UNIVERSITY OF TWENTE

A study that predicts the intention to use laughing gas among young adults according to the Theory of Planned Behavior

Would you like to take a balloon trip?

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Abstract

Laughing gas is an upcoming drug in the Netherlands. In contrast with other drugs, not much is known about the behavioral aspects of laughing gas use. Therefore, this research aims to provide support in that. It is the first study to predict the intention to use laughing gas within young adults aged between 18 and 25, by means of the Theory of Planned Behavior (TPB). The TPB was adopted, as it has accurately predicted intentions and behaviors in various other drug-related studies. The independent variables in this study consist of attitude, subjective norm and perceived behavioral control (PBC). Additionally, previous use of laughing gas and age were included as distal variables. To collect the data, a total of 126 participants filled in an online survey. The most important results showed that the attitude towards laughing gas use significantly predicted the intention to use the drug. A more positive attitude led to an increased intention to use laughing gas. The subjective norm and PBC did not have a significant effect on intention to use. Furthermore, it was concluded that attitude partially mediates the effect of previous use of laughing gas on the intention to use the drug. It was also concluded that, on average, participants had a negative attitude towards laughing gas, the subjective norm was negative, and the PBC was positive. The mean intention to use laughing gas was low. The main results of this study were used to formulate an advice for the drug prevention organization Tactus on how to approach laughing gas. The advice was granted to focus prevention efforts on negatively altering the attitude towards laughing gas in an informative manner. Preventive measures should specifically be targeted at previous users of laughing gas, who can widely be found at festivals and parties.

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1. Introduction

That drugs and alcohol can pose serious threats on public health is a well-known fact. Importantly, a drug that is now popular, legal and increasingly used is laughing gas (Trimbos Instituut, 2018). Monshouwer, Van der Pol, Drost, and Van Laar (2016) found out that 54% of the people who go partying between 15 – 35 years old have tried laughing gas. Ten percent of this group has used the substance in the past month. People take it by filling a balloon with laughing gas from a tank, after which the gas is inhaled by breathing into the balloon. The user experiences a short, yet strong high.

According to Jellinek (2017), laughing gas is legal as it falls under the commodities law (Warenwet). This withholds that, in a similar fashion as every day products, the manufacturer of the drug is held responsible for the safety of the product. The commodity authority (Waren Autoriteit) is in control of the enforcement of the law. This authority instructed the RIVM to perform a risk analysis on laughing gas. The report showed that there is no evidence of laughing gas posing serious health risks (RIVM, 2016). However, it should be mentioned that the risk analysis did not take into account the setting in which the drug is used or the risks concerning combining laughing gas with other drugs. Regardless, the conclusion drawn from the report entails that there is no reason for the commodity authority to act on the commodities law. Hence, national restrictions against laughing gas manufacturing or usage are non-existent currently. Municipalities are allowed to have their own rules regarding laughing gas to reduce nuisance (Schelfaut, 2019). Nevertheless, this has not been effective as the drug can be bought online or in another city.

In contrast to the risk analysis that was executed by RIVM (2016), Trimbos Instituut (2018) reports that various possible harmful effects on the short-term and long-term are known. First, short-term risks consist of the chance of bursting of the eardrum when the user has a cold, dizziness and fainting, as well as downplaying of after effects which is dangerous in traffic. The long-term effects that are known consist of vitamin B12 shortage, resulting in tingling in the body, dizziness, and numbness and pains in the limps. It is unlikely that a person will become addicted to laughing gas, yet there is a possibility. Furthermore, there are clues that laughing gas can possibly damage brains that are still in development. Apart from these consequences, Trimbos Instituut (2018) argues that there may be other effects of the drug, which are still unknown.

Furthermore, the negative effects of laughing gas have been in the news repeatedly. An example of this is a news item by NOS (2017), which mentions that burn units increasingly encounter patients who were harmed by laughing gas. The drug takes away pain stimuli, which is why the patients did not feel that the freezing gas in the tank was burning their skin. Other than that, Schelfaut (2019) discusses the growing concerns of the government regarding laughing gas. The drug causes nuisance, as people tend to cause accidents, act strangely, hallucinate or pass out. For instance, on Kingsday 2019 in Amsterdam, multiple people passed out after taking the drug. A more severe case is also mentioned. Rehabilitation doctor Christof Smit encountered an increase in people with neurological damage after using laughing gas, due to vitamin B12

shortage. The past half year, three people have been hospitalized with paraplegia after reporting having used excessive amounts of laughing gas. In contrast, the article mentions that the risks of laughing gas are limited, especially compared to other drugs.

With all this commotion, and contrasting health scenarios surrounding laughing gas, it is definitely time for researchers to step up. Similar to studies on other drugs, such as on marihuana and alcohol, research should be conducted on laughing gas. Behavioral and health scientists have thus far contributed greatly to existing knowledge about drugs. This has been highly important for governmental drug policies, and for drug education and prevention. As not enough is known about laughing gas, the government as well as health organizations are now in doubt about how to handle the upcoming drug. Schelfaut (2019) mentions that national policies regarding laughing gas cannot be made yet, as research concerning the consequences of laughing gas use by Trimbos Instituut is still ongoing.

Moreover, drug prevention organizations, such as Tactus are in doubt about how to approach laughing gas in campaigns (J. Ooink, personal communication, April 11th, 2019). Campaigns cannot just be based on research concerning other drugs, as laughing gas is significantly different. Therefore, campaigns that work for marihuana use, might not work for laughing gas. This emphasizes the need for behavioral scientists to get involved in studying laughing gas. Whereas research concerning the health consequences is pending, the behavioral aspects: for example, underlying predictors of laughing gas use, are not being studied. In order to effectively approach the drug in campaigns and policies, it is crucial that more knowledge on laughing gas using behavior is created.

Therefore, this research aims to serve as a first step in that by studying the intentions of people to use laughing gas according to the Theory of Planned Behavior (TPB). Numerous TPB studies have focused on what causes the behavior to use other drugs, such as marihuana, alcohol and ecstasy. Many of these have found that TPB factors, consisting of attitude, perceived behavioral control and subjective norm, accurately predict using behaviors in (young) adulthood (e.g., Armitage et al., 1999; Bandura, 1999; Connor & McMillan, 1999; McMillan & Connor, 2003; Morrison et al., 2002; O'Callaghan & Joyce, 2006 as cited in Malmberg et al., 2012). Yet, interestingly, specific research regarding predictors of laughing gas usage has not been conducted. This emphasizes the novelty of this study, as it researches the TPB in a completely new context.

The question that will be answered is:

"What is the influence of attitude, subjective norm and perceived behavioral control on the intention to use laughing gas?"

In the following chapter, the theoretical background concerning this topic will be discussed. After that, the method of data collection, the results, conclusion and discussion will be provided.

2. Theoretical background

With regards to human action studies, the Theory of Planned Behavior is one of the most used and influential among researchers (McMillan & Conner, 2003a). It is a highly useful theory to understand and predict behavior. The theory states that three independent variables, being; attitude, subjective norm and perceived behavioral control (PBC), influence the intention to perform a certain behavior (Ajzen, 2002b). The intention, in turn, directly predicts actual behavior. This theory is mostly used among social and health psychologists, and it can be applied to many domains. It is interesting to outline the variation of behaviors that can be researched by means of this theory. For instance, Ajzen (2002a) assessed the behavior of walking on the threat mill for thirty minutes every day. Furthermore, Ajzen (2013) used the TPB to gain understanding into class attendance.

In this study, the TPB will be used to predict the intention to use laughing gas. The link between intention and behavior can only be measured in a longitudinal study (McMillan & Conner, 2003a). To explain this further, an individual can set the intention to, for instance, walk on the threat mill thirty minutes every day for six months. However, setting the intention does not guarantee that this will actually happen. Similarly, if individuals intent to use laughing gas in the upcoming six months, this does not guarantee that they will actually use laughing gas. Therefore, to measure the link between the individual's intention and behavior in this case, the behavior should be measured after six months. However, as this study is not longitudinal, the focus lays on solely predicting the intention to perform the behavior. Future longitudinal studies can elaborate on this, by measuring the behavior.

In the following, there will be elaborated on the use of the TPB in drug-related studies to evaluate whether this can be applied to laughing gas use. As not much is known about the behavioral aspects of laughing gas, it cannot be set in stone which other drug is most comparable to laughing gas. Therefore, the aim is to include studies that regard a variety of different drugs. However, the focus lays on the comparison to marijuana-related studies, as it is assumed that laughing gas mostly resembles this drug. The main reasoning behind that assumption, pertains to the fact that laughing gas and marijuana are both soft drugs. The two have in common that they are subjected to limited laws. In the following, their commonalities will be highlighted in more depth. This is structured by touching upon each construct that is included in this study. Starting with the dependent variable; intention to use laughing gas. Then, the three independent variables, consisting of attitude, subjective norm and perceived behavioral control (PBC) will be discussed in depth. After that, the remaining variables; age and previous use of laughing gas will be elaborated upon. It is expected that TPB factors accurately predict the intention to use laughing gas (see figure 1).

2.1. Intention to use laughing gas

In order to define the intention to use laughing gas, a look will be taken at studies regarding other drugs. The intention to use marijuana was defined by Malmberg et al. (2012) as: "the motivation or readiness to start using marijuana in the future". O'Callaghan and Joyce (2006),

specified this further by asking how often participants plan on using marijuana in the upcoming two weeks. Furthermore, Armitage, Conner, Loach and Willetts (1999), assessed the intention to use marijuana and alcohol. Questions to measure intention were identical for both drugs, and pertained to the planned future use of the drugs. Additionally, the study of McMillan and Conner (2003a) assessed the intention to use different kinds of drugs, by asking participants how often they intent to use LSD, amphetamine, marijuana, and ecstasy in the upcoming six months. To conclude, multiple researches approach the intention to use different kinds of drugs in a similar fashion. Thus, it is assumed that this can also be applied to laughing gas. Therefore, the intention to use laughing gas is defined as "the motivation or readiness to start using laughing gas in the future".

Various studies have confirmed that intention accurately predicts actual behavior. This is especially prevalent in studies that regard drug use. For instance, the research of Malmberg et al. (2012) established that the intention to use marihuana significantly predicts monthly marihuana use. Furthermore, in the study of Marcoux and Shope (1997), intention to misuse alcohol was the only variable that significantly predicted actual misuse of alcohol. Adding to that, a study found that the intention to use ecstasy over the upcoming two months, accurately predicted the behavior to use the drug (Orbell, Blair, Sherlock & Conner, 2001). Therefore, by focusing on the intention to use laughing gas, insights into actual laughing gas usage can possibly be obtained.

2.2. Attitude towards laughing gas

In the TPB, attitude is one of the three antecedents that predicts intention. Attitude results from underlying behavioral beliefs, such as what consequences will likely come with the performance of a certain behavior, as well as evaluations of the consequences by the individual (McMillan & Conner, 2003b). These consequences are perceived as either positive or negative. If an individual finds mostly negative consequences, they will develop a negative attitude towards the behavior. In case the consequences are evaluated as positive, the attitude will be formed accordingly.

A look will be taken at previous studies that have assessed attitudes towards marijuana, according to the TPB. If multiple studies have found a similar effect of attitude towards marijuana on the intention to use the drug, it can be expected that this can also be applied to laughing gas use. Results of these studies show that a positive attitude towards use of marijuana will result in an increased intention to use it (e.g., Armitage et al., 1999; Bandura, 1999; Connor & McMillan, 1999; McMillan & Connor, 2003; Morrison et al., 2002; O'Callaghan & Joyce, 2006 as cited in Malmberg et al., 2012). According to Ajzen (2002a), and McMillan and Conner (2003b), this can be taken as a general rule; the more favorable the attitude, the stronger the intention of a person to perform a certain behavior. A negative attitude, on the other hand, negatively affects the intention to perform the behavior.

Trimbos Instituut (2018) states that the negative consequences of laughing gas are underestimated. This is possibly due to the fact that the effects of the drug only last for one to five minutes. However, this connection has not been confirmed by literature. A large study on

changes in attitude towards marijuana, related to its legalization in the state of California, found that legalization decreased the perceived harmfulness of marijuana (Khatapoush & Hallfors, 2004). As laughing gas is legal, it is expected that the participants in this study will downplay the harmful effects of the drug. Thus, it is expected that the attitude towards this drug will be relatively favorable. It is hypothesized that the general attitude towards laughing gas will be positive, and this will increase the intention to use laughing gas. However, the attitude also includes the extent to which individuals enjoy taking the drug or find it valuable (Ajzen, 2002a). As the effects of laughing gas only lasts for a short period of time, individuals might not enjoy or value this drug as much as other drugs, such as marijuana or ecstasy.

H1: There will be a significant positive effect of attitude on intention to use laughing gas.

2.3. Subjective norm

The second variable that will be used to predict intention to use laughing gas is the subjective norm. The subjective norm can be derived from normative beliefs, being the expectations of other people and social pressure (Ajzen, 2002b). If an individual perceives a behavior to be socially acceptable, the subjective norm is considered positive. In addition, an individual's motivation to comply with these norms should be assessed. If an individual does not feel motivated to comply with social norms, the influence of these social norms on the intention of this individual to use will likely decrease (Ajzen, 2002b).

According to various studies that have focused on alcohol and nicotine use, the subjective norm significantly predicts intention to use (e.g., Aasetal., 1995; Cameron et al., 2003; Conrad et al., 1992; DeVries et al., 1995; Jones et al., 2001; Kametal., 2009; Leigh & Stacy, 2004; Marcoux & Shope, 1997; Patrick et al., 2010; Randolph et al., 2006; Scheier et al., 1999; Tyas & Pederson, 1998; Van De Ven et al., 2007 as cited in Malmberg et al., 2012). When it comes to marijuana and ecstasy use, similar results were found (e.g. Bashirian, Hidarnia, Allahverdipour & Hajizadeh, 2012; McMillan & Conner, 2003a, O'Callaghan & Joyce 2006; Orbell et al., 2001). Derived from these studies, a more favorable social norm increases the intention to use. When it comes to laughing gas, this means that if it is considered socially acceptable to use the drug, this increases the intention to use it.

Policies on drugs are able to influence social norms. Relevantly, the tolerant policy on marijuana in the Netherlands has influenced the Dutch social norm on the drug in a favorable manner (Erikson, Butters & Walko, 2005 as cited by Malmberg et al., 2012). To build on that, the Dutch policy regarding marijuana is stricter than policies on laughing gas. Laughing gas is completely legal and widely available in the Netherlands, whereas marijuana is regulated. Therefore, it is expected that the subjective norm will be relatively favorable for laughing gas use. More specifically, it is proposed that laughing gas use will be accepted by friends and family. Thus, it is hypothesized that the subjective norm regarding laughing gas use will be positive, resulting in an increased intention to use the drug.

H2: There will be a significant positive effect of the subjective norm on the intention to use laughing gas.

2.4. Perceived behavioral control (PBC)

The final independent variable, being PBC, consists of control beliefs, which involves the perception of an individual on how easy or difficult it is to perform the behavior (Ajzen, 2002b). This is based on whether this person perceives internal or external factors that may hinder or further the performance of the behavior.

More specifically, to measure PBC, both self-efficacy factors and controllability factors should be taken into account (e.g. Ajzen, 2002b; Morrison et al, 2010; Orbell et al., 2001). Derived from these studies, items that measure self-efficacy, pertain to an individual's confidence in being capable of performing the behavior. Items that measure controllability, pertain to whether the individual is in control of performing the behavior, and whether it is up to them to perform the behavior or not. According to Ajzen (2002b), who reviewed multiple studies, self-efficacy alone always predicted the intention. On the other hand, controllability did not have a significant effect on intention in any of the reviewed studies. However, when combined with self-efficacy, controllability did in fact predict the intention. It was concluded that the two are correlated and have a great overlap. Hence, there should not be made distinctions and the two should together form the PBC.

The PBC in this case, pertains to the perceived control of participants with regards to their use of laughing gas. As adopted from Morrison et al. (2010), this is operationalized by measuring the control and confidence of individuals that they will be able to refrain from using laughing gas. The reason for choosing this instead of measuring control over using laughing gas, according to Morrison et al. (2010), was that the participants all reported they would be able to use marihuana if they wanted to. As laughing gas is known to be legal and widely available, it is assumed that any person would perceive to be able to obtain the drug if they would want to.

In contrast, McMillan and Conner (2003a) used controllability items that assess perceived availability of illegal drugs. This study was conducted among underaged students from England. In that case, the participants were more likely to experience constraints on their drug use. Thus, controllability becomes more relevant when there are laws or constrictions against the drug. However, in this study concerning laughing gas, that is not applicable. Therefore, it is more relevant to assess the perceived control over not using the drug, which pertains more to a person's self-efficacy. This means that in this study, self-efficacy plays a more important role in measuring the PBC.

In previous studies, a positive PBC resulted in a decreased intention to use drugs (e.g., Armitage et al., 1999; Bandura, 1999; Connor & McMillan, 1999; McMillan & Connor, 2003; Morrison et al., 2002; O'Callaghan & Joyce, 2006 as cited in Malmberg et al., 2012). To illustrate that, if an individual finds it easy to refrain from using laughing gas, this would decrease the intention to use the drug. Additionally, a negative PBC will likely result in a higher intention to use laughing gas. As laughing gas is not addictive (in most cases), and the effects of the drug do not last long according to Trimbos Instituut (2018), it is assumed that participants can refrain from using laughing gas if they want to. In this study, it is therefore hypothesized that the PBC will be positive, resulting in a decreased intention to use laughing gas.

H3: There will be a significant negative effect of PBC on the intention to use laughing gas.

Interestingly, Conner and McMillan (1999), and Morrison et al. (2002), who studied marijuana use in a TPB context, found that PBC has the greatest influence on intention to use. Adding to that, according to Ajzen (1991), PBC is the only one of the independent variables that can directly influence the behavior. A person can be motivated to perform a behavior and set the intention to do so. However, if individuals do not think they are in control of performing the behavior, that negatively affects behavioral outcomes. This happens, for instance, when there is a lack of time, money, resources or cooperation of others (Ajzen, 1991). It was also stated that if there is perceived control, and the intention to perform the behavior, the individual should succeed in performing the actual behavior. This emphasizes the impact of PBC on behavior. As behavior is not measured in this study, the interplay between PBC and intention can be used to formulate implications about behavior.

H4: PBC predicts the intention to use laughing gas significantly better than the subjective norm and attitude.

2.5. Previous use of laughing gas

As stated by Ajzen (1991), prior behavior influences later behavior. However, prior behavior cannot be seen as an independent variable that directly influences the intention.

The study of Morrison et al. (2010) has adopted this view. It was mentioned that marijuana use in adolescent years can influence attitudes about use, expose the youth to social norms regarding drug use, and impact the perceived behavioral control to refrain from using the drug. Altogether, previous use in adolescence years would make a person more likely to use marijuana in adulthood. The results of the study show that there was no significant effect of previous drug use on subjective norm and perceived behavioral control. Nevertheless, there was found a significant effect on attitude.

Other than that, when it comes to alcohol, the attitudes of youths change from negative to positive after experimenting with it (Aas et al. 1998; Aitken, 1978; Gillmore et al. 1998; Johnson & Johnson, 1995 as cited in Leigh & Stacy, 2004).

Additionally, Patrick, Wray-Lake, Finlay and Maggs (2009), who predicted adult alcohol use from adolescent alcohol expectancies, state that there should be controlled for previous alcohol use. Experience with using alcohol can namely form beliefs about the effects of it, for example beliefs pertaining to alcohol being fun and relaxing (Cooper, 1994; Cox & Klinger, 1988 as cited by Patrick et al., 2009).

Thus, it is useful to include previous use of laughing gas as a distal variable in this model. It is hypothesized that if an individual has previously used laughing gas, this will influence the attitude positively. As the attitude is expected to influence the intention, it is hypothesized that previous use will indirectly affect the intention to use laughing gas, by influencing the attitude

towards the drug. It is expected that previous use will not have a significant effect on the subjective norm and PBC.

H5: Previous use of laughing gas has a significant indirect effect on intention to use laughing gas through attitude.

2.6. Age

Especially people from the age group of 18-25 years old actively consume substances (Trimbos Instituut, 2017). The results of research show that only 25 percent of this group does not consume alcohol or does not drink more than one glass a day. This group also contains the highest percentage of excessive drinkers. From the group of 18 - 20 years old, 15,3 percent drinks excessively and within the group of 21 - 25 years old, this is 15,9 percent. Furthermore, when it comes to marijuana usage, these groups also take the lead. From the age group of 18 - 20 years old, 23,5 percent has used marijuana. From the age group of 21 - 25 years old, this is 29,5 percent. There can be found wider differences between the groups of 18 - 20 and 21 - 25 years old when it comes to analyzing ecstasy use. From the first group, 5,2 percent has used this drug, compared to 13,1 percent within the group of 21 - 25 years old. Trimbos Instituut has not collected data regarding laughing gas usage among 18 till 25-years old people. Due to the lack of data on age when it comes to laughing gas, it is highly interesting to include age in this study. To fit the small scale of this research, this has been limited to the age group of 18 - 25 years old. This group is specifically chosen, due to the fact that the consumption of drugs is the highest within this group. Furthermore, as mentioned, Trimbos Instituut found differences in usage percentages between the age groups 18 – 20 and 21 – 25. Therefore, this study aims to examine possible differences between these two groups.

Age is treated as a distal variable within this theoretical model. It is expected to influence the three independent variables. For example, the difference in ecstasy use between the groups of 18 - 20 and 21 - 25 can be due to differing social norms, attitudes and perceived behavioral control. However, as laughing gas is not a hard drug and more comparable to marijuana, the differences between the two age groups are expected to be smaller.

H6: Age group will have a significant effect on the subjective norm, attitude, PBC, the intention to use and previous use.

2.7 Conclusion

Within this theoretical framework, laughing gas has consistently been compared to studies that regard drugs such as marijuana, alcohol and ecstasy. However, it has also become clear that laughing gas is different from other drugs. To summarize, laughing gas is significantly less addictive, if at all addictive, the effects last for a shorter period of time, and the drug is completely legal (Trimbos Instituut, 2017). Thus, it is possible that different results will be found in this study compared to other studies regarding drugs and the TPB. Therefore, the hypotheses are based on the results of drug-related studies, yet they are not entirely copied.

It would be highly interesting if different results were found compared to other drug-related studies. This can namely imply that laughing gas should be approached differently, for instance in prevention campaigns. Overall, surprising results would further emphasize why studying laughing gas use is especially relevant.

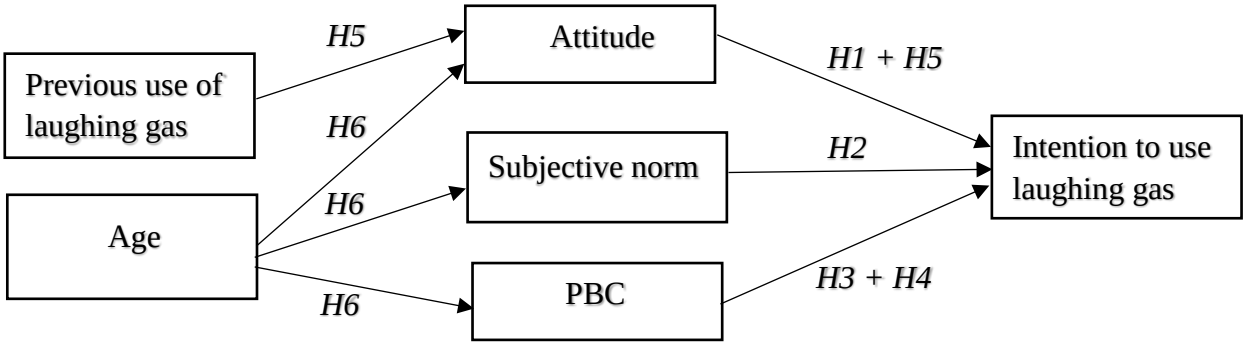

Figure 1. The theoretical model to predict the intention to use laughing gas.

3. Research design

By means of an online survey, the different constructs of the Theory of Planned Behavior, and the distal and demographic variables, were measured. The survey method was chosen due to its general advantages, for example large amounts of data could be obtained in a short amount of time. For this study, that was considered a highly useful quality.

A convenience sampling strategy was adopted, due to its relative ease and time-effectiveness. This was executed by publishing the surveys on Facebook, Instagram and in different WhatsApp group chats. The aim was to establish a sampling group that closely resembled the population. Two studies found that lower educational levels or aspirations led to increased drug use (Haider, Johnell, Weitoft, Thorslund & Fastbom, 2009; Newcomb & Bentler, 1986). As drug use may vary among participants with different educational levels, the purpose of including education was to control for a somewhat equal distribution of educational level among participants, to ensure a representative sample. Towards the end of the data collection, it was found that the sampling group mostly consisted of highly educated people from HBO and WO. It was then decided that more people from MBO should be included in the study. This was operationalized by sending surveys to people from MBO through direct message on Facebook. Other than that, a visit was paid to ROC, an MBO school, in order ask random students to fill out the survey in person.

3.1. Participants and procedure

A total of 158 youths from the Netherlands took part in this online survey research. The 30 participants who were not aged between 18 and 25 years old were excluded. Other than that, one response with a duration below one minute was deleted. Furthermore, one participant was omitted due to the lack of data that was submitted. Thus, 126 participants were included in the analysis.

The participants had to agree with an informed consent form by ticking the “agree” box. Then, they could continue to fill in the online survey which consisted of 19 questions based on a 7-point Likert-scale. The first two questions regarded the age and educational level of participants. After that, two questions pertaining to previous use of laughing gas and the intention to use in the upcoming six months were presented. The remaining 11 questions pertained to the participant’s perceptions on the use of laughing gas as a recreational drug. The survey duration was approximately five minutes. After the survey was completed, participants were thanked for their time.

It was measured that 37,3 percent of the participants were aged between 18 and 20 years (see table 1). The remaining 62,7 percent consisted of young adults between 21 and 25 years old. Furthermore, analysis of educational levels of participants showed that 8.7 percent of the participants opted for high school, 11.9 percent opted for MBO, 31.7 percent filled in HBO and 47.6 percent filled in WO (see table 2). Thus, the largest part of the sample consisted of highly educated participants. Other than that, in order to assess previous use of laughing gas, the item “I have used laughing gas before” was included. The scoring was multiple choice with five options ranging from: “no, never” to “yes, more than 20 times” (Morrison et al., 2010). It was

concluded that 36.5 percent of the participants had never used laughing gas before (see table 3). From the group of participants who had used the drug before, 26.2 percent used it less than five times, 11.9 percent used it between 5 and 10 times, 7.1 percent used it between 10 and 20 times and 18.3 percent used it more than 20 times.

Table 1

The distribution of age

Age	Frequency	Percentage
18	9	7.1
19	15	11.9
20	23	18.3
21	35	27.8
22	20	15.9
23	10	7.9
24	6	4.8
25	8	6.3

Table 2

The distribution of educational level (EL)

EL	Frequency	Percentage
High school	11	8.7
MBO	15	11.9
HBO	40	31.7
WO	60	47.6

Table 3

Previous use of laughing gas (PU)

PU	Frequency	Percentage
Never	46	36.6
<5 times	33	26.2
5-10 times	15	11.9
10-20 times	9	7.1
>20 times	23	18.3

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3.2. Study design and materials

Ajzen (2002a), provided a reliable and valid example of a TPB survey. Various studies that researched other drugs according to the TPB have adopted this (e.g., Morrison et al., 2010; McMillan & Conner, 2003b). As there was a variety of information available, specifically on producing a TPB questionnaire, this was the correct path to take. The survey was translated to Dutch, in order to avoid ambiguity among the Dutch participants.

3.2.1 Intention to use laughing gas

The dependent variable in this research, intention to use laughing gas, was operationalized by one item that was adopted from the article of McMillan and Conner (2003b): "I intent to use laughing gas in the upcoming six months.". Participants could answer on a 7-point scale ranging from highly likely to highly unlikely. Although it unusual to use a one-item scale, different TPB papers state this item is reliable and that intention to use drugs is measured using only one item (e.g. Ajzen, 2002; McMillan, & Conner, 2003b; O'Callaghan & Joyce, 2006).

3.2.2. Attitude

In order to measure the independent variable attitude, the item: "Using laughing gas over the next 6 months would be ..." was utilized (McMillan et al., 2003). The scoring had a 7-point scale, ranging from 1 till 7, with 1 referring to the positive option and 7 referring to the negative option. As derived from Ajzen (2002a), different aspects were included such as good (1) versus bad (7) , and beneficial (1) versus harmful (7) (see Appendix A, attitude). By means of a factor analysis (see table 4, component 1), it was determined that one component could be extracted from the five items that were supposed to measure attitude (Eigenvalue = 5.48). A Chrohnbach's alpha (α) reliability analysis was executed to uncover the reliability of this construct. An acceptable reliability is $\alpha > .7$ (Gliem & Gliem, 2003). The analysis proved that the construct attitude had a good reliability, $\alpha = 0.93$.

3.2.3. Perceived behavioral control

PBC was represented by five items, such as: "If I wanted to, I could easily refrain from using laughing gas (Zemore & Ajzen, 2014). This item specifically measured self-efficacy, being one of the two aspects of PBC. The scoring was based on a 7-point scale which ranged from 1, being strongly agree, to 7, being strongly disagree. The second aspect, which pertained to controllability, was measured by means of the item: "If people would pressure me to use laughing gas, I believe I could resist it" (see Appendix A, perceived behavioral control). This was adopted from Ajzen (2013), and it assessed the perceived control when dealing with tempting situations. This was also based on a 7-point scale ranging from strongly agree to strongly disagree. By means of a factor analysis (see table 4, component 2), it was determined that one component could be extracted from the five items that were supposed to measure PBC (Eigenvalue = 2.37). The Crohnbach's alpha reliability analysis showed that this construct had a solid reliability, as $\alpha = 0.77$.

3.2.4. Subjective norm

In line with McMillan et al. (2003a), the subjective norm was assessed in relation to family and closest friends. As derived from Ajzen (2002a), questions pertained to whether these groups thought the individual should or should not use laughing gas based on a 7-point scale ranging from 1 till 7 (see Appendix A, subjective norm). Furthermore, the motivation of the individual to comply with these norms was assessed by means of two items. According to theory, these two aspects together formed the construct subjective norm.

However, by running a factor analysis (see table 4, component 3 & component 4), two components could be extracted from the five items that were supposed to measure the subjective norm. Component 3 (Eigenvalue = 1.42; Cronbach's alpha = 0.53), included the items that regarded compliance with social norms, whereas component 4 (Eigenvalue = 1.02; Cronbach's alpha = 0.72) included the items pertaining to social norms. Thus, social norms and compliance with social norms could not be combined to account for the subjective norm.

To illustrate that, the Crohnbach's alpha reliability analysis proved that the construct subjective norm had a low reliability, with $\alpha = 0.38$. When the two items pertaining to compliance with social norms were removed, the Crohnbach's alpha increased to an acceptable reliability, $\alpha = 0.72$. Therefore, these two items were omitted to ensure the construct's internal consistency. As component 3 was not reliable on its own, only component 4 was left to capture the subjective norm.

Table 4

The four components and their factor loadings

	Factor Loading			
Item	1	2	3	4
Component 1: Attitude (α = 0.93)				
5. Beneficial/harmful	**.82**	.02	-.05	.00
6. Enjoyable/unenjoyable	**.85**	-.06	.01	.14
7. Good/bad	**.86**	.04	-.05	.08
8. Valuable/worthless	**.80**	-.12	-.00	.06
9. Pleasant/Unpleasant	**.83**	.04	.04	.21
Component 2: PBC (α = 0.77)				
15. Resist at party	.07	**.87**	.11	.06
16. Resist when pressured	.12	**.79**	-.0	-.01
17. Resist when friend offers	.05	**.86**	.0	.11
18. Trust in ability to resist	-.33	**.46**	-.1	.05
19. Ease of resist	-.18	**.57**	-.05	.13
Component 3: Compliance subjective norm (α = 0.53)				
12. Compliance friends	.33	-.04	**.77**	-.23
13. Compliance family	-.28	.06	**.9**	.22
Component 4: Subjective norm (α = 0.72)				
10. Approval friends	.09	-.01	.11	**.89**
11. Approval family	.23	.04	-.28	**.44**
14. Approval important people	.21	-.09	.0	**.75**
Eigenvalue	5.48	2.37	1.42	1.02
Percentage of Variance	36.55	15.82	9.5	6.8

Note. For each component the corresponding loadings are denoted in bold font.

4. Results

To test the hypotheses, various statistical analyses were executed. First, an analysis of means showed that the sample as a whole was unlikely to use laughing gas in the upcoming six months (mean = 5.15, SD = 2.12, see table 5, LG Use Intention). The average attitude towards laughing gas was negative (mean = 4.88, SD = 1.6, see table 5). The means of all items that measured this construct were on the negative side of the scale.

The mean subjective norm was negative (mean = 4.22, SD = 1.44, see table 5). The means of the items that measured whether family and other important people would approve of the participant using laughing gas, were negative. The mean of the item that measured whether friends would approve of the participant using laughing gas, was positive (mean = 2.9, SD = 1.96).

The mean result for Perceived Behavioral Control was positive (mean = 1.7, SD = 0.95, see table 5). The means of all items that measured this construct were on the positive side of the scale.

Table 5

Means, minimum, maximum and standard deviations for the independent and dependent variables

	Min	Max	Mean	SD
Attitude	1.0	7.0	4.88	1.60
PBC	1.0	4.6	1.7	0.95
Subjective norm	1.0	7.0	4.22	1.44
LG Use Intention	1.0	7.0	5.15	2.12

4.1. Regression analysis

A multiple regression analysis was performed to predict intention to use laughing gas based on attitude, subjective norm and PBC. A significant regression equation was found $F(3, 117) = 48.61$, $p = .00$, with an R^2 of .56 (see table 6). Participants predicted intention is equal to .07 + .95 (attitude), where attitude is measured by 1 = positive attitude, and 7 = negative attitude. This analysis showed that attitude had a significant positive effect on intention to use laughing gas (Beta = .95, p = .00, see figure 2). Subjective norm (Beta = .09, p = .41) and PBC (Beta = .07, p = .62) were not significant predictors of intention to use laughing gas. Therefore, hypothesis 1: “There will be a significant positive effect of attitude on intention to use laughing gas” was accepted. Derived from these results, hypothesis 2: “There will be a significant positive effect of the subjective norm on the intention to use laughing gas” was rejected. Hypothesis 3: “There will be a significant negative effect of PBC on the intention to use laughing gas” and hypothesis 4: “PBC predicts the intention to use significantly better than the subjective norm and attitude” were also rejected.

Table 6

Summary of regression analysis for variables predicting intention to use laughing gas

Variable	B	SE B	β	T	Sig.
Attitude	.95	.12	.72	8.9	.00
Subjective norm	.09	.11	.06	.83	.41
PBC	.07	.14	.03	.50	.62

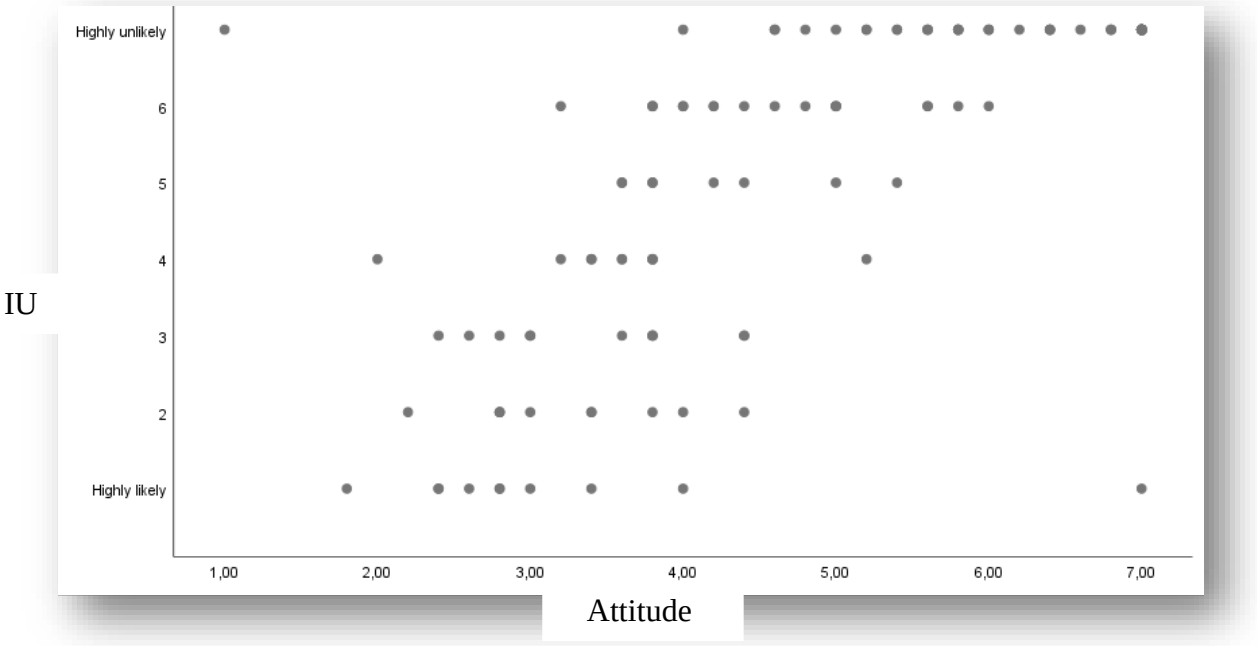

Figure 2. A scatterplot showing the positive correlation between attitude and intention to use laughing gas.

4.2. The effect of previous use

In order to examine whether the effect of previous use of laughing gas (PU) on intention to use laughing gas (IU) is mediated by attitude, figure 1 was utilized. Path C1 represents the effect of the independent variable (PU) on the dependent variable (IU), without inclusion of the mediator. Path A is the effect of the independent variable on the mediator. Path B is the effect of the mediator (attitude) on the dependent variable. Finally, Path C2 represents the direct effect of the independent variable on the dependent variable with inclusion of the mediator. The indirect effect of previous use of laughing gas on intention to use laughing gas can be calculated by multiplying Path A by Path B.

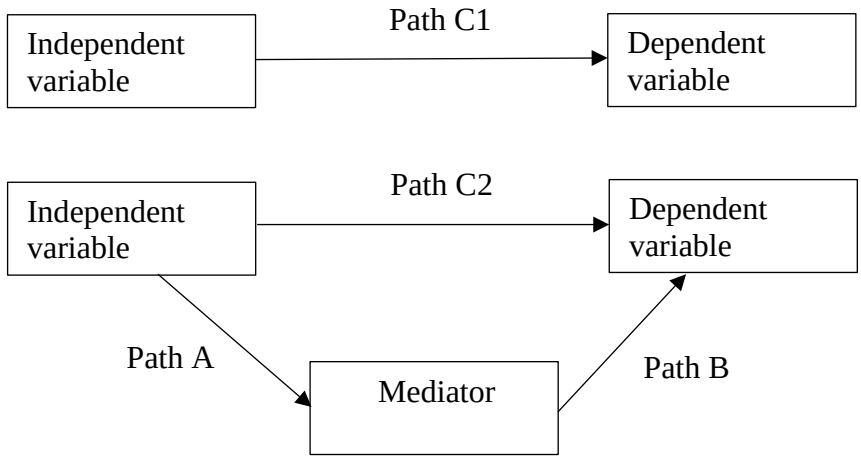

Figure 3. The effect of the IV on the DV, modelled without and with the mediator.

The first step in mediation analysis (Path C1), being regression of PU with IU, ignoring the mediator, was significant, b = .61, t(124) = 8.53, p = .00 (see figure 4). In step 2, calculations of Path A showed that the regression of PU with the mediator attitude, was significant, b = .69, t(119) = 10.51, p = .00. Step 3 which measured the effect of the mediator attitude on IU, including PU in the model as captured by Path B was also significant, b = .60, t(118) = 7.22, p = .00. Finally, calculations of Path C2 revealed that, controlling for the mediator (attitude), PU was a significant predictor of IU, b = .20, t(118) = 3.37, p =.02. To obtain the indirect effect of PU on IU, Path A (0.69) was multiplied with Path B (.60) resulting in .42 being the indirect effect of PU on IU. A Sobel test was conducted and found a significant mediation effect in the model (z = 6.02, p = .00). It was found that attitude partially mediated the relationship between previous use of laughing gas and intention to use laughing gas. Thus, hypothesis 5: “Previous use of laughing gas has a significant indirect effect on intention to use laughing gas through attitude” was accepted.

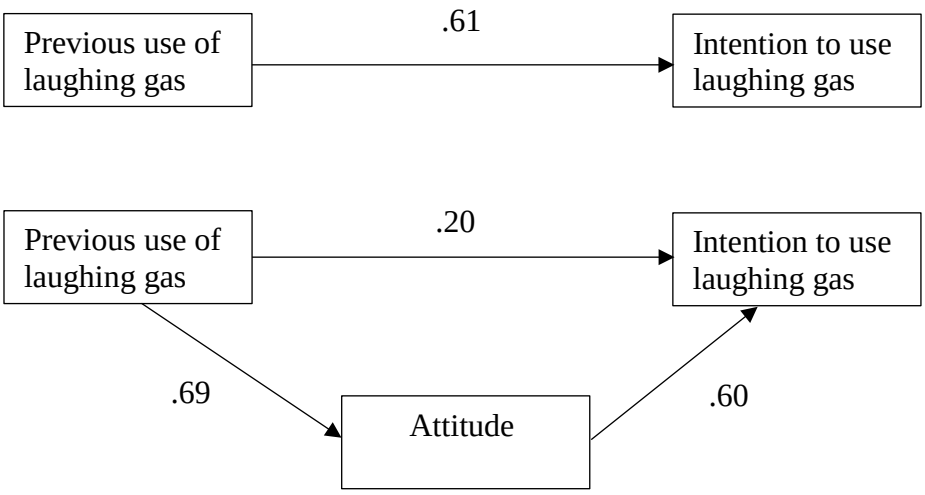

Figure 4. The effect of PU on IU, modelled without and with the mediator attitude.

4.2. The effect of age group

A between-subjects T-test was conducted in order to compare the mean results of participants aged 18 – 20 years and 21 – 25 years old. As depicted in table 7, there were no significant differences found for any of the constructs. The attitude mean for the age group 18-20 was 4.67 (SD = 1.47). The attitude mean for the age group 21-25 was 5 (SD = 1.66). Thus, the mean score was .33 higher for the age group 21-25. This difference was not significant (F = 3.17, p = .08). Furthermore, subjective norm mean was .17 higher for the age group 21-25 (F = .07, p = .79). The PBC mean was 0.31 higher for the age group 18-21 (F = 1.59, p = .21). The intention to use mean score was .17 higher for the age group 21-25 (F = .01, p = .92). Finally, the mean score of previous use was .15 higher for the age group 21-25 compared to the mean score of the age group 18-25 (F = .08, p = .40). As the differences were not significant, hypothesis 6: "Age group will have a significant effect on the subjective norm, attitude, PBC, the intention to use and previous use" was rejected.

Table 7

The constructs' mean scores divided into the two age groups

Variable	Age	N	Mean	Std. D	Std. E
Attitude	18-20	44	4.67	1.47	.22
	21-25	77	5	1.66	.19
Subjective norm	18-20	46	4.12	1.45	.21
	21-25	79	4.29	1.44	.16
PBC	18-20	47	1.89	.98	.14
	21-25	79	1.58	.92	.10
Intention to use	18-20	47	3.45	1.56	.23
	21-25	79	3.62	1.46	.16
Previous use	18-20	47	3.45	1.56	.23
	21-25	79	3.6	1.46	.16

5. Research conclusion

Results from this study shed new lights on the intention to use laughing gas predicted by attitude towards laughing gas, perceived behavioral control over laughing gas use and the subjective norm regarding laughing gas use. First, opposed to prior expectations, the mean attitude was negative. This means that on average, the participants found mostly negative consequences when it comes to laughing gas use. For example, using the drug was generally perceived as more unenjoyable than enjoyable, and the drug was considered more harmful than beneficial.

The mean subjective norm was negative, opposed to prior expectations. This means that on average, the participants did not think that their family or other important people would approve of them using laughing gas. However, participants did think that their friends would approve of them using laughing gas.

As expected, the mean perceived behavioral control was positive. This means that, in general, participants perceived to be in control of using laughing gas, and they were confident about their ability to refrain from using the drug.

According to theory, a negative attitude, a negative subjective norm, and a positive PBC, are the perfect conditions to minimize the intention to use laughing gas. In line, this study's results showed that on average, participants had a low intention to use the drug.

Most importantly, this research established a relationship between the attitude towards laughing gas use and the intention to use the drug in the upcoming six months. A more positive attitude was found to lead to an increased intention to use laughing gas. In contrast with theory, this study did not confirm a relationship between the subjective norm and intention to use laughing gas. Furthermore, no relationship was found between perceived behavioral control and the intention to use laughing gas. To summarize, these results withhold that the intention of an individual to use laughing gas depends on whether they perceive the drug as, for example, harmful/beneficial, enjoyable/unenjoyable, good/bad. The intention to use laughing gas did not depend on social norms regarding laughing gas or on a person's confidence in the ability to resist the drug in tempting situations.

Adding to that, it was concluded that previous use of laughing gas has both an indirect effect on the intention to use laughing gas, by influencing the attitude, as well as a smaller direct effect on the intention to use laughing gas. As such, having previously used laughing gas increased the intention to use the drug in the future.

Finally, opposed to theoretical findings, no significant differences between the age groups 18 - 20 and 21 - 25 were found.

6. Research discussion

This chapter will discuss possible explanations for the results that diverge from expectations derived from theory.

6.1. PBC and the intention to use laughing gas

In contrast to studies concerning marijuana (e.g., McMillan & Conner, 1999; Morrison et al., 2010), who state that PBC has the greatest effect on intention to use marijuana, PBC did not influence the intention to use laughing gas. This can be due to the fact that both participants who planned on using laughing gas and participants who did not plan on using laughing gas, appeared to have high perceived control. Whereas in the marijuana-related studies, participants who planned on using marijuana, experienced low perceived control. That can be explained by the fact that laughing gas is significantly less addictive than other drugs (Trimbos Instituut, 2018).

Other than that, the PBC items within this study merely focused on the ability to resist laughing gas in tempting situations and participants' trust in their ability to refrain from using laughing gas. Perhaps, different results would have been found if, for example, constraints on availability had been included. However, as outlined in the theoretical background, there are little apparent availability constraints when it comes to laughing gas, making this aspect less relevant to assess.

6.2. Subjective norm and the intention to use laughing gas

In contrast to marijuana-related studies, the subjective norm did not influence the intention to use laughing gas. Thus, perhaps social pressure plays a less important role when it comes to the intention to use laughing gas.

This can be assessed by means of the item that was omitted from the subjective norm: "I find it important to do what my friends think I should do when it comes to using laughing gas". The item had a 7-point scale ranging from strongly agree to strongly disagree (mean = 6.06, SD = 1.46). In general, participants did not find it important what their friends think of them using laughing gas. Furthermore, the importance of the opinions of family members when it comes to laughing gas use, can be assessed by means of the item that was omitted from the subjective norm: "I find it important to do what my family thinks I should do when it comes to using laughing gas". The item had a 7-point scale ranging from strongly agree to strongly disagree (mean = 5, SD = 1.87). In general, participants did not find it important what their family thinks of them using laughing gas. These results implied that there is a lack of willingness to comply with social pressure when it comes to laughing gas use. Thus, there is a possibility that no relationship between the subjective norm and intention to use was found, due to the lack of willingness to comply with social norms (Ajzen, 2002b).

MacCoun (1993) argues that the social pressure and social control regarding a drug is shaped by laws, which strengthen and reinforce social norms. The fact that laughing gas is fully legal can possibly be a reason for weaker social norms surrounding the drug.

Interestingly, the social image of drugs plays an important role when it comes to drug usage (Amos, Gray, Currie, & Elton,1997). The two items in this study related to compliance with social norms, were not sufficient to grasp the full scope of this concept.

According to Amos et al. (1997), the social image of a drug is formed through e.g. laws, media, the internet, subcultures and music videos. For example, marijuana is often mentioned in American Popular Music. The study of Primack, Douglas, and Kraemer (2010) examined the exposure of youths to marijuana in music and marijuana use. They found an independent association between early marijuana use and exposure to marijuana-related lyrics in music.

In contrast, there are only few songs that contain lyrics regarding laughing gas use. However, as previously stated, laughing gas has been on the Dutch news regularly. For future studies, it is interesting to evaluate the effect of this on the social image, and the subjective norm concerning laughing gas.

6.3. Differences between age groups

To start, the age groups were not equally distributed, 18-20 (N = 47) and 21-25 (N = 79). This could have biased the results.

It was hypothesized that there would be a difference in laughing gas use between the age groups of 18-20 years old and 21-25 years old, yet the mean scores of previous use of laughing gas showed no significant difference. As previously discussed in theory, Trimbos Instituut (2017) found wider differences in ecstasy use between these groups compared to marijuana use. As mentioned, laughing gas is not a hard drug, such as ecstasy, making it more comparable to marijuana. Moreover, laughing gas is considered more innocent than marijuana, which can explain the fact that no differences were found between the age groups.

6.4. Other limitations

First, the study had a small sample of 126 participants. Small samples have various disadvantages (Simmons, 2018). There is less variability in the sample, leading to a larger standard deviation. When the standard deviation is large, results are likely to be less accurate. Thus, small samples are less representative of the entire population. This decreased the generalizability of the results of this study.

Secondly, the educational levels of participants were not equally distributed. As mentioned, research has found differences in drug use when it comes to educational level. The largest part of the participants in this sample was highly educated, which could have biased the results.

Thirdly, this study only tested the intention to use laughing gas. As outlined in the theoretical framework, the intention to use laughing gas, does guarantee actual using behavior. Furthermore, it was mentioned that PBC and intention to use combined are very powerful for predicting actual behavior. However, PBC did not significantly correlate with intention to use in this model. Therefore, one should be careful about making assumptions regarding behavior drawn from the intention to use laughing gas. Longitudinal studies should be conducted to be able to make accurate assumptions about the behavior of using laughing gas.

Lastly, limited background variables were taken into account in this study. For further research, it is helpful to include more variables such as: environmental adversity, use of other drugs,

emotional distress, and drug use in the social network (Morrison et al, 2010). Including more variables in the TPB model is helpful for uncovering more influential determinants than the ones that are commonly used, and to create a deeper understanding of what drives the intention and behavior to use drugs (McMillan & Conner, 2003a).

7. Research advice

In this chapter, an advice on how to approach laughing gas will be given to the drug prevention organization Tactus.

First, as the intention to use laughing gas is greatly influenced by attitude, it is advised to focus prevention efforts on people's attitudes towards laughing gas. It was found that a positive attitude towards laughing gas increases the intention to use the drug. Therefore, the attitude towards laughing gas should be influenced in a way that will make it more negative. Additionally, people who have previously used laughing gas had a more positive attitude towards the drug. Therefore, extra attention should be given to this group.

It must be mentioned that the attitude mean was already good, considering it was negative (mean = 4.88). Furthermore, as outlined in the introduction, the many negative news outlets are already contributing a great deal. They are, for example, discussing the harmfulness of the drug.

The question remains what actions Tactus can take to contribute to laughing gas use prevention. It is understandable that a knowledgeable institute like Tactus does not want to spread exaggerated fears about laughing gas to alter attitudes, when the drug is considerably less harmful compared to for instance marijuana or alcohol. Moreover, the news is already covering the harmful effects in a sensational manner.

However, this does not mean that Tactus should sit back and watch the situation play out. Current laughing gas prevention methods consist of laughing gas information stands at festivals and informative posters (J. Ooink, personal communication, April 11th, 2019). As mentioned, at festivals and parties, there is a large group of people who have used laughing gas (Monshouwer, et al., 2016). Thus, the target group, being previous users, is correctly addressed.

Therefore, at parties or festivals, it is important that information regarding laughing gas comes across. This can start at the laughing gas selling point, as this will force the youths who are waiting in the line for a balloon, to see the information. Clear, attractive and informative posters about the harmful effects should be presented. For instance, the fact that laughing gas is dangerous in combination with alcohol can be highlighted. Nevertheless, it must be mentioned that further research should establish whether this prevention method is actually effective.

To conclude, the prevention efforts that are currently being taken concerning laughing gas are in line with the results of this research. It is advised to increase the information flow at festivals and parties in particular.

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Appendix A

The online survey

Hey, leuk dat je hier bent!

Je bent namelijk uitgenodigd om deel te nemen aan het onderzoek genaamd: **"De voorspellers van lachgas gebruik onder jongeren van 18-25 jaar"**. Dit onderzoek wordt gedaan door Myrthe Kaal van de Faculty of Behavioural, Managements and Social Sciences (BMS) aan de Universiteit Twente.

Het doel van deze studie is om erachter te komen welke factoren jongeren beïnvloeden om lachgas wel of niet te gebruiken. Het invullen van deze vragenlijst duurt ongeveer **5 tot 10 minuten**. De gegevens zullen worden gebruikt voor mijn bachelorscriptie.

Je deelname aan deze studie is volledig vrijwillig en je kunt je op elk moment terugtrekken. Je bent ook vrij om een vraag leeg te laten.

Wij zijn van mening dat er geen risico's zijn verbonden aan dit onderzoek; echter zoals met alle online gerelateerde activiteiten, is het risico van een datalek altijd mogelijk. De resultaten van dit onderzoek zullen voor zover mogelijk **vertrouwelijk** blijven. Wij zullen alle risico's minimaliseren door de gegevens **anoniem** te maken en deze alleen voor en tot en met het einde van de bachelorscriptie op te slaan. Alleen de onderzoeker heeft toegang tot de gegevens.

Voor meer informatie over dit onderzoek kun je contact opnemen met Myrthe Kaal via m.c.kaal@student.utwente.nl

Door op "eens" te klikken geef je aan:

- de bovenstaande informatie te hebben gelezen
- tenminste 18 jaar oud te zijn
- vrijwillig mee te doen aan dit onderzoek

() eens () oneens

Wat is je leeftijd?

Wat is je hoogst genoten opleidingsniveau?

() Middelbare school () MBO () HBO () WO

Previous use of laughing gas

Heb je ooit lachgas gebruikt?

() Nee, nooit () Ja, minder dan 5 keer () Ja tussen 5 en 10 keer () Ja tussen 10 en 20 keer () Ja, meer dan 20 keer

Intention to use laughing gas

Ik ben van plan om lachgas te gebruiken in de komende 6 maanden

Erg waarschijnlijk : ___:___:___:___:___:___:___: Erg onwaarschijnlijk

Attitude
Lachgas gebruiken de komende 6 maanden vind ik

Schadelijk : ___:___:___:___:___:___:___: Voordelig

Prettig : ___:___:___:___:___:___:___: Onprettig

Goed : ___:___:___:___:___:___:___: Slecht

Waardeloos : ___:___:___:___:___:___:___: Waardevol

Plezierig : ___:___:___:___:___:___:___: Onplezierig

Subjective norm

Mijn goede vrienden zouden het goedkeuren als ik lachgas zou gebruiken de komende 6 maanden

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Mijn goede vrienden zouden het goedkeuren als ik lachgas zou gebruiken de komende 6 maanden

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Met betrekking tot het gebruik van lachgas vind ik het belangrijk om te doen wat mijn vrienden denken dat ik zou moeten doen.

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Met betrekking tot het gebruik van lachgas vind ik het belangrijk om te doen wat mijn familie denkt dat ik zou moeten doen.

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

De mensen van wie ik de mening belangrijk vind zouden het goedkeuren als ik lachgas zou gebruiken in de komende 6 maanden

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Perceived behavioral control
Als ik had besloten om de komende 6 maanden geen lachgas te gebruiken, dan zou het makkelijk zijn om lachgas af te slaan als ik het aangeboden kreeg op een feestje.

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Wanneer mensen me onder druk zouden zetten om lachgas te gebruiken, geloof ik dat ik dit kan weerstaan/afslaan.

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Als ik had besloten om de komende 6 maanden geen lachgas te gebruiken, dan zou het makkelijk zijn om lachgas af te slaan als een vriend me dit aanbiedt.

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Geen lachgas gebruiken de komende 6 maanden zou makkelijk zijn voor mij

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Ik heb er vertrouwen in dat ik lachgas kan weerstaan de komende 6 maanden

Helemaal mee eens : ___:___:___:___:___:___:___: Helemaal mee oneens

Appendix B

Study logbook

Research questions literature study

Does attitude predict the intention to use laughing gas?

Does subjective norm predict the intention to use laughing gas?

Does PBC predict the intention to use laughing gas?

What is the influence of previous use in the TPB model?

What is the influence of age group in the TPB model?

Criteria preferred materials

As nothing is known about the Theory of Planned behavior and laughing gas use, a variety of scientific articles should be included. This variation can consist of different years or different drugs. The results of these studies should be compared, in order to derive which studies resemble laughing gas use the most, to make implications about the use of laughing gas. The language of these articles should be in Dutch or in English.

Selected databases

Derived from a conversation with J.ooink (personal communication, April 11th, 2019), Trimbos Instituut is highly knowledgeable about drugs, and also leading the research regarding laughing gas. Thus, their database is useful. Furthermore, Google Scholar proves to be helpful, as the search terms regarding this subject are not ambiguous. For example, inserting "theory of planned behavior, drug use" would result it the desired references immediately.

Relevant terms

Concepts	Related terms	Smaller terms	Broader terms
Lachgas informatie	Lachgaswet, lachgas risico's, lachgas nieuws	Lachgas werking	Lachgas
TPB	Theory of planned behavior	TPB drug use	TPB
Intention	TPB intention	Intention to use drugs, TPB	Tpb intention
Attitude	TPB attitude	TPB attitude drug use	TPB attitude
Subjective norm	TPB subjective norm	TPB subjective norm drug use	TPB subjective norm
PBC	TPB Perceived behavioral control	TPB perceived behavioral control drug use	TPB perceived behavioral control

Previous use of drugs	TPB previous use of drugs	Theory of planned behavior prior marihuana use	Theory of planned behavior, prior behavior
Lachgas gebruik	Lachgas gebruik leeftijd cijfers	Lachgas gebruik jongeren cijfers	Lachgas gebruik

Search actions

	Date	**Database**	**Search action**	**Total hits**
1	02-04-2019	Trimbos Instituut	Lachgas gebruik	2
2	02-04-2019	Google nieuws	Lachgas	42,800
3	25-04-2019	Google scholar	Theory of planned behavior	1690,000
4	25-04-2019	Google scholar	Theory of Planned behavior drug use	848,000
5	02-05-2019	Google scholar	TPB intention to use drugs	9,920
6	02-05-2019	Google scholar	TPB intention to use marijhuana	1,240
7	02-05-2019	Google scholar	TPB attitude towards drugs	10,200
8	03-05-2019	Google scholar	TPB subjective norm drugs	7,670
9	05-05-2019	Google scholar	TPB questionnaire	36,600
10	05-05-2019	Google scholar	TPB questionnaire drug use	8,080
11	07-05-2019	Google scholar	Perceived behavioral control drug use	23,900
12	07-05-2019	Google scholar	Perceived behavioral control marijhuana use	19,600
13	07-05-2019	Google scholar	TPB marihuana use subjective norm	10,200
14	07-05-2019	Google scholar	TPB marihuana use attitude	1,250
15	12-05-2019	Google scholar	TPB ecstasy use	502

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Reflection

In order to obtain a solid understanding of the Theory of Planned Behavior, and the drug laughing gas, more general information was searched at the start of this study. For instance, the sources from Ajzen, were highly useful to learn about the Theory of Planned Behavior in depth, before applying it to drugs. The factsheet Lachgas by Trimbos Instituut was interesting, in order to derive the risks, effects and laws concerning laughing gas. This was helpful, to anticipate on possible outcomes of the research, and to find out to which other drug, laughing gas is most comparable. After this, the theoretical research could be specified more, and it was established that the main focus should be on marijuana-related studies. The most important search terms were “Theory of Planned Behavior drug use” or more specifically “Theory of Planned Behavior (insert drug of choice) use”. Marijuana (or marijhuana), alcohol, ecstasy, nicotine and amphetamine were inserted in that search term.

At the beginning, the search engine Google Scholar was chosen, in order to obtain a broad range of information. However, as the study proceeded, Google Scholar was still being used. The reason for this was that every search action in Google Scholar, came with highly relevant sources. Google Scholar is easy to use, and as there were no problems encountered concerning literature, this search engine was continuously used. Although highly relevant sources were found by means of Google Scholar, it is wise to also make use of other search engines such as Scopus.

The theoretical framework was structured by first discussing the dependent variables, then the independent variables, and finally the distal variables. For each section, different search actions were used. For instance, specifically for the topic of attitude, search terms such as “attitude drugs Theory of Planned Behavior” were adopted.

The relevance of these sources was assessed by including both old sources, e.g. around or older than the year 2000, as well as more recent sources after the year 2010.

As this research pertains to the Netherlands, the aim was to include sources regarding more western countries that resemble the Netherlands. For instance, studies were found regarding research that was conducted in Mexico and Indonesia. As these countries greatly deviate from the Netherlands, these sources were not included.