



The impact of the prohibition of benzylpiperazine (BZP) “legal highs” on the availability, price and strength of BZP in New Zealand



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ABSTRACT

Background: Legal highs containing benzylpiperazine (BZP) were widely sold in New Zealand until BZP was prohibited in 2008. We examined the impact the prohibition had on the availability and price of BZP over following years.

Methods: Two national population surveys of BZP use were conducted in 2006 and 2009. Four annual targeted surveys of frequent drug users (FDU) were conducted from 2007–2010. Availability and price measures were obtained. Inflation-adjusted real retail prices were calculated. Other drug markets were monitored as quasi-controls.

Results: The proportion of BZP users from the general population who considered the availability of BZP to be ‘very easy’ declined from 76% in 2006 to 21% in 2009. The proportion who thought BZP had become ‘harder’ to obtain increased from 5% in 2006 to 71% in 2009. The proportion who reported the price of BZP was ‘higher’ increased from 27% in 2006 to 51% in 2009. FDU who considered the availability of BZP to be ‘very easy’ declined from 98% in 2007 to 15% in 2008, and then increased to 42% by 2010. The real retail price of a BZP tablet increased from \$9.86 in 2007 to \$15.83 in 2010. The proportion who considered the price of BZP to be ‘increasing’ rose from 3% in 2007 to 47% in 2010.

Conclusions: The availability of BZP declined immediately following its prohibition. Availability recovered in subsequent years, but not to the pre-prohibition legal level. The price of BZP increased slowly over a number of years following the prohibition.

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1. Introduction

So called ‘legal highs’ containing new psychoactive substances (NPS) have become of increasing concern around the world in recent years (Griffiths et al., 2010, 2013; EMCDDA, 2012, 2013; UNODC, 2013). NPS encompass a range of compound classes including piperazines (e.g., BZP, TFMPP, and mCPP), phenethylamines (e.g., 2C-B, 2C-I), cathinones (e.g., mephedrone, methylone, and MDPV), synthetic cannabinoids (e.g., JWH-018), tryptamines (e.g., DMT), and plant extracts, such as salvia divinorum (EMCDDA, 2012; UNODC, 2013). The number of NPS compounds reported globally increased from 166 at the end of 2009 to 348 in 2013 (UNODC, 2014). The number of online shops selling NPS in Europe increased from 170 in 2010 to 693 in 2012 (EMCDDA, 2012).

A common policy response to NPS around the world has been to attempt to prohibit these compounds (UNODC, 2013; Reuter, 2011;

Coulson and Caulkins, 2012). However, to date, there are only a handful of studies which have attempted to examine the impact of these bans on the prevalence of NPS use (Artur Malczewski, 2011; Sheridan et al., 2013; Stogner et al., 2012; United Kingdom Home Office, 2012; Wilkins and Sweetsur, 2012; Wood et al., 2012), and even fewer which have investigated changes in availability and price (Johnston et al., 2014; EMCDDA, 2011; McElrath and O'Neill, 2011; Winstock et al., 2010b). Some commentators have questioned the impact of NPS bans as the same products remain available from the black market and international websites (Birdwell et al., 2011).

Empirical studies of the impact of prohibition on the price and availability of NPS are largely limited to reports of the immediate impact of banning mephedrone. The price of mephedrone in Europe increased from €10 to €12 (per gram) before its prohibition to €20–€25 following its prohibition (EMCDDA, 2011). A small qualitative study of mephedrone users in Northern Ireland found the price of mephedrone increased from £9 to £15 (per gram) when it was legal to £25–£30 following its prohibition (McElrath and O'Neill, 2011). An on-line survey of people associated with the

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dance music scene in the United Kingdom reported the per gram price of mephedrone increased from £10 when it was legal to £16 after its prohibition (Winstock et al., 2010b). Several studies noted a greater reliance on drug dealers to obtain mephedrone following its prohibition, but suggested availability may not have been greatly affected (Winstock et al., 2010b; Wood et al., 2012; McElrath and O'Neill, 2011). Furthermore, a number of studies have shown illegal drug markets are capable of adapting to control measures overtime (Reuter, 1988; Caulkins and Reuter, 2010; Cunningham et al., 2009, 2011).

New Zealand had an extensive market for benzylpiperazine (BZP) legal highs in the mid-to-late 2000s (Sheridan et al., 2007). BZP is a piperazine-based central nervous system stimulant with approximately one-tenth the potency of dexamphetamine, and subjective and physiological effects similar to other commonly known stimulants, such as amphetamine and 3,4-methylenedioxymethamphetamine (MDMA) (Bye et al., 1973; Campbell et al., 1973; Baumann et al., 2004, 2005; Antia et al., 2009; Lin et al., 2009; Arbo et al., 2012). Adverse effects from BZP use include heart palpitations, agitation, anxiety, confusion, dizziness, headache, tremor, mydriasis, insomnia, urine retention, vomiting, and seizures (Schep et al., 2011). BZP has the potential to create dependency at high dosage levels (Brennan et al., 2007), but there was only limited evidence of dependency among users of legal BZP products in New Zealand (Wilkins et al., 2007). In 2006, 15% of the New Zealand population aged 13–45 years reported using a BZP legal high in the previous year, including 40% of males aged 18–24 years (Wilkins et al., 2007). An estimated 200,000 BZP legal highs were sold each month; generating retail sales of \$24 million per year ($1\text{NZ} = 0.81\text{US} = 0.60\text{€}$; Cohen and Butler, 2011). An estimated 80–120 different BZP legal high products were available during this time (Ministry of Health, 2012). They were sold from a wide range of retail outlets including convenience, liquor and speciality stores, and from internet websites (Sheridan et al., 2007). BZP was prohibited in New Zealand in April 2008 following research linking its use with moderate health risks (see Wilkins et al., 2008; Gee et al., 2005; Sheridan et al., 2007).

The aim of this paper is to examine the impact the BZP prohibition had on the availability and price of BZP over a number of years. The impacts are examined over a number of years to investigate how long the initial impacts of the BZP prohibition last, and the extent to any subsequent illegal BZP market is able to adapt to the new control measures to improve availability and prices. The same market measures are examined for methamphetamine, ecstasy and cannabis over the same years as quasi-control groups (Cook and Campbell, 1979).

2. Methods

2.1. General population survey

A national household survey of BZP and other drug use was conducted in New Zealand in early 2006 and repeated in late 2009 (i.e., over 12 months after the 2008 BZP prohibition; see Wilkins et al., 2007, 2008; Wilkins and Sweetsur, 2012). Both surveys employed the same Computer Assisted Telephone Interview (CATI) methodology and randomly surveyed approximately 2000 people aged 13–45 years from the general New Zealand population (i.e., 2010 = 2006 and 2040 = 2009). The country was divided into 34 strata to represent the different socio-economic characteristics of the population. Each telephone number was tried at least 10 times on different days and times of the day in an effort to reach those seldom at home. Within each randomly selected household one person was randomly selected for an interview. The survey samples were weighted by eligible household size to adjust for the selection of only one person from each household. The 2006 and 2009 surveys achieved a 69% and 64% response rate respectively.

2.1.1. General population measures. Those who had used BZP in the previous 12 months were asked about 'current availability' (i.e., 'very easy', 'easy', 'difficult', 'very difficult'), 'change in availability in the previous 12 months' (i.e., 'easier', 'the same', 'harder') and the 'change in strength in the previous 12 months' (i.e., 'higher', 'the same', 'lower'). Those respondents who had purchased BZP in the previous 12

months were asked 'how much they would spend on the BZP on a typical occasion', 'how much BZP they would receive for that dollar expenditure', 'how the price had changed compared to 12 months ago' (i.e., 'higher', 'the same', 'lower'), and 'how long it would take them to purchase some BZP if they wanted some' (i.e., 'months', 'weeks', 'days', '1 day', 'hours', '1 h', 'less than 20 min'). Those who had used methamphetamine/amphetamine, ecstasy or cannabis were asked about the current availability and change in availability of these drug types in the previous 12 months.

2.2. Survey of frequent drug users

An annual targeted survey of frequent illegal drug users (i.e., the Illicit Drug Monitoring System or IDMS) has been conducted in New Zealand since 2006 to monitor trends in drug markets (see Wilkins et al., 2011b, 2011a). Frequent drug users are considered to be particularly knowledgeable about drug markets as they regularly use and purchase drugs (Hando et al., 1998). The IDMS interviews three types of frequent drug users (i.e., methamphetamine users, ecstasy users and injecting drug users) from the three largest cities of New Zealand (i.e., Auckland, Wellington and Christchurch). The frequent drug users are recruited with purposive sampling and 'snowballing' using three separate community-level recruitment campaigns undertaken in the same locations each year. A total of 300–400 frequent drug users are interviewed each year consisting of equal numbers of the three frequent drug user groups (i.e. 324 = 2007, 404 = 2008, 315 = 2009, and 411 = 2010). The number and types of frequent drug users interviewed in each study site are determined by site targets and the final sample is weighted by location and drug type to ensure consistent annual comparisons. Respondents are screened for eligibility for the drug type they contact the interviewer about and can only be interviewed for one of the groups (i.e. they are mutually exclusive). Participants are required to be 16 years or older, have used the drug type of interest or injected a drug approximately monthly or more often in the past six months, and have resided in the site location for the past 12 months. Eligible participants are administered a structured face-to-face interview at a public venue of their choosing (e.g., café). They are offered a \$20 food voucher for their time and are provided with contact numbers for treatment services. The study procedures have been approved by the Massey University Human Subjects Ethics Committee.

2.2.1. Frequent drug user measures. Those frequent drug users who reported they had knowledge of the availability, strength and price of a drug market (e.g., methamphetamine, ecstasy, cannabis or BZP) were asked about the 'current availability' (i.e. 'very easy', 'easy', 'difficult', 'very difficult'), 'change in availability in the previous 6 months' (i.e., 'more difficult', 'fluctuates', 'stable', 'easier'), 'change in strength in the previous 6 months' ('increasing', 'stable', 'fluctuates', 'decreasing'), and 'change in the price of the drug in the previous 6 months' ('increasing', 'stable', 'fluctuates', 'decreasing'). Those who had purchased a drug type in the past 6 months were asked 'how much they would spend on the drug on a typical occasion' and 'how much of the drug they would receive for that dollar expenditure', and 'how long it would take them to purchase the drug if they wanted some' (i.e., 'months', 'weeks', 'days', '1 day', 'hours', '1 h', 'less than 20 min').

2.3. Analysis

For the general population surveys, chi-square tests were used to test for the difference between the specific categorical measure of interest and all other categories of the measure (e.g., 'easier' vs. combined category of 'the same' and 'harder') in 2006 and 2009. The Rao-Scott Chi-square test was performed which accounts for the stratified sample design and was weighted to adjust for the number of eligible people in the household.

For the frequent drug user surveys, logistic regression was used to test for differences in the proportion of respondents reporting a specific category of interest and all other categories of the measure (e.g., 'easier' vs. combined category of 'the same' and 'more difficult') from 2007 to 2010 and between each pair wise combination of years (e.g., 2008 vs. 2009) with year fitted as a categorical variable. The multiple *p*-values obtained from the pair-wise tests were adjusted for multiple comparisons by using the Bonferroni–Holm step-down method. Regression was used to test for differences in price using the same approach. Spending on drugs and the quantity of drugs purchased were log-transformed to achieve approximately normal distributions.

To calculate the mean retail price of a drug we divided expenditure on a drug on a typical occasion by the quantity reported received for that amount, for retail quantities only. Price was calculated in this way as the typical sale quantity of BZP changed once BZP was made illegal (i.e., standard retail packs of 3–4 tablets to lose individual tablets) and to take account of the quantity discounts available in illegal drug markets (Wilkins et al., 2005). The retail quantities were defined as the quantity that approximately 80% of the respondents had purchased on a typical occasion (i.e., 6 or less BZP tablets, 0.3 g or less methamphetamine, 2 tablets or less ecstasy and 4.5 g or less cannabis). These cut-off points were cross checked with other survey and police intelligence sources (NDIB, personal correspondence, 2012). Finally, we calculated the real (i.e., inflation adjusted) price based on equivalent 2010 dollars. We also include the nominal price where no account has been made for price inflation.

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