ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis Behavioural & Health Economics

The "Ostrich Effect" in Obtaining Additional Information Among Ecstasy Consumers

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November 14, 2022

Content

Abstract

In previous papers in behavioural economics, the avoidance of obtaining additional information has been called the "The Ostrich Effect", mainly referring to obtaining information that can be considered negative or confrontational. This paper further investigates whether the "Ostrich Effect" occurs for consumers of ecstasy in the Netherlands for obtaining additional information about the ecstasy. Three different ways of obtaining information are distinguished, these are testing in a lab, using the Red Alert App for additional information or obtaining information from the dealer of the ecstasy. The data was collected by distributing a questionnaire among young adults that included hypothetical situations in obtaining information about ecstasy. The current study found that information avoidance does occur however, consumers are willing to obtain information when they are triggered by an event of contaminated drugs. Determinants such as gender, income, education level, frequency of use do not seem to have an effect on avoiding obtaining information. Age seemed to have an effect, as in younger participants were more likely to test their ecstasy or download the Red Alert App after the news of a contaminated pill. At last, anonymity is important to consumers, but they are willing to substitute this for accessibility of testing. Despite signs that "The Ostrich effect" seems to be present, it appears that unawareness on the possibilities to gain addition information on ecstasy also could play a significant factor. This is where further research is necessary and future policy makers could intervene.

Introduction

The term "The Ostrich Effect" was first mentioned in an article by D. Galai and O. Sade in 2006 to describe individuals who avoid gaining information when the outcome might be unfavourable in a financial situation, their experiment showed that people in the stock market reviewed their financial situation more when their financial situation was favourable and less when it was unfavourable. The term Ostrich Effect is used to describe an individual's behaviour in risky situations, since ostriches are believed to treat risky situations by pretending they do not exist and put their head in the ground (Galai et al., 2006). Another example of the occurrence of the "Ostrich Effect" is seen at the study of Olafsson (2017) that looked at the amount of attention an individual spends on their financial accounts, they concluded that attention is decreasing when an individual has to spend money or overdrafts occur, while attention is increasing for positive events like cash holdings and liquidity. It was also found in the study that attention for the financial account increased when the balance shifted from negative to positive (Olafsson, et al 2017). This example shows that "The Ostrich Effect" tends to occur for information that could be seen as risky or negative for an individual.

Where classical economic theories on utility predicts that consumers always prefer to gain information when it is free of cost over no information, even if the free information has almost zero to little utility (Fishburn, 1968). However, it seems that in reality consumers do not always prefer to gain additional information. With empirical examples it has been proven that this effect can occur in a variety of situations, from situations in the workplace to even actively avoiding information about an individual's own health (Goldman et al., 2017). According to the rational choice theory of Adam Smith that is considered as a classical economic theory an individual would trade off the costs and benefits of seeking information (Friedman et al., 1988). In this classical theory of Adam Smith an individual would spend the same amount of attention to its financial account for a gain and its equal loss. According to the von Neumann-Morgenstern utility theory, which is considered a classical economic theory, a person behaves rationally when facing different risky choices of a situation. The person behaves in such a way that it strives to maximise the expected value of its own utility function at a given time of the future (Neumann et al., 1947).

Even if the information is useful, there are several reasons why people might avoid gaining information ("Ostrich effect"). This could be for hedonic reasons, such as discomfort,

sadness, fear, increased uncertainty or cognitive dissonance (Taylor and Brown, 1988; Sullivan et al., 2004; Ganguly and Tasoff, 2016; Golman and Loewenstein, 2018; Akerlof and Dickens, 1982; Edenbrandt et al., 2021). However, there could also be other determinants that influence non-health seeking behaviour. A study of Eriksson-Backa, et al. (2018) found that gender and education influence in avoiding information on health, concluding that man and lower-educated individuals avoid more information than woman or higher-educated individuals. A study of Ramanadhan et al., (2009) found that nonseekers of health information were lower educated and had a lower income compared to health information seekers. Furthermore, a study of Ek (2015) concluded that the female gender where much more interested in and active seeking for health related information compared to the male gender. Besides gender, education level and income, Shi (2019) fount that risk perception was an important factor in seeking health information behaviour. Risk perception was negatively associated with health information avoidance, e.g., if participants had a high perceived health risk they were more likely to seek health information (Shi, 2019). A study of Kim et al., (2018) found that younger adolescents, compared to older peers, rated the chances that health risks happen to them (risk perception) as significantly lower. Also a recent study of Megías-Robles et al., (2022), found that age was positively correlated with risk perception.

In behavioural economics there are several theories that indicate a consumer does not always act rational when facing risky choices. For instance, the prospect theory shows that individuals value gains and losses differently, placing more weight on perceived gains versus perceived losses while classic theories consider it to be linear (Kahneman et al., 1979). Another example that contradicts the classic economic theory is an experiment conducted by Slovic and Tversky, (1979) this experiment shows that subjective expected utility is not always normative. Both studies prove that even after explaining the logic of the experiment and what would be the best choice in the experiment, people still were not convinced and made the irrational choice (Slovic and Tversky, 1979; Kahneman et al., 1979). According to a more recent study by Björkstedt (2018), who studied the role of hedonism when making choices for indulgent substances (candies, drugs and alcohol), it was concluded that individuals do not want to attain information on the indulgent substance (for this study it was chocolate) that could surprise of upset them (Björkstedt, 2018). Also, Reisch et al., (2021) concluded that a substantial percentage of their participants do not want to receive information even when it improves the consumers health or welfare.

However, there are not so many studies about the occurrence of the "Ostrich Effect" for indulgent substances such as ecstasy or other drugs. For the Netherlands it might be even more interesting because there it is possible to legally obtain additional information on drugs for the consumer of the drugs. Since the 1990s, the Dutch Ministry of Health has made it possible to test illicit drugs for consumers, in order to prevent serious health hazards associated with unexpected dangerous substances (Brunt et al., 2011). Selling, buying, owning and using ecstasy is illegal in the Netherlands, therefore it is sold in the illegal circuit. This results that there is no national monitoring on the quality, and thus safety, of the product. If someone produces or sells contaminated ecstasy, there is no official control that prevents the product to be sold on the market (Brunt et al., 2011).

Besides the hazard of contamination, consumers often do not know the quantity of amphetamine that is present in the ecstasy that is bought (Wanjek et al., 2007). It is important to know this information in order to know what dosage someone is going to consume (Jellinek, 2022). The amount of amphetamine in an ecstasy pill has increased in recent years. This means that one ecstasy pill 10 years ago contained less amphetamine than one ecstasy pill today (GGD, 2022). Because of the increase of amphetamine in a pill it has become easier to consume an overdose. To prevent taking an overdose or take an contaminated pill, it becomes more and more important to gain additional information about the ecstasy a consumer is going to take.

In this paper we will further investigate these three main ways for a consumer to obtain additional information on its ecstasy in the Netherlands. The three main ways are testing ecstasy in a lab, gaining information by using the Red Alert App or by gaining information from the supplier of the ecstasy, often named "the dealer". First, testing the ecstasy in a laboratory. Testing ecstasy in a lab gives the most valuable information, as you collect information on what substances are in the ecstasy and in what quantities the substances are present. Testing the ecstasy is free of monetary cost however, there are still some non-monetary costs that should be considered. For example, travelling to the service location and people could still experience a stigma for testing ecstasy even though the test is done anonymously. Numbers suggest that testing ecstasy in a lab is relatively low compared to the consumption of ecstasy (National Drug Monitor, 2022).

Second, a consumer can check and compare its own ecstasy with the online database of the GGD by using the Red Alert App. The Red Alert App is an app to compare the acquired

ecstasy in a database with a list of known tested ecstasy pills. The additional information that can be received can reduce the risk to a consumer's own health, physically and mentally (Brunt et al., 2011). There are no monetary costs for downloading and using the Red Alert App, the only non-monetary costs a person has to make is by downloading and using the app by yourself (GGD,2022).

Third, a consumer can inquire information about the ecstasy at the seller of the ecstasy. However, the gained information is more unreliable than an actual laboratory test. The dealer might have an incentive to always claim that the quality of the ecstasy is reliable and has been tested, while it is actually not, to gain the trust of the buyer. The non-monetary costs you have to make to gain this information is the effort you have to make to ask the dealer for additional information, where there might be a stigma in confronting the dealer. However, this is a simple and fast way of gaining additional information about the acquired ecstasy.

It is important to note that anonymity could play an important role in obtaining additional information on illicit health behaviour. As stated before, obtaining and using ecstasy is still illegal in the Netherlands. Anonymity provides immunity against revealing that people are involved in illicit and stigmatising behaviours (McKenna et al., 2014; Wood et al, 2010; Barratt, 2011). The importance of anonymity can also be seen in the article of Warner et al., (2011) that show that US soldiers that went on deployment in Iraq or Afghanistan reported significantly more (mental) health problems when the mandatory screening was anonymous instead of a personal screening.

Little is still known if the "Ostrich Effect" occurs on obtaining additional information about ecstasy. However, based on the findings of the studies mentioned before it could be expected that consumers avoid such information. Therefore, the first research question (RQ) is:

RQ1: "Does information avoidance ("The Ostrich Effect") play a significant role for consumers in obtaining additional information about their ecstasy?"

Previous literature already suggests that Ostrich effect does occur in gaining additional information on indulgent substances (Björkstedt, 2018). Besides consumers are willing not to receive further information for hedonic reasons (Taylor and Brown, 1988; Sullivan et al., 2004; Ganguly and Tasoff, 2016; Golman and Loewenstein, 2018; Akerlof and Dickens, 1982; Edenbrandt et al., 2021) or do not make the rational choice (Slovic and Tversky, 1979; Kahneman et al., 1979). Therefore, it could be hypothesised that consumers of ecstasy do not

necessarily want to receive additional information about the drugs they take beacuse they know it could result in negative new information. To prevent gaining negative news, they prefer to avoid information about the ecstasy they take. Which thus result in the phenomenon "Ostrich effect".

Furthermore, less is known about specific determinants that could influence information avoidance on additional ecstasy information. Therefore, the second research question is:

> RQ2: "Are there specific determinants that influence the consumers in avoiding information?"

Literature suggests that male gender, lower education level and lower income are determinants for seeking less health information (Eriksson-Backa, et al. 2018; Ramanadhan et al., 2009; Ek, 2015). Furthermore, younger people perceive less health risk which also is a determinant for nonseeking health information (Shi, 2019; Kim et al., 2018; Megías-Robles et al., 2022). Therefore our hypothesis is that male gender, lower educated people, younger people and people with a lower income obtain less additional information about ecstasy. In addition, it could be that frequent ecstasy users seeking less additional information. A study of Singer et al., (2011) found that more frequent ecstasy users, use ecstasy more uncontrolled.

At last, it is not known if anonymity plays a role in gaining additional information about ecstasy. Therefore, the third research question is:

> RQ3: "How does anonymity influence the consumer in avoiding information?"

Studies have shown that anonymity could play an important role in illicit health behaviour because it could provide immunity against revealing that people are involved in illicit and stigmatising behaviours (McKenna et al., 2014; Wood et al, 2010; Barratt, 2011). Therefore, we hypothesise that anonymity also plays an significant role in gaining additional information about ecstasy.

In this study gaining additional information on ecstasy for the first and second research question is divided for the three different types (lab testing, using the Red Alert App or asking the dealer). The third research question is only divided for lab testing and using the Red Alert App because anonymity for asking the dealer is not feasible.

Background

What often is associated with nightlife among young adults is the consumption of alcohol and drugs. Drugs are used as a means of pleasure when going out. It can be used for several reasons; a person can use it to endure longer on his/her night out, to add an extra element of experience to his/her evening, or to relax and use the drugs as a sedative (Trimbos, 2022). These are short-term "positive" effects of the consumption of drugs.

One of the drugs which is consumed by young adults is ecstasy, especially in the Netherlands. A study among students in Groningen showed that 30.8% of the Dutch students had recently used party drugs (mostly ecstasy) where the share of international students in Groningen who had recently used party drugs was 19.8%, (van den Bos et al., 2017). According to the Trimbos Instituut (Dutch research institute for drugs usage and mental health) the Dutch are also leading in EU-countries in the consumption of ecstasy within the last year with 4% of the Dutch population between 15-64 years old, number two is Ireland with 2,7% of the population to consume ecstasy within the last year. Figure 1 shows the consumption of ecstasy within the last year among EU-countries where it can be observed that the Netherlands is clearly ahead of all other countries in ecstasy consumption.

Figure 1: Percentage of inhabitants between 25-65 years old that used ecstasy in the last year.
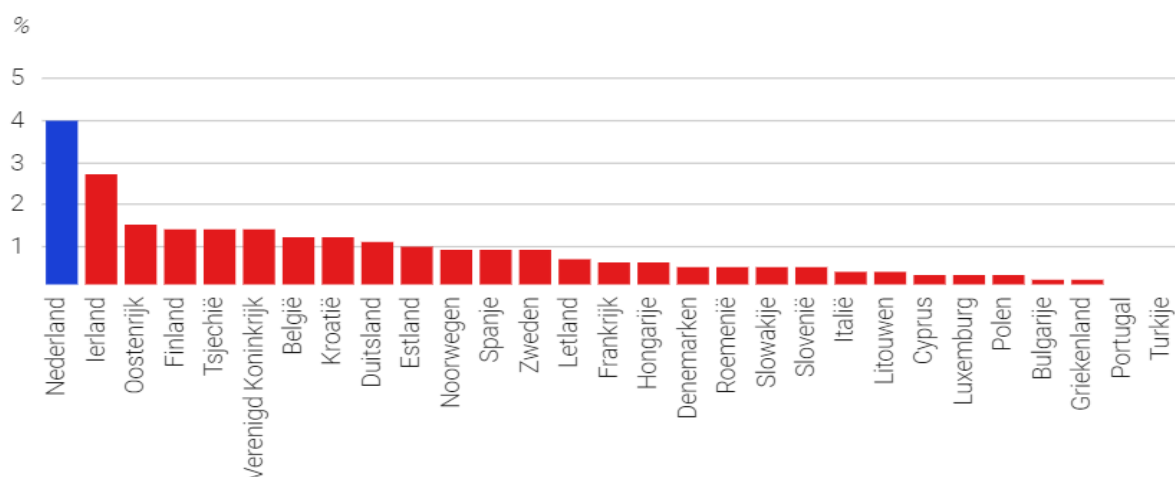
Gemaakt met ANP/LocalFocus   Bron: European Drug Report 2022, EMCDDA

Hazards of consumption of ecstasy

Besides the short-term positive effects that are mentioned before, consuming ecstasy can damage the consumer's health; both physically and mentally. This can be caused by long-term consumption, overdose of ecstasy, consumption of contaminated ecstasy or a combination

with alcohol and/or other types of drugs (Rijksinstituut voor Volksgezondheid en Milieu, z.d.). Physical consequences of ecstasy consumption could be a heat-stroke, liver failure and heart failure (Trimbos, 2020). Psychiatric consequences of ecstasy consumption could be schizophrenia-like symptoms, neurological damage, anxiety issues and unwanted flashbacks (Trimbos,2020; Shewan et al., 2000). In extreme cases of consuming ecstasy, it can cause a person to suffer from water intoxication, which can result in death. (Trimbos, 2020). In 2018, 31% of the drug-related incidents in the Netherlands was due to the consumption of ecstasy (Jellinek, 2022).

Besides the hazard for a consumer's mental and physical health, ecstasy goes hand in hand with the criminal circuit in the Netherlands with an estimated turnover of €18.9 billion (Tops et al., 2018). Buying and consuming ecstasy is punishable by law in the Netherlands in many situations. Participating by buying and consuming ecstasy means participating in the illegal circuit.

A final element that is important to mention is the environmental impact of the production of ecstasy. Illegal drug waste disposal is a growing problem that consumers of ecstasy often do not know about or do not want to think about. (Trimbos, 2022)

Despite these negative consequences of ecstasy consumption, the growing amount of people consuming ecstasy indicates that consumers prefer the short-term benefits of ecstasy consumption over the negative consequences for health and society as mentioned before (Trimbos.,2022). The actual consumption of ecstasy can be explained by using the theory of planned behaviour, a theoretical framework to predict and explain human subsequent behaviour and cognitions in a specific context (Ajzen, 1991; Nool, 2013). According to the theory of planned behaviour, subjective norms, attitudes, intentions and perceived behavioural control could predict the actual use of ecstasy by young people (Nool, 2013). According to different studies the best predictor for the intention to consume ecstasy was a positive attitude towards it (Conner et al., 1998; Mcmillan & Conner, 2003; Orbell et al., 2001; Peters, Kok & Abraham, 2007; Umeh & Partel, 2004). This means that if young adults focus on the short-term benefits of ecstasy and therefore, develop a positive attitude towards ecstasy, it is more likely that they will consume ecstasy.

Lab testing

Testing in a laboratory can be done for free at the "Gemeentelijke Gezondheidsdienst" (GGD) throughout different locations in the Netherlands for consumers. Consumers will hand over, anonymously, a sample of ecstasy at a test service point. Testing the ecstasy is free of monetary cost however, there are still some non-monetary costs that should be considered. For example, travelling to the service location, and people could still experience a stigma for testing ecstasy even though the test is done anonymously. These examples can be considered as a cost for testing. The sample, which is handed over, will directly be tested in a laboratory on the spot and the consumer will receive an immediate result of the test (GGD, 2022; Jellinek, 2022).

The data on lab testing are published every year online by Drugs Informatie en Monitoring Systeem (DIMS) a department of the Trimbos Instituut. These numbers showcase the number of samples that are handed in for Lab testing. Of the samples handed in for 2020 almost half of them were ecstasy pills, 48% (Jaarbericht Trimbos). Figure 2 shows the number of samples handed in weekly for testing over 2019 and 2020. Figure 3 shows the types of drugs that are handed in as samples weekly over 2020. Summarizing figures 2 and 3, in 2019 on average around 400 samples are tested weekly and in 2020 the first couple of weeks also around 400, but later that year due to Covid-19 restrictions the number of samples handed in dropped. It also shows that ecstasy is the most popular drug to be handed over for lab testing. If these numbers are compared to the number of young adults (18 -25 years) who consumed ecstasy in the Netherlands in 2020, around 45.000 (National Drug Monitor, 2022), it could be suggested that the testing of ecstasy in a lab is relatively low compared to the consumption of ecstasy.

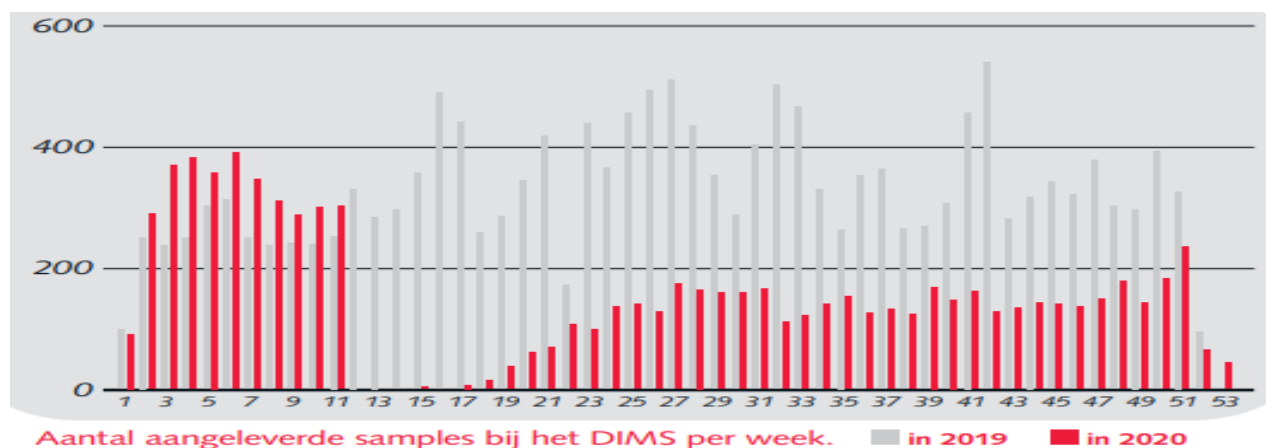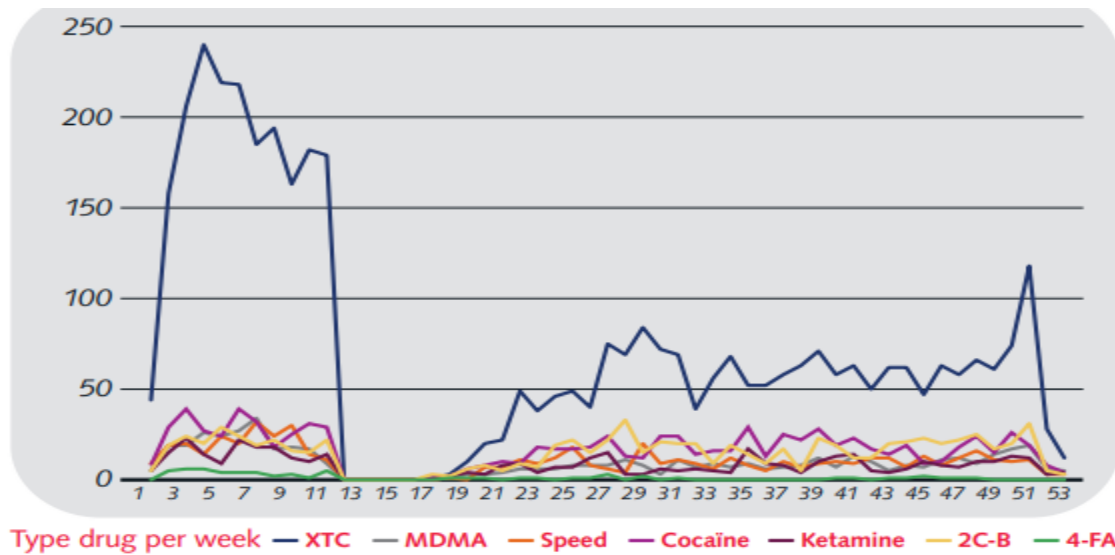Figure 2: Number of samples delivered for testing weekly in 2019 and 2020

Aantal aangeleverde samples bij het DIMS per week. ▇ in 2019 ▇ in 2020

Figure 3: Types of drugs tested by week in 2020

Red Alert app

In the Red Alert App the GGD showcases the different kinds of ecstasy that they have tested previously and give a short summary about the origin, ingredients of the pill and create an awareness (GGD,2022). Ecstasy is often made in batches with a specific character and specific colour (e.g., logos of fancy brands and music bands) a consumer can compare its acquired ecstasy with the database to gain additional information. The Red Alert App also spreads an alert when a contaminated pill is currently on the market, this is called a "Red Alert" (GGD, 2022). This second type of testing is a fast way in which a consumer can gain information about the ecstasy they bought. The Red Alert App was launched in 2016 in the App store and Google Play Store and has always been free of monetary cost to download. The Red Alert App is updated monthly by updating the "Blacklist" in the App or when necessary a "Red Alert" will be called out in the app, this "Red Alert" occurs around one time every two years. Since the launch in 2016 the App has been downloaded over 135.000 times. In 2021 the app was downloaded 22.000 times in the App Store and 10.400 times in the Google Play Store (Total of 32.400 in 2021). The app was also deleted around 14.000 times in total in 2021. In 2021 around 10 pills have been added to the "Blacklist" and for one Ecstasy pill (The Tesla-Pill) the "Red Alert" protocol was started. (M. van Goor, personal communications, June 9, 2022).

Methods

Participants

Participants that are included in this study were Dutch young adults aged 18 years and older who at least once in their life consumed ecstasy. If the participants never used ecstasy or were younger than 18 years old, they were excluded from the study. Participants who were less frequent consumers of ecstasy were not excluded from the study because these participants still had some experience and faced the hazards of consuming ecstasy. In addition, they could empathise in the hypothetical questions (explained later on). Participants for this study were recruited in August 2022 through social media and snowballing (e.g., research participants recruit other research participants). All participants were invited to finish an online questionnaire that could be filled in by mobile phone, laptop or computer.

Measurements

Questionnaire

The questionnaire was constructed with the programme Qualtrics and is presented in appendix A. The questionnaire started with a disclaimer for the participants, including some information that participation is completely voluntary, anonymously and that the data would be treated confidentially and only for the purpose of this thesis. They received background information and were informed that if they would like more information, they could contact the researcher. The first question was followed by informative questions to examine how well informed the participant already was on the different types of testing ecstasy in the Netherlands. The informative questions were followed by hypothetical questions to examine information avoidance. After the hypothetical questions the participants were asked some background questions about age, education level, gender and work situation.

All the questions were multiple-choice by using dichotomous, ordinal or nominal response scales. As the participants of the questionnaire were Dutch, the language of the questionnaire was also in Dutch. This ensured that the participants understood the questions and increased the validity of their answers. The questionnaire was pre-tested on length of time and understanding. The questionnaire took around 5 minutes to complete.

RQ1: Information avoidance in obtaining additional information about ecstasy

Information avoidance was divided into three types. First, information avoidance through lab testing was inquired by the demographic question how often participants tested their ecstasy.

Followed by the dichotomous (yes/no) hypothetical questions: "Suppose there is a new contaminated ecstasy pill on the market, would you rather have your drugs tested in a lab?". Second, information avoidance through the Red Alert App. The use a knowledge of the Red Alert App was asked with demographic questions. Followed by the dichotomous hypothetical questions: "Suppose there is in the news that there is a contaminated ecstasy pill on the market, would you download the Red Alert App on your phone?". Third, information avoidance through

 asking the dealer. A demographic question was asked if participants ever asked their dealer for information about their ecstasy. Followed by the dichotomous hypothetical question: "Suppose the dealer could give you a form with information about the ecstasy, would you accept this form?".

RQ2: Determinants that could influence the consumers in avoiding information
To measure the influence of determinants on avoiding information, the determinants frequency of using ecstasy, age, gender, educational level and work situation, were used in this study. The frequency of using ecstasy was inquired by the question: "How often do you use Ecstasy?". Age was inquired by the question: "What is your age?". Gender was inquired by the question: "What is your gender?". Education level was inquired with the question: "What is your highest level of education or education that you are currently working on?". Work situation was inquired by the question: "What is your current work situation?". Avoiding information was again divided in the three types as mentioned before.

RQ3: The Influence of anonymity in avoiding information
The influence of anonymity was measured for lab testing and using the Red Alert app. First, anonymity for lab testing was inquired by the dichotomous question: "If you have your ecstasy tested, would you always want to do this anonymously", followed by the dichotomous hypothetical question "Suppose you could test your drugs for free on the spot at a festival, would you use it?". Second, anonymity for using the Red Alert App which was inquired by the dichotomous hypothetical question "Suppose you received a phone from your employer that you use privately and for work, would you download the Red Alert App on it if you knew that there is a contaminated ecstasy pill on the market?".

Statistical analyses

The study population was described by using descriptive statistics.

RQ1: Information avoidance in obtaining additional information about ecstasy

To study information avoidance, first an estimated risk was calculated, including a 95% confidence interval, to establish the likelihood of the hypothetical questions about testing ecstasy in a lab, downloading the Red Alert App, and ask the dealer for a form. Second, to investigate whether there was a difference in the information consumers collect at the moment they hear a contaminated ecstasy pill is on the market, 2x2 tables were composed. Because the measurements were within a person, a McNemar-test was used to test if the expected counts were statistically significantly different compared to the observed counts. A p-value lower than 0.05 was considered as statistically significant.

RQ2: Determinants that could influence the consumers in avoiding information

To study the influence of determinants on the three types of information avoidance, there was investigated of the determinants were dependently related to the hypothetical questions about lab testing, using the Red Alert app and asking the dealer. To investigate dependently, a Chi-Square test was performed. A Chi-Square test, tests associations between two normal variables, by comparing the differences between the expected values and the observed values. If the Chi-Square test is statistically significant ($p < 0.05$) there was concluded that the null hypothesis of independence could be rejected and that there is an association between the determinant and the hypothetical question. A Chi-Square was more reliable if 80% of the expected counts were 5 or more and all individual expected counts were 1 or greater. All analyses were pre-tested for this, and categories were adjusted if they did not meet this criterion.

RQ3: The Influence of anonymity in avoiding information

To study the influence of anonymity for lab testing and the Red Alert App, again a McNemar-test was performed for a 2x2 table. For lab testing a 2 x 2 table was composed for the questions "If you have your ecstasy tested, would you always want to do this anonymously" and "Suppose you could test your drugs for free on the spot at a festival, would you use it?". For the Red Alert App, a 2 x 2 table was composed for the questions "Suppose you could test your drugs for free on the spot at a festival, would you use it?" and

"Suppose you received a phone from your employer that you use privately and for work, would you download the Red Alert App on it if you knew that there is a contaminated ecstasy pill on the market?". The McNemar-test was followed by calculating an estimated risks for the hypothetical questions: "Suppose you could test your drugs for free on the spot at a festival, would you use it?" and "Suppose you received a phone from your employer that you use privately and for work, would you download the Red Alert App on it if you knew that there is a contaminated ecstasy pill on the market?".

All the statistical analyses were performed by using IBM SPSS statistical software, version 28.0 for Windows.

Results

When the questionnaire data was extracted from Qualtrics, there were a total of 50 responses. Of these 50 responses, one respondent was removed because the questionnaire had not yet been completed. Of the 49 respondents, 13 had never consumed ecstasy. These 13 respondents were excluded from further analyses. In total 36 respondents were included in the analysis.

Table 1 shows the descriptive statistics. Of the 36 participants, 44.4% were male and 52.8% were female. Among the participants, no one had an age of 21 years or younger, 25% were between the ages of 22 and 25 and 72.2% were between the 26 and 30 years old. Only one participant was over 30 years old. All respondents had an education or are in the process of obtaining a degree. Most participants have a master's degree or are working on attaining a master's degree, namely 58.3%. In addition, most participants, 72.2%, had a full-time job.

Of the participants, 5.6% indicated that they consumed ecstasy over 12 times per year, 8.3% consumed ecstasy between 6 and 12 times a year and 11.1% of the participants consumed ecstasy between 3 and 6 times a year. Most respondents consumed ecstasy between 1 and 3 times a year (47.2%). A slight majority, 58.3% indicated that they were aware of the possibility for free lab testing of ecstasy. However, only 6 participants (16.7%) indicated that they had ever tested their ecstasy in a lab. Of those 6 participants only 2 tested their ecstasy every time they were going to use it. In addition, only 22.7% of the participants were familiar with the existence of the Red Alert App. Besides, only 11.1% had downloaded the Red Alert App before participating in the questionnaire and 8.6% had actually used the Red Alert App. At last, one third of the participants ever asked the dealer if the ecstasy was tested (33.3%).

Table 1: *Descriptive study population*

	Total
Sex	
- **Man**	16 (44.4%)
- **Woman**	19 (52.8%)
- **Other**	1 (2.8%)
Age (years)	
- **18-21 years**	0 (0.0%)
- **22-25 years**	9 (25%)
- **26-30 years**	26 (72.2%)
- **30-35 years**	1 (2.8%)
Education	
- **No diploma**	0 (0.0%)
- **Elementary education**	0 (0.0%)
- **VMBO – MBO1**	1 (2.8%)
- **HAVO, VWO, MBO2-4**	5 (13.9%)
- **Bachelor (HBO/WO)**	9 (25%)
- **Master (HBO / WO)**	21 (58.3%)
- **Doctor, PHD**	0 (0.0%)
Current Work Situation	
- **Fulltime**	26 (72.22%)
- **Parttime**	6 (16.67%
- **Full time studying**	3 (8.33%)
- **Looking for a job**	0 (0.0%)
- **Unemployed and not looking for a job**	1 (2.78%)
- **Otherwise**	0 (0.0%
Frequency of Ecstasy use	
- **More than 12 times per year**	2 (5.56%)
- **6-12 times per year**	3 (8.33%)
- **3-6 times per year**	4 (11.11%)
- **1-3 times per year**	17 (47.22%)
- **Less than 1 time per year**	4 (11.11%)
- **Have used Ecstasy in the past but I quit using Ecstasy**	6 (16.67%)

Aware of testing Ecstasy for free	
- **Yes**	21 (58.33%)
- **No**	15 (41.67%)
Ever tested ecstasy in a lab	
- **Yes**	6 (16.67%)
- **No**	30 (83.33%)
How often have you tested Ecstasy in the lab (when answered yes at: Ever tested drugs in a lab)	
- **Every time before I consume Ecstasy**	2 (33.33%)
- **The moment I use a new type of Ecstasy**	1 (16.67%)
- **From time to time**	2 (33.33%)
- **I have done it once**	1 (16.67%)
Known with the Red Alert App	
- **Yes**	8 (22.86%)
- **No**	27 (77.14%)
Have downloaded the Red Alert App	
- **Yes**	4 (11.11%)
- **No**	32 (88.89%)
Have used the Red Alert App	
- **Yes**	3 (8.57%)
- **No**	33 (91.43%)
Did you ever ask your dealer if the ecstasy was tested?	
- **Yes**	12 (33.3%)
- **No**	18 (50%)
- **I never bought it myself**	6 (16.7%)

RQ1: Information avoidance in obtaining additional information about ecstasy

Lab testing. Only 16.7% of all respondents obtain information about their ecstasy pill through lab testing (Table 2). Overall, respondents were 1.7 times more likely to test their ecstasy if they heard a contaminated pill was on the market (95%CI: 1.24 - 2.23). All respondents who ever tested their ecstasy, would test their ecstasy if they heard that there was a new contaminated ecstasy pill on the market. Of the respondents who never tested their ecstasy, a statistically significant amount (60%) would test their ecstasy if they heard that there was a new contaminated pill on the market ($p < 0.01$). (Table 2)

Red Alert app. Out of all the participants, only 9% had downloaded the Red Alert App. Participants were 1.41 times more likely to download the Red Alert App after the news that a contaminated pill was on the market (95%CI: 1.13 – 1.77). The participants who ever used the Red Alert App would all download it after the news a contaminated pill was on the market. Of the participants who did not use the Red Alert App, 71% would download the app after the news a contaminated pill was on the market ($p < 0.01$). (Table 2)

Dealer. Of all participants, 60% had never asked their dealer if the ecstasy was tested (Table 2). Of the participants who bought ecstasy for themselves but did not ask the dealer if the pills were tested, 77.8% would accept an informative form about the ecstasy if the dealer could give it to them ($p < 0.001$). Participants were 1.18 times more likely to accept an informative form with information about the drugs if the dealer could give it to them (95%CI: 0.87 – 1.59). (Table 2)

Table 2: Information avoidance in obtaining additional information about ecstasy

	Lab testing Yes	Lab testing No		Download the RAA Yes	Download the RAA No			Ask dealer/ Accept the form Yes	Ask dealer/ Accept the form No
Before news a contaminated pill is on the market	6 (17%)	30 (83%)		3 (9%)	32 (91%)		Before an informative form is available	12 (40%)	18 (60%)
After news a contaminated pill is on the market	24 (67%)	12 (33%)		25 (71%)	10 (29%)		After an informative form is available	25 (83%)	5 (17%)
	McNemar test: <0.001 Risk estimate[a]: 1.667 (95%CI: 1.24 - 2.23)			McNemar test: <0.001 Risk estimate[b]: 1.455 (95%CI: 1.13 – 1.77)				McNemar test: <0.001 Risk estimate[c]: 1.179 (95%CI: 0.87 – 1.59)	

[a] For cohort: "Suppose there is a new contaminated ecstasy pill on the market, would you rather have your drugs tested in a lab?" = "yes".

[b] For cohort: "Suppose there is in the news that there is a contaminated ecstasy pill on the market, would you download the Red Alert App on your phone?"= "yes".

[c] For cohort: "Suppose the dealer could give you a form with information about the ecstasy, would you accept this form?"= "yes".

RQ2: Determinants that could influence the consumers in avoiding information

Lab testing. Age and testing ecstasy after the news a contaminated pill was on the market were dependent variables. Of the participants between 22-25 years, 100% would test their ecstasy after the news of a contaminated pill, versus 55.6% of the 26-35 years old participants (p = 0.014). Gender, education level, working situation and frequency of using ecstasy were all independent from testing ecstasy after the news that there was a contaminated pill on the market (Table 3).

Red Alert App. Table 3 shows that the frequency of consuming ecstasy, gender, education level and working situation were independent related to downloading the Red Alert App after the news a contaminated ecstasy pill was on the market. In contrast, younger participants (age 22-25 years) would statistically significantly download the Red Alert App more after the news of a contaminated pill than older participants would do (26-35 years) (p= 0.028).

Dealer. Table 3 shows that age, gender, level of education, working situation and frequency of using ecstasy were all independently related to accepting an informative form from the dealer.

Table 3: Comparing determinants for information avoidance of drugs testing, downloading the Red Alert App or accepting the form after the news that there was a contaminated ecstasy pill on the market.

	Lab testing Yes[a]	Lab testing No[a]	Chi-quadrat	Download the RAA Yes[b]	Download the RAA No[b]	Chi-quadrat	Accept the form Yes[c]	Accept the form No[c]	Chi-quadrat [a]
Gender • **Man** • **Women**	9 15	7 4	$X^2(1) = 2.08$ $p = 0.150$	11 14	4 5	$X^2(1) = 0.001$ $p = 0.982$	13 15	3 4	$X^2(1) = 0.03$ $p = 0.865$
Age • **22-25** • **26-35**	9 15	0 12	$X^2(1) = 6.00$ $p = 0.014$	9 16	0 10	$X^2(1) = 4.85$ $p = 0.028$	8 21	1 6	$X^2(1) = 0.53$ $p = 0.466$
Education level • **MBO** • **Bachelor** • **Master**	4 4 16	2 5 5	$X^2(2) = 2.86$ $p = 0.240$	3 7 15	2 2 6	$X^2(2) = 0.49$ $p = 0.780$	4 7 18	2 2 3	$X^2(2) = 1.14$ $p = 0.566$
Current work situation • **Full time** • **Part time** • **Study/ No job**	16 4 4	10 2 0	$X^2(2) = 1.77$ $p = 0.413$	16 5 3	9 1 0	$X^2(2) = 2.24$ $p = 0.326$	22 4 3	4 2 0	$X^2(2) = 1.79$ $p = 0.410$
Frequency of using ecstasy • **High** • **Medium** • **Low**	4 14 6	1 7 4	$X^2(2) = 0.6$ $p = 0.741$	4 14 7	1 7 2	$X^2(2) = 0.59$ $p = 0.744$	4 17 8	1 4 2	$X^2(2) = 0.005$ $p = 0.997$

Hypothetical question: "Suppose there is a new contaminated ecstasy pill on the market, would you rather have your drugs tested in a lab?"
[b] Hypothetical question: "Suppose there is in the news that there is a contaminated ecstasy pill on the market, would you download the Red Alert App on your phone?"
[c] hypothetical question: "Suppose the dealer could give you a form with information about the ecstasy, would you accept this form?"

RQ3: The influence of anonymity in avoiding information

Lab testing. If participants would test their ecstasy in a lab, 94.4% would like to do it anonymously. However, if participants could test their ecstasy for free on a festival but not anonymously, 96.7% of the participants would like to test their ecstasy on a festival (p = 0.219). Participants were 1.71 times more likely to test their ecstasy if it was available for free at a festival (95%CI: 0.42 – 6.87).

Red Alert app. Of the 71% of the participants who would download the Red Alert App after the news of a contaminated pill, 80% would not download the app if they used a company phone (p < 0.01). Participants were 0.8 times more likely to download the Red Alert App on a company phone after the news there was a contaminated pill on the market (95%CI: 0.66 - 0.97).

Discussion

The aim of this study was to investigate if information avoidance, "The Ostrich Effect", played a significant role for consumers in collecting additional information about their ecstasy. Despite the Netherlands providing facilities, without any monetary costs, for the consumer to collect additional information about the ecstasy pill, most of the participants made no use of these facilities. As this would assume that "The Ostrich Effect" does occur there also seemed to be the occurrence of unawareness among the participants if you consider the collected data. As 42% were not aware of the existence of free lab testing in the Netherlands and 77% were not aware of the existence of the Red Alert App. When there would be in the news that there is a contaminated pill on the market, participants were more likely to test their ecstasy in a lab and download the Red Alert App. Besides, if non-monetary costs for asking the dealer could be removed, by handing over an informative form by the purchase of the ecstasy pill, participants were more likely to accept this. In the present study most determinants had no influence on gaining additional information. Only age was dependently related to lab testing and downloading the Red Alert App, as in after the news of a contaminated pill younger participants (age 22-25 years) would download the Red Alert App more and would test their ecstasy in a lab compared to older participants. The results further show that in contrast, lack of anonymity, such as using a company phone, could undo the likelihood of gaining information. Participants prefer to test the drugs anonymously. But if it is arranged for the participants to have the drugs tested for free at a festival, they are willing to give up their anonymity for this and have it tested at the festival. This result alone shows that anonymity is important to participants. However, participants are willing to trade their anonymity for the service if it can be arranged for free and on location. For example, if it is present at a festival they are willing to test the ecstasy on the festival.

The results were in line with the hypothesis that consumers avoid gaining additional information about their ecstasy pill, even though the current government policies already tackled the blockade of accessibility of the resources for additional information by providing it for free. Only if participants were made more aware of the dangers, they were more likely to gain additional information. Results were not in line with the hypothesis that information avoidance occurs more among the male gender, lower educated participants, lower income, younger participants and more frequent ecstasy users. In the current study, only age was

related to information avoidance for lab testing and using the Red Alert App, where the result was in contrast with our hypothesis, namely younger participants were more likely to gain information after the news there was a contaminated pill on the market, than the older participants. Our results are partly in line with the hypothesis about anonymity. Participants prefer to test the drugs anonymously or download the Red Alert App on a private phone. However, they are willing to substitute anonymity for an easier accessibility of lab testing at the location where they want to use the ecstasy.

According to our best knowledge this is one of the first studies showing the occurrence of the "Ostrich Effect" for gaining additional information about ecstasy. It is therefore difficult to compare the outcomes of this study with other similar epidemiological studies that investigate the "Ostrich Effect" for gaining additional information about ecstasy. Studies in both international research and Dutch research are rare. The results of this study are in line with a study of Woolly and Risen (2018), which concluded that people avoid information to protect their intuitive preference, so when an intuitive preference is stronger the avoidance becomes greater. In addition, Hart et al. (2009), found that people seek out information when it supports their preferences however, when they are uncertain of the content of the information, they choose to avoid information. In this study, participants do not know for sure if the additional ecstasy information will support or discourage their preference (consuming ecstasy), and therefore might avoid gaining additional information. The outcomes of this study may be considered to be in line with studies showing information avoidance on other health behaviours. A study of Zhong (2019), found that people were more likely to avoid a diabetes screening test when they were anxious, if monetary costs and time costs were higher or health and longevity expectations played a significant role. A study of Li et al. (2021), found that some people avoid a medical screening test when there is neither transaction nor monetary cost in the disease treatment. Emanuel et al. (2015), found that participants who had a preference of avoiding cancer risk information, were associated with lower levels of colon cancer screening.

The findings of the present study are slightly in contrast with the findings of Link et al. (2021), which compared online health information seeking behaviour in four different countries (The Netherlands, Switzerland, Germany and Austria). They found that in the Netherlands 84.5% of the participants involved in online health information seeking behaviour, which was the highest of the four countries (Link et al., 2021). In the current study only 8.6% were involved in online health information seeking behaviour through the Red

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Alert App however, it is important to state that in the current study the only investigated online health information was about additional information of ecstasy.

Strengths of the study were that of the 50 participants that filled in the questionnaire 36 participants answered that they had ever used ecstasy. Because of this high rate of participants that actually used ecstasy it was possible to get significant results for the study. It also showed that, when anonymous, participants are not afraid to answer questions about a sensitive topic of the consumption of ecstasy. Another strength was that because of the usage of hypothetical situations in the questionnaire, results could be collected on data that is hard to collect in daily practice. For instance, how people would react when bad drugs are on the market or what people would do if the dealer would offer additional information when buying ecstasy. This data is very hard to collect because it is not observable in experimental studies due to ethics.

A limitation of the study was that the participants of the study were mainly aged between 22 years old and 35 years old. This means that the results of the study can only be interpreted for this age group and not over a wider age group. This could be solved by spreading the questionnaire on different platforms or societies where a wider age group can be reached. Spreading the questionnaire on a wider group can also solve the problem that the participants reflect better on society with their educational background as currently most of the participants were highly educated. Another limitation of the study was that in the survey most of the questions that were asked for the results were hypothetical situations. This means that people had to imagine for themselves what they would do in certain situations, but it doesn't actually mean that if that situation really occurs the participants would react in the same way as answered in the questionnaire. A possible solution is that questionnaires will be spread to consumers of ecstasy who have some experience in "bad drugs" on the market to increase the validity of the answers of the hypothetical situations. Another limitation of the study is that it is difficult to reproduce it in other countries. In other countries they do not have the same facilities and freedom for testing ecstasy as they do in the Netherlands. Also, there is generally more of a stigma on the consumption and testing of hard drugs in other countries than in the Netherlands and it is therefore more difficult to collect data on this topic.
In summary, recommendations for further research are a larger sample size with a wider variation in demographic variables (e.g., age and education level).

So despite signs that "The Ostrich effect" seems to be present, it appears from the data received that a factor that could possibly influence the consumer as well is unawareness on the possibilities to gain additional information on ecstasy. Since the data reveals that many participants do not know about the existence of the Red Alert App nor the existence of free drug testing in a lab, this may cause people not to test their ecstasy. The article of Borman et al. (2017), shows the importance of awareness in health risks as people with breast cancer seem to be unaware of consequences after their treatment. But when aware of these consequences their behaviour changes and the people seem to be more prepared to gain additional information (Borman et al., 2017). In a study of Munene et al. (2020), they also concluded that creating awareness for testing water that comes from a well resulted in people to test the water from wells more often or with higher quality tests. Thus, to make a more accurate assessment on "The Ostrich effect" for gaining information on ecstasy, it is actually of significant importance to create greater awareness of the options to gain additional information on ecstasy among society. Also, it might be better to see what the role of "The Ostrich effect" is by doing the same tests with a target group that is aware of the existence of the Red Alert App and aware that drugs can be tested for free at the GGD. This would allow to look at "The Ostrich effect" in a more focused and isolated way.

The results of this study showed that the Dutch government still has a lot of ground to cover in the area of safety for consumers of ecstasy. Despite the fact that the study was conducted on a limited group, significant results can already be measured. Consumers are willing to get additional information about the ecstasy they consume. However, in order to make sure that these consumers actually obtain additional information, it is important that the government creates more awareness of the dangers of ecstasy among consumers. Thereby, a considerable number of participants had never heard of the Red Alert App but would like to make use of it if an event such as a contaminated pill on the market, should occur. If the government could promote the existence and use of the Red Alert App, this could already help to create better awareness among consumers.

The results of the study also showed that many of the consumers have never had their ecstasy tested in a lab but are willing to do so. At present, the government does not promote lab testing enough or it is not attractive enough to do it. Reducing the effort of an ecstasy consumer for lab testing could rapidly result in an increase in the number of lab tests among consumers. An increase in these lab tests will not only provide consumers with additional

information about the safety of the ecstasy pill but will also allow the government and the labs to gather more data about the pills that are on the market and therefore, have a better idea of the current situation among consumers of ecstasy. A possible proposal for the government to consider is to make lab testing more attractive by providing tests at festivals. The study showed that most of the participants would test their ecstasy when it was provided at a festival.

Conclusion

To conclude it could be assumed that information avoidance, "The Ostrich Effect", is present in gaining additional information among consumers of ecstasy in the Netherlands among young adults aged between 22 and 35 years old. However, it could also be influenced by the unawareness of the testing possibilities for ecstasy. If the consumers are aware of the testing possibilities it could be that the occurrence of the Ostrich effect decreases, or if there was more awareness among the consumers it could be better estimated what the effect of the ostrich effect is among the consumers. This shows that the Dutch government should increase their efforts in the area of safety for consumers of ecstasy. By creating more awareness of the hazard of consuming ecstasy among consumers they would be more likely to gain additional information and possibly resulting in a decrease of the "Ostrich Effect". Further research among a larger sample size with a wider variation in demographic variables can result in a more generalizable conclusion of the occurrence of the "Ostrich Effect " in obtaining additional information of ecstasy for consumers in the Netherlands.

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Appendix A

Beste participant,

Bedankt dat je de vragenlijst wil invullen. De vragenlijst duurt ongeveer 5 minuten. Het is volledig anoniem. De resultaten van het onderzoek zullen <u>niet</u> verspreidt worden naar deren en strikt en alleen gebruikt worden voor mijn eigen onderzoek.

Mocht je nog vragen hebben kun je deze mailen naar 461729pw@eur.nl

Heb je ooit xtc gebruikt?
- Ja
- Nee

Hoe vaak gebruik je xtc?
- Meer dan 12 keer per jaar
- 6-12 keer per jaar
- 3-6 keer per jaar
- 1-3 keer per jaar
- Minder dan 1 keer per jaar
- Ik heb het ooit gebruikt maar ik ben gestopt.

Ben je bekend met het gratis testen van je xtc?
- Ja
- Nee

Heb je ooit je drugs laten testen in een lab, bijvoorbeeld door de GGD?
- Ja
- Nee

Zo ja:
Hoe vaak laat je dit doen?
- Elke keer als ik ga gebruiken
- Op het moment dat ik een nieuw soort pil ga gebruiken
- Af en toe
- Ik heb het 1x gedaan

Ben je bekend met de Red Alert App?
- Ja
- Nee

Uitleg Red Alert App: De Red Alert App is een app gemaakt door het Trimbos Instituut. Met deze app wordt je als eerste op de hoogte gebracht als er "levensgevaarlijke" drugs in omloop is (o.a. xtc). Hier krijgt je dan een melding van op je telefoon. Daarnaast kun je via de app je eigen drugs nakijken in hun database.

Heb je de Red Alert app gedownload?
- Ja
- Nee

Heb je de Red Alert App ooit gebruikt?
- Ja
- Nee

Heb je ooit aan degene waarvan je de xtc kocht, gevraagd of de drugs getest is?
- Ja
- Nee

Als je xtc laat testen, zou je dit dan altijd anoniem willen doen?
- Ja
- Nee

Stel je zou je drugs gratis kunnen testen op het festival waar je naartoe gaat, zou je hier gebruik van maken?
- Ja
- Nee

Stel er komt in het nieuws dat er een vervuilde xtc-pil op de markt is, zou je dan eerder je drugs laten testen in een lab?
- Ja
- Nee

Stel er komt in het nieuws dat er een vervuilde xtc-pil op de markt is, zou je dan de Red Alert App downloaden op je telefoon?
- Ja
- Nee

Stel je hebt een telefoon van je werkgever ontvangen die je privé en voor werk gebruikt, zou je daar de Red Alert App op downloaden als je weet dat er een vervuilde xtc-pil op de markt is?
- Ja
- Nee

Stel de dealer zou jou een formulier kunnen geven met informatie over de xtc, zou je dit formulier dan aannemen?
- Ja
- Nee

Hoe oud ben je?
- 18 - 21
- 22-25
- 26-30
- 31 -35
- 35+

Wat is je geslacht
- Man
- Vrouw
- Anders

Wat is je hoogst behaalde opleiding of opleiding waar je momenteel nog mee bezig bent?
- Geen diploma
- Basisonderwijs
- VMBO, MBO1
- HAVO, VWO, MBO2-4
- Bachelor (HBO / WO)
- Master (HBO / WO)
- Doctor, PhD

Wat is je werksituatie?
- Ik werk fulltime (>32 uur per week)
- Ik werk parttime (≤ 32 uur per week)
- Ik studeer
- Ik ben werkzoekend
- Ik werk niet (en ook niet op zoek)
- Anders

English translation of the questionnaire

Disclaimer:

Dear participant,

Thank you for completing the questionnaire. The questionnaire will take about 5 minutes to complete. It is completely anonymous. The results of the survey will not be distributed to others and will be used strictly and only for my own research.

If you have any questions please email them to 461729pw@eur.nl

Have you ever used ecstasy?

- Yes

- No

How often do you use xtc?

- More than 12 times a year

- 6-12 times a year

- 3-6 times a year

- 1-3 times a year

- Less than once a year

- I used to use it once but stopped.

Are you familiar with free testing of your xtc?

- Yes

- No

Have you ever had your drugs tested in a lab, e.g. by the GGD?

- Yes

- No

If yes:

How often do you have this done?

- Every time I start using

- The moment I start using a new type of pill

- Occasionally

- I have it done once

Are you familiar with the Red Alert app?

- Yes

- No

Explanation Red Alert App: The Red Alert App is an app created by the Trimbos Institute. With this app, you will be the first to be notified when "life-threatening" drugs are in circulation (including ecstasy). You will then receive a notification of this on your phone. You can also use the app to check your own drugs in their database.

Have you downloaded the Red Alert app?

- Yes, I have

- No

Have you ever used the Red Alert app?

- Yes

- No.

Did you ever ask the person you bought the xtc from if the drugs were tested?

- Yes

- No.

If you have xtc tested, would you always want to do this anonymously?

- Yes

- No.

Suppose you could test your drugs for free at the festival you go to, would you take advantage of this?

- Yes

- No.

Suppose it comes out in the news that a contaminated xtc pill is on the market, would you be more likely to have your drugs tested in a lab?
- Yes
- No.

Suppose news comes out that there is a contaminated xtc pill on the market, would you download the Red Alert App on your phone?
- Yes
- No

Suppose you received a phone from your employer that you use privately and for work, would you download the Red Alert App on it if you knew that there is a contaminated xtc pill on the market?
- Yes
- No

Suppose the dealer could give you a form with information about the xtc, would you accept this form?
- Yes
- No

How old are you?
- 18 – 21
- 22-25
- 26-30
- 31 -35
- 35+

What is your gender
- Male
- Female
- Other gender

What is your highest education or training you are currently pursuing?

- No degree

- Primary education

- VMBO, MBO1

- HAVO, VWO, MBO2-4

- Bachelor (HBO / WO)

- Master (HBO / WO)

- Doctor, PhD

What is your work situation?

- I work full-time (>32 hours per week)

- I work part-time (≤ 32 hours per week)

- I am studying

- I am looking for work

- I am not working (nor looking)

- Other