Journal of the American Academy of Child and Adolescent Psychiatry* **20**,

Singh, H. & Mustapha, N. (1994). Some factors associated with substance abuse among secondary school students in Trinidad and Tobago. *Journal of Drug Education* **24**, 83-93.

Smith, A.L. & Weissman, M.M. (1992). Epidemiology. In: *Handbook of Affective Disorder*, 2nd edition (ed E.S. Paykel), pp 111-129, London: Churchill Livingstone.

Stowell, R.J. & Estroff, T.W. (1992). Psychiatric disorders in substance-abusing adolescent inpatients: A pilot study. *Journal of American Academy of Child and Adolescent Psychiatry* **31**, 1036-1040.

Tarter, R.E., Alterman, A.I. & Edwards, K.L. (1985). Vulnerability to alcoholism in men: a behavior-genetic perspective. *Journal of Study in Alcohol* **46**, 329-356.

Teichman, M., Rahav, G. & Barnea, Z. (1987). Alcohol and psychoactive drug use among Israeli adolescents: an epidemiological and demographic investigation. *International Journal of Psychiatry* **128**, 638-639.

Weiss, G., Hechtman, L., Milroy, T. & Perlman, T. (1985). Psychiatric status of hyperactives as adults: a controlled prospective 15-year follow-up of 63 hyperactive children. *Journal of the American Academy of Child and Adolescent Psychiatry* **24**, 211-220.

Woodruff, R.H., Guze, S.B., & Clayton, P.J. (1972). Anxiety neurosis among psychiatric outpatients. *Comprehensive Psychiatry* **13**, 165-170.

Table 1. *Weighted prevalence of DSM-III-R substance use disorders by sex among ninth-grade adolescents in Taiwan*

Substance	No. of cases	Weighted prevalence (%) (95% CI)
Alcohol		
Male	14	3.4 (1.7-5.2)
Female	1	0.3 (0-0.8)
Total	15	1.9 (1.0-2.9)
Betel		
Male	18	4.4 (2.4-6.4)
Female	1	0.3 (0-0.8)
Total	19	2.2 (1.2-3.2)
Tobacco		
Male	67	17.3 (13.3-21.3)
Female	11	3.0 (0.3-4.8)
Total	78	10.6 (4.7-16.6)
Illicit drug**		
Male	2	0.5 (0-1.5)
Female	0	-
Total	2	0.3 (0-0.6)
Any substance		
Male	70	18.0 (14.0-22.1)
Female	11	3.0 (1.3-4.8)
Total	81	11.0 (8.7-13.5)

Sample size: male 441, female 363.

CI: Confidence interval

Table 2. *School performance and the risk of substance use disorders among ninth-grade adolescents in Taiwan*

	No. of cases	Weighted prevalence (%) (95% CI)
Class status		
Good[1] (N=389)	23	6.5 (3.7-9.4)
Poor[2] (N=385)	58	14.0 (10.3-17.7)
School ranking[3]		
Top group (N=266)	22	9.1 (5.1-13.0)
Middle group (N=262)	25	9.5 (6.0-13.1)
Lowest group (N=246)	34	14.7 (9.8-19.6)

CI: Confidence interval.

[1]Classes with good academic performance;

[2]Classes with poor academic performance;

[3]According to the passing rates of senior high school entrance examination;

Comparison between good/poor classes: $z=3.33$, $P < 0.001$

Table 3. *Urban-rural difference in substance use disorders among ninth-grade adolescents in Taiwan*

	No. of cases	Weighted Prevalence (%) (95% CI)
Urban (Taipei City, N=237)		
Alcohol	2	0.8 (0-2.0)
Betel	3	1.3 (0-2.7)
Tobacco	24	11.1 (6.5-15.6)
Any substance	25	11.5 (6.9-16.1)
Suburban (Taipei County, N=279)		
Alcohol	3	1.1 (0-2.3)
Betel	3	1.1 (0-2.3)
Tobacco	19	7.7 (4.0-11.5)
Any substance	19	7.7 (4.0-11.5)
Rural (Kaohsiung County, N=258)		
Alcohol	10	3.9 (1.5-6.2)
Betel	13	5.0 (2.4-7.7)
Tobacco	35	13.6 (9.4-17.7)
Any substance	37	14.3 (10.1-18.6)

CI: Confidence interval

Comparison between three regions (any substance):

$X^2=8.12$, df=2, $p < 0.05$

Table 4. *Distribution of DSM-III-R psychiatric comorbidity in adolescent cases with substance use disorders and their controls*

Psychiatric comorbidity	Substance use disorders CA(%)	CO(%)	OR (95% CI)
Disruptive behavior disorders	48(59.3)	5(3.0)	32.6(11.9-112)
Conduct disorder	36(44)	0	9.5 -
Attention-deficit Hyperactive disorder	10(12.3)	3(1.8)	5.4(1.3-22)
Oppositional defiant disorder	2(2.5)	2(1.2)	2.1(0.3-17)
Depressive disorders	9(11.1)	8(4.8)	2.5(0.8-7.7)
Major depression	8(9.9)	7(4.2)	2.5(0.8-8.4)
Dysthymic disorder	1(1.2)	1(0.6)	3.4(0.2-60)
Anxiety disorders	6(7.4)	5(3.0)	3.2(0.7-16.1)
Generalized anxiety disorder	2(2.5)	2(1.2)	1.9(0.2-18)
Phobic	2(2.5)	0	1.8 -
Panic	1(1.2)	1(0.6)	3.4(0.1-126)
Obsessive compulsive disorder	1(1.2)	2(1.2)	2.5(0.2-34)
Adjustment disorders	1(1.2)	5(3.0)	1.0(0.1-10)
Psychoses	1(1.2)	3(1.8)	0.7(0.1-8.7)
Any disorder	50(61.7)	23(13.8)	10.0(5.4-19)
Number of comorbid disorders			
None	31(38.3)	144(86.2)	1.0
One	38(46.9)	21(12.6)	8.4(4.1-17.1)
More than one	12(14.8)	2(1.2)	18.6(5.6-26.2)
Total No.	81	167	

OR, odds ratio; 95% CI, 95% confidence interval

Table 5. *Joint effects of disruptive behavior disorder, depressive disorder and sex on the risk of substance use disorder: logistic regression analysis**

	OR (95% CI)	*P*
Sex		
Females	1.0	
Males	12.9 (4.5-37.2)	< 0.001
Disruptive behavior		
Absent	1.0	
Present	44.0 (13.7-141.8)	< 0.001
Depressive disorder		
Absent	1.0	
Present	15.7 (3.7-66.0)	< 0.001

*There was no significant interactive effect.

Table 6. *Comparison of psychiatric comorbidity among adolescent substance use disorders in different studies**

Psychiatric comorbidity	Comorbidity rate (%)			
	Bukstein	Stowell	Milin	Chong
Conduct disorder	70.5	54.0	91	44.4
ADHD	-	8.0	26	12.3
Oppositional disorder	-	35.0	58	2.5
Depressive disorders	51.3	-	18	11.1
Major depression	30.7	18.0	-	9.9
Dysthymia	5.1	34.0	-	1.2
Anxiety disorders	-	43.0	-	7.4
OCD	-	4.0	12	1.2
Adjustment disorders	9.0	12.0	-	1.2
Psychoses	-	3.0	7	1.2
Organic mental disorder (substance induced)	-	16.0	-	-
Any diagnosis	-	82.0	81	61.7
Average no. of diagnoses	-	-	2.2	1.34
Total No.	156	226	111	774

*Bukstein et al(1992): inpatients (age: 13-18), DSM-III-R;
Stowell et al(1992): inpatients (age: 12-18), DSM-III-R;
Milian et al(1991): juvenile offenders (age: 11-17), DSM-III;
Chong et al(1999): community samples (age 14-16), DSM-III-R.