



MONITORING DRUG USE IN THE DIGITAL AGE: STUDIES IN WEB SURVEYS

Party Panel: developing theory- and evidence-based health promotion in nightlife settings

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Abstract: This paper describes the development and results of a web survey, named the Party Panel, that addresses emerging risks in nightlife settings. The survey does so by gathering the information that prevention organisations require to develop theory- and evidence-based behaviour change interventions. The survey supports the development of such interventions by mapping the determinants and sub-determinants of substance use-related behaviours among Dutch nightlife participants. The paper presents the results of the survey round which focused on highly dosed ecstasy pills, an issue which prompted public health concerns and highlighted the need to develop interventions to discourage the use of high doses of MDMA. As the authors highlight, because all Party Panel resources, data and analysis scripts are openly available, and the infrastructure is completely open-source, other organisations can use the survey results or copy the resources to their servers to set up similar web surveys. This approach allows prevention professionals to rapidly identify which sub-determinants need to be targeted in campaigns responding to emerging risks. By extension, this shows how web surveys can be valuable tools in addressing emergent risks in nightlife settings and in developing appropriate interventions based on those risks.

Introduction

Over the past three decades, the average amount of 3,4-methylenedioxymethamphetamine (MDMA) in ecstasy tablets in the Netherlands has varied greatly. Whereas in the 1990s, only around 10 % of ecstasy tablets contained more than 100 milligrams of MDMA, by the 2010s this had increased to around 90 %, with the average MDMA dose per ecstasy tablet reaching 171 milligrams in 2018 (van der Gouwe and Vrolijk, 2019; Vogels et al., 2009). These developments have prompted public health concerns and highlighted the need to develop behavioural change interventions targeted at reducing the use of high-dose MDMA products. Designing such interventions first requires an understanding of behavioural motivations – in this case, why people use high or low doses of MDMA – which can be explored through determinant studies (Peters, 2014). This paper describes the development and results of a web survey, known as the Party Panel, for mapping the determinants and sub-determinants of substance use-related behaviours to enable theory- and evidence-based prevention efforts in Dutch nightlife settings. The aim of the survey is to provide the information that prevention organisations require to develop theory- and evidence-based behaviour change interventions to address emerging risks in nightlife settings.

The paper begins with a brief overview of the basics of behaviour change, with linked resources for readers interested in further details. The Party Panel survey is then presented and the results of the survey round addressing highly dosed ecstasy pills discussed. The paper shows how web surveys can

be used for several valuable purposes, in this case all related to the development of targeted interventions based on emergent risks.

Basics of behaviour change

As a background to the Party Panel survey, it is useful to briefly outline the basics of behaviour change and its relevance to the use of drugs (for more details, see Bartholomew Eldredge et al., 2016; Crutzen and Peters, 2019; Metz et al., 2022). Reducing health risks such as those associated with substance use often requires changing people's behaviour (either the behaviour of the at-risk population or that of environmental agents controlling the at-risk population's environment, such as their peers, bar staff or venue owners). The psychological constructs that determine a given behaviour are called the behaviour's determinants. These include knowledge, risk perception, attitude, perceived norms, self-efficacy, habit, self-identity, self-regulation, self-stigma and impulse control (Bartholomew Eldredge et al., 2016).

Knowing which determinants are the most important predictors of a given behaviour is not in itself sufficient to develop interventions. For example, knowing that attitude is an important determinant highlights the need to target expectations of a behaviour's consequences, but does not indicate which expectations, for example, whether to target the expectation that using a high dose of MDMA will cause hallucinations, or that using a high dose of MDMA interferes with social interaction. Therefore, in a determinant study, it is also important to identify sub-determinants (Crutzen et al., 2017; Peters and Crutzen, 2018). Only when the most important sub-determinants have been identified is it possible to select the most promising behaviour change principles (Crutzen and Peters, 2019; Kok et al., 2016).

The Party Panel approach

The Party Panel online questionnaire was developed in order to map the determinants and sub-determinants of specific behaviours and to support prevention organisations in the Netherlands.

Producing such a questionnaire involves two preparatory stages. The first stage is initiated after a problem has been selected by the overseeing organisation. In this example, the problem identified was the high MDMA dose in ecstasy pills. In the first preparatory stage, experts are consulted to help select the questionnaire's target behaviour. This consultation registers the experts' opinions on the most important behaviours in the light of the selected problem. On the basis of the resulting list of behaviours and arguments, the target

behaviour (or behaviours) is then selected. For the 2015 questionnaire, three behaviours were selected: using highly dosed ecstasy pills, using a high dose of MDMA, and getting ecstasy tested at a testing centre (we distinguished between behaviours as people may prefer highly dosed pills without using them in a high dose).

In the second preparatory stage, members of the target population are consulted using an online survey with open questions, in which they are asked why they think people engage, or do not engage, in the selected target behaviour(s). This stage results in a list of potentially relevant sub-determinants. Examples of this in the 2015 questionnaire were that a high dose facilitates connecting to others; that a high dose provides more energy; that a high dose gives a sense of feeling more self-absorbed (all three are sub-determinants underlying the determinant attitude). This list is then combined with guidelines from psychological theories that explain human behaviour in order to produce the final questionnaire, which measures these sub-determinants and overarching determinants in a larger sample.

This questionnaire is then entered into the free/libre and open-source software package LimeSurvey (LimeSurvey Project Team and Carsten Schmitz, 2017) on a secure server. To recruit nightlife patrons, the collaborating prevention and nightlife organisations are asked to promote the questionnaire on their websites and social media channels. The data collected are analysed using R (R Core Team, 2021) and the report is published under a Creative Commons license that guarantees open access (specifically, CC-BY-NC-SA). In addition, all resources for each wave, such as the questionnaire, data and analysis scripts, are made public at a [GitLab repository](#) and on the [Party Panel website](#). Each Party Panel report contains the data visualisations needed to inform the selection of intervention targets (i.e. the determinants and sub-determinants to be targeted in a health promotion intervention), as well as a brief text with suggestions for prevention efforts.

Every year, the determinants and sub-determinants of a different nightlife-related risk behaviour are mapped using this questionnaire. In 2015, we addressed highly dosed ecstasy pills; in 2016, visiting first-aid in nightlife settings; in 2017, using hearing protection; in 2018, transgression of personal boundaries while flirting; and in 2019, securing sufficient sleep surrounding participation in nightlife and multi-day festivals. The primary results are 'confidence-interval-based estimations of relevance' plots (CIBER plots; see Crutzen et al., 2017 and Peters and Crutzen, 2018, for the advantages over traditional analyses), which are explained below.

Participants of Party Panel 2015

In 2015, 1 948 participants began answering the questionnaire. However, many dropped out after the first page and around 700 participants provided answers for the sub-determinant questions. Because of the sensitive nature of the topic (possession of MDMA is still illegal in the Netherlands), demographics were registered on the last page of the survey and completed by 398 participants. Of these, 62 % identified as male ($n = 245$), 38 % as female ($n = 151$), and two identified as nonbinary or genderqueer. Participants' mean age was 25 years (median = 23, mode = 20, standard deviation = 7). Among participants answering the demographic questions, 80 % were either currently in or had completed higher education.

Results also showed that the participants were frequent nightlife patrons, the most visited nightlife settings being house parties (31 % visited every few weeks, 25 % monthly and 13 % weekly), followed by bars (24 % visited every few weeks, 20 % weekly and 18 % monthly), clubs (24 % visited monthly, but 19 % only once or twice in the past six months and 21 % not at all), and large outdoor festivals (44 % visited 1-2 times in the past six months, 19 % 3-4 times and 16 % not at all). The sample clearly over-represented people who used alcohol and other drugs. Over 78 % used alcohol at least weekly, 45 % used cannabis at least monthly and 27 % used ecstasy monthly or more often. The prevalence of other drugs was similarly high: for example, 14 % used cocaine and 7 % used ketamine monthly or more often.

The determinants and sub-determinants underlying the use of a high dose of MDMA

One of the CIBER plots resulting from the 2015 questionnaire is shown in [Figure 1](#) ($N = 697$). Specifically, these are the results for the expected effects of using a high dose of MDMA. Of note, Dutch ecstasy users commonly refer to MDMA powder as 'MDMA', reserving the term 'ecstasy' for tablets, even though the active ingredient in those pills is usually MDMA because adulteration with other psychoactive substances is rare in the Netherlands (van Laar and van Ooyen-Houben, 2015). For each expected effect, the left-hand panel shows participant responses, with a diamond representing the 99.99 % confidence interval for the mean. The right-hand panel shows the 95 % confidence intervals for the association of each expectation to, in this example, the overarching determinants of attitude and intention.

When reading a CIBER plot, the data in the two panels have to be interpreted in concert to identify feasible intervention targets. Expectations that are strongly associated with attitude and intention, as shown by the diamonds in the right-hand panel, may be feasible intervention targets, whereas changing expectations that are unrelated to these overarching determinants is unlikely to yield behaviour change.

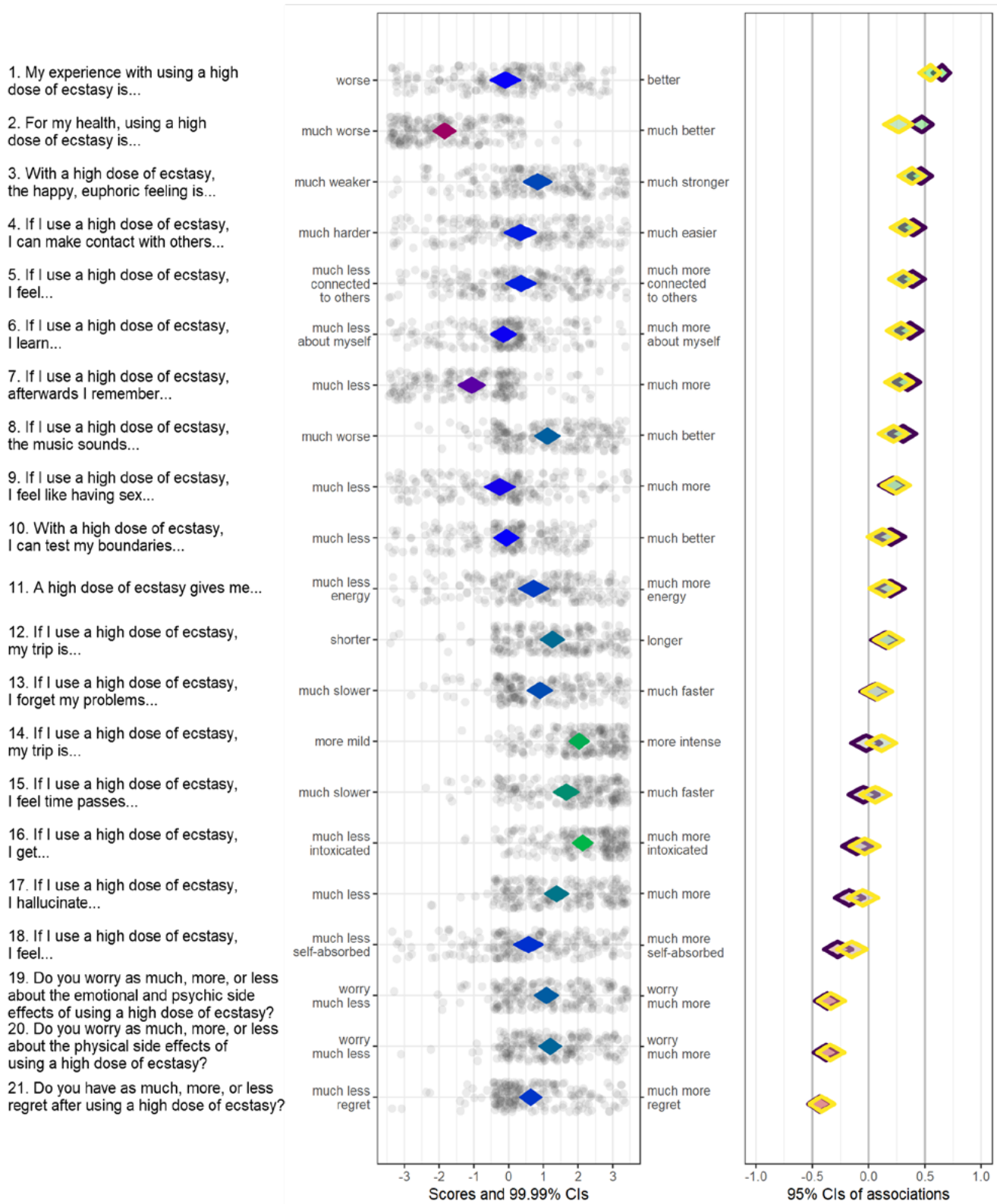
However, these associations do not tell the full story. For example, although the expectation that a higher dose is unhealthy is associated with both attitude and intention, the right-hand panel shows that most people already expect a higher dose to be less healthy. This means that there is little room for improvement if an intervention were to target this expectation. Of the three examples listed earlier, the expectation that a high dose facilitates connecting to others is listed as number 4; the expectation that a high dose provides more energy as number 11; and the expectation that a high dose causes one to feel more self-absorbed as number 18. As noted above, all these expectations were included in the questionnaire because they seemed plausible intervention targets; therefore, the results that show that some seem irrelevant (such as sub-determinant 11) are as valuable as those that show strong associations (e.g. sub-determinants 3 and 4).

Prevention organisations that want to develop an intervention targeting 'using a high dose of MDMA' can now inspect the various CIBER plots in the report and select the sub-determinants to target in their intervention. These selected sub-determinants can then be entered into an 'ABCD' matrix (an acyclic behaviour change diagram matrix, Metz et al., 2022) along with the overarching determinants, corresponding sub-behaviours and overarching target behaviour. This ABCD matrix can be further developed to design a theory- and evidence-based intervention, to discuss the intervention rationale with stakeholders and members of the target population, and to publish that rationale to support other prevention professionals in adapting the intervention to their country and context.

In addition to producing reports using the results from the questionnaire and the CIBER plots, a series of brief animations was produced. These were designed to introduce this systematic approach to behaviour change and to highlight some of the results of each questionnaire round to prevention professionals without a background in behaviour change science. These brief animations are available in Dutch and English on the Party Panel YouTube channel.

FIGURE 1
Confidence-interval-based estimation of relevance plot

Means and associations (r) with attitude ($R^2 = [.47; .65]$) & intention ($R^2 = [.3; .51]$)



The left-hand panel shows the univariate distribution for a set of sub-determinants, with a diamond depicting the 99.99 % confidence interval for the mean. The mean's position relative to the scale endpoints is indicated by the colour of the diamond derived from a continuous gradient anchored by red (corresponding to low means), blue (means in the scale's centre) and green (high means). The right-hand panel shows the 95 % confidence intervals for the associations to overarching determinants. The colour of the stroke indicates which determinant the mean relates to (purple diamonds represent the relationship with attitude and yellow diamonds represent the relationship with intention), and the fill indicates the relative strength of the correlation (again on a continuous gradient, anchored at its extremes by red and green signifying negative and positive correlations, respectively, and in its centre by grey representing no association).

Limitations

Web surveys are useful for mapping the determinants of target behaviours, although there is room for improvement and some limitations to consider. Among other issues is a considerable degree of selection bias. In the case of the Party Panel questionnaire, this has three causes. First, there were no funds to develop a strategy that could support the recruitment of a broader sample. Instead, recruitment relied on pop-ups on websites of partner organisations and social media. Second, the topic of each questionnaire was clear to participants before they decided to participate. For example, participants that were interested in ecstasy use were more likely to participate in the questionnaire about ecstasy use, and might decline to join the survey round that related to flirting. As we collaborated with different and specific expert organisations for each round, which supported recruitment, this probably contributed to self-selection by those interested in the specific survey topic. Third, no measurement instruments have been developed and validated for segments of the population with a background in vocational education or practical training. As such, there was more drop-out in these groups, resulting in over-representation of participants with a background in higher education.

Lastly, one challenge of running the survey is that comprehensively mapping the determinants and sub-determinants of a given behaviour requires a large number of questions. As a result, drop-out over the questionnaire is considerable. Fortunately, some of the limitations outlined here can be addressed by more funding, particularly for the development and implementation of a broader recruitment strategy and for the development and validation of measurement instruments for other segments of the population.

Conclusion

In this paper we have introduced the Party Panel, a web survey for mapping the determinants and sub-determinants of substance use-related behaviours to enable theory- and evidence-based prevention efforts. We have described how the Party Panel was set up and where the relevant materials are available for use by others. In addition, we have presented a series of results pertaining to the perceptions that Dutch nightlife patrons have of the effects of using a high dose of MDMA compared to a lower dose. This has, in turn, been used to develop evidence-based interventions to reduce the harms associated with high-dose MDMA use. Because all Party Panel resources, data and analysis scripts are openly available and the infrastructure is completely open-source, other organisations can use these results or copy them to

their servers and set up similar web surveys. This approach allows prevention professionals to rapidly identify which sub-determinants need to be targeted in campaigns responding to emerging risks and contributing to safer nightlife settings. By extension, this shows how web surveys can be valuable tools in addressing emergent risks in nightlife settings and in developing appropriate interventions based on those risks.

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