Chapter 5 Social cognitive determinants of ecstasy use: does studying mixed samples of non-users and users leads to over-estimation of association strengths?

Ecstasy use is potentially damaging to health [17; 20; 21] yet prevalent [74; 112], and although accordingly, a need for intervention development has been asserted, it has also been observed that evidence to base these interventions on is scarce [35]. If evidence-based interventions are to be developed, more research into the determinants of ecstasy use is necessary. In the Netherlands, in particular, only two quantitative studies have addressed determinants of ecstasy use, and both explored the applicability of the outcome expectancy approach to studying drug use [13; 86]. This approach assumes that behaviour is a function of people's expectations about outcomes of that behaviour (e.g. the expectation that using ecstasy produces a positive mood state). Although these studies yielded interesting results, they did not provide any information as to the relevance of other determinants that have been found predictive of ecstasy use in other countries, particularly the United Kingdom [56; 58-61]. This is especially problematic because the expectancies that were most strongly associated to intention to use ecstasy reflect actual effects of ecstasy, rendering them inadequate as intervention targets [35]. Intervention developers in the Netherlands therefore remain largely without evidence to inform intervention development. The current study aims to provide this evidence.

Although there have been studies into the role of other determinants in other countries, these results may not generalise to the Netherlands. Because of the relatively liberal drug policy in the Netherlands, drug use patterns may differ from those in other countries [120-123]. In addition, different dance drugs are used in the Netherlands than in other countries [124]. For example, methamphetamine use is prevalent in Australia [125] and the US [126], but

virtually nonexistent in the Netherlands [127; 128]. LSD use shows a similar but less pronounced pattern [38; 112]. As recreational drugs have been shown to be each others substitutes [129], these differences may affect ecstasy use patterns. Thus, before being able to base interventions on these determinants, their role in ecstasy use in the Netherlands needs to be addressed.

These other determinants were mainly drawn from the Theory of Planned Behaviour [TPB; 30]. The TPB postulates intentions as most proximal social cognitive determinant of behaviour, in turn predicted by attitude (i.e. evaluation of the likelihood and desirability of that behaviour's consequences), subjective norm (i.e. perception of others' approval of the behaviour) and perceived behavioural control [PBC, i.e. perception of control based on perception of skills and external obstacles/facilitators; very similar to self efficacy; 30]. In addition to these traditional TPB determinants, four additional determinants have been found predictive of ecstasy use [35]: subjective descriptive norm [an extension of the traditional subjective normative construct that assesses the perceived behaviour of social referents; 142], anticipated regret [or affect; the amount of negative emotions one experiences when prospectively imagining not having performed the target behaviour; 143; 144], moral norm [ones personal norm regarding performing a behaviour; 58; 145], and habit.

Studies into ecstasy use have generally employed either a TPB approach [e.g. 56; 58; 59-61] or an outcome expectancy approach [based on Social Cognitive Theory, 34; e.g. 54; 55], but no study as yet has combined these approaches. Although each approach does have merit in itself [35], these single-approach studies preclude conclusions about the degree of overlap of the two approaches. In general, the TPB considers outcome expectancies to be lower-level determinants that underlie its attitude construct [146], but it remains unclear whether this relationship holds for ecstasy use (i.e. whether outcome expectancies underlie attitude regarding ecstasy use). To address this issue, the current study included a number of outcome expectancies so that their association with TPB's attitude may be assessed. These expectancies were drawn from the two previous Dutch studies [13; 86], with two additions based on a Dutch qualitative study [147].

One last limitation of research that mapped the determinants configurations of ecstasy use so far, was that these analyses mostly computed bivariate and multivariate association strength measures for the combined sample of non-users and users [13; 56; 58; 60; 61]. Although some studies have compared the two groups [59; 86], variables distinguishing between non-users

and users need not predict intention to use in either of the two groups. Indeed, a recent qualitative review suggested that reasons for trying out ecstasy among non-users are different from reasons for using ecstasy among ecstasy users [114]. If this is the case, the determinant configuration (the relative relevance of each determinant) arrived at when analysing these combined samples may not be representative for either of the two subsamples of non-users and users. Boys and colleagues [55; 148] did analyse determinant configurations within two samples of users, but they did not measure any TPB determinants.

In sum, the current study was designed to address a number of lacunae in ecstasy use research. First, the determinant configuration of using ecstasy will be mapped both for the combined sample and the separate samples of non-users and users. Second, the overlap of the TPB and the outcome expectancy approach will be addressed. Third, the relative relevance of the traditional TPB determinants and three of the four additional TPB determinants that were found predictive of ecstasy use will be determined (habit was not included, as using ecstasy cannot sensibly be operationalised for non-users of ecstasy). Fourth, this study will allow comparison of these determinant configurations between the Netherlands and other countries.

Methods

Procedure

An online questionnaire study was conducted as the internet has been argued to be a suitable medium for studying hidden populations such as non-misusing illicit drug users [149]. Participants were recruited by links at several dance-related Dutch websites (most participants came from the online community at http://partyflock.nl). The questionnaire was administered by a self-chosen virtual interviewer in a Flash interface [150; also see 151]. To activate the proper context for respondents, the interview took place to the background of several party pictures while dance music was playing. Server-side parsing of the content (using PHP and MySQL; see [152]) enabled tailoring of the questionnaire to the respondent (i.e. presentation of every item depended upon previous answers).

This possibility to tailor the questionnaire enabled data collection for several behaviours simultaneously, but only results pertaining to using ecstasy will be reported here, and therefore only methodological details relevant to these results. At the first measurement (t_1), demographics, drug use, party

behaviour, ecstasy expectations, and behavioural intentions were measured for all participants, after which a subset of participants answered questions about the determinants of using ecstasy (the other participants answered questions about the determinants of other behaviours). After three months, participants could access the follow-up measurement (t_2), where their ecstasy use behaviour in the past three months, and their intention to use or try out ecstasy in the next three months, were measured. Five months later (t_3; logistical problems delayed this follow-up two months), behaviour was measured again. Participants were attended to the follow-ups by e-mail, and six weekly reminders were sent out. Permission to perform this investigation was granted by the Ethical Committee Psychology of Maastricht University (the ECP).

Measurements

At t_1, *demographic variables* (gender, age and education level), *drug use* ('which of these substances do you occasionally use at parties?') and *party behaviour* were measured with one item each, as well as a number of consistently reported *ecstasy expectations* (the leading statement "if I take ecstasy, I . . ." for users, or "if I would take ecstasy I would . . ." for non-users, was followed by "feel very good", "feel more connected to other people", "make contact easier", "understand myself better", "have better sex", "get a lot of energy", "live my life more intensely", "have a better life than without ecstasy", "damage my health", "feel bad the next couple of days", "feel nauseous", and "get stiff jaws"). These expectation measures were not aggregated because factor analyses revealed different factor structures for users and non-users. *Behavioural intention* was measured with two items (i.e. 'do you intend to [use/try out] ecstasy in the next three months?' and 'do you think that you will indeed do that?', both absolutely not–absolutely; range 1-5; α = .92 for using and .93 for trying out).

Attitude was measured with five semantic differentials (i.e. 'I think that using ecstasy is/would make me ...', unpleasant-pleasant, bad-good, unwise–wise, not nice-nice, unhappy-happy; range 1–5; α = .92). *Subjective norm* was measured by multiplying an item tapping injunctive subjective norm (e.g., 'how would your parents feel if you were to use ecstasy?', disapproving–approving; range -2–2, also including an option 'I don't know' with the same value as the middle option 'neutral', i.e. 0) with an item tapping motivation to comply (e.g. 'how important do you find your parents' opinion about whether you use ecstasy?', very unimportant–very important; range 1–5) for best friend, other friends, and parents, and dividing the product by 5 to get a range of -2–2 (α =

.78). *Perceived behavioural control* was measured with two items (i.e. 'imagine that you would want to use ecstasy', followed by 'does it seem easy to you to use ecstasy?', 'do you think you would manage to use ecstasy?', absolutely not–absolutely; range 1–5; α = .86). *Descriptive norm* was measured by three items (measuring whether ones best friend, friends with whom one attends parties, and other friends use ecstasy, absolutely not-absolutely, range 1-5, α = .65). *Moral norm* was measured by two reverse items (i.e. 'using ecstasy contrasts my principles', 'I would feel troubled if I were to use ecstasy' absolutely not–absolutely; range 1–5; α = .91). *Anticipated regret* was measured by three items (i.e. 'imagine that in a few weeks at a party you use ecstasy. Imagine how you would feel the next day. Would you [regret it/worry/feel guilty]?', not at all–very much; range 1–5; α = .94).

At t_2, *intention* was measured with the first of the two intention items used at t_1. *Behaviour* at t_2 and t_3 was measured by asking whether since the last questionnaire, participants had taken ecstasy, and if so, how often (to which participants typed in a number). In addition, the number of parties participants had attended in the past three months was measured.

Analyses

As Cohen argued, "the primary product of a research inquiry is one or more measures of effect size" [153, p. 1310]. Especially with large samples, trivial associations can become significant. Therefore, rather than their significance, associations' meaningfulness will guide the discussion of the results. Associations are considered meaningful when they are non-trivial. We distinguish five levels of association strength (effect size): trivial, weak (Cohen's d > .2; Pearson's r > .1; Cramer's V > .1; odds ratio > 1.5), moderate (Cohen's d > .5; Pearson's r > .3; Cramer's V > .3; odds ratio > 2.5), strong (Cohen's d > .8; Pearson's r > .5; Cramer's V > .5; odds ratio > 4), and very strong (Cohen's d > 1.3; Pearson's r > .7; Cramer's V > .7; odds ratio > 10) [70; 109; see also 154; 155].

For the significance tests of bivariate associations between one dichotomous and one continuous variable, the t-test for unequal variances will be used (in recognition of the issues pointed out by Ruxton [156]). In addition to bivariate analyses, we will conduct a number of multivariate analyses to enable exploration of associations between variables while artificially keeping other variables constant. In particular, we used linear and logistic regression. In these analyses, Cook's distances were examined (but always remained low), and cases with absolute studentised residuals > 3 were considered outliers and discarded from the analyses (at most, this lead to the removal of 6 cases).

Results

At the first measurement (t_1), 5 525 non-users and users participated (ex-users are not currently considered). At the second measurement (t_2), 2 644 participants were retained (48%), and at the third measurement (t_3), 1 607 participants (61%). At t_1, 260 users and 234 non-users participated in the section where the determinants of using ecstasy were measured. Of these, 91 non-users and 138 users were retained at t_2, and 58 non-users and 80 users at t_3. Drop-out analyses for demographic variables, used drugs, party behaviour, intention, and expectancies showed that none of these variables was significantly and meaningfully associated to whether participants did not drop out, dropped out at t_2, or dropped out at t_3 (highest Cohen's d = .17 for age). The characteristics of participating ecstasy users and non-users, as well as labeled association strength measures for the difference between non-users and users and significance tests are shown in Table 5.1. Compared to non-users, ecstasy users were more likely to be male, use other drugs (except alcohol), visit big parties (but not small parties) more often, be older, score higher on all positive expectations and lower on all negative expectations (except the expectation to get stiff jaws), and score much higher on all TPB determinants.

In bivariate analyses, participants' intention at t_1 very strongly predicted whether they would indeed have used ecstasy at t_2 (2.2 vs. 4.1, Cohen's d = 1.80, t[2642] = 46.0, $p < .001$), and intention at t_2 very strongly predicted use at t_3 (1.9 vs. 3.9, Cohen's d = 1.9, t[1 605] = 38.8, $p < .001$). In a multivariate analysis where ecstasy use at t_2 was logistically regressed on intention and perceived behavioural control (PBC) at t_1, the resulting model (N = 229, $\chi^2[2] = 146.2$, $p < .001$) correctly predicts ecstasy use at t_2 for 84.7% of the cases (Nagelkerke $R^2 = .64$; corrected OR = 4.4, $p < .001$ for intention and corrected OR = 2.3, $p < .05$ for PBC). When the analysis was repeated for each user-group separately (non-users and users), PBC did not reach significance. Thus, although intention was highly predictive of later ecstasy use in all analyses, PBC did not contribute to this prediction when non-users and users were examined separately. This crucial role for intention warrants closer examination of its determinants.

The correlations between all determinants, in the combined sample of non-users and users for whom all determinants were measured, are shown in Table 5.2. The correlations between the TPB determinants and intention, both for the combined sample of non-users and users and for the two user-groups separately, and the regression weights in regression analyses of intention on the traditional (step 1) and additional (step 2) TPB determinants, are shown in

Table 5.1: Participant characteristics (for means, standard deviations are provided in parentheses) and differences between non-users and ecstasy users.

		% or mean (sd)		Difference[1]		
Variable name or categories	Range	Non-users (n = 1772)	Ecstasy users (n = 3753)	Lbl[2]	Unit	Value
Gender (being female)		56%	41%	+	OR	.55
Higher educated		41%	45%	-	OR	1.19*
Alcohol use		83%	84%	-	OR	1.10[ns]
Tobacco use		40%	60%	+	OR	2.29
Cannabis use		21%	51%	++	OR	3.94
Speed use		2%	38%	++++	OR	29.97
Cocaine use		2%	38%	++++	OR	37.57
GHB use		.3%	16%	++++	OR	56.57
Poppers use		.7%	7.4%	++++	OR	10.78
Nitruous oxide use		1.7%	7.0%	+++	OR	4.20
Psylocybin use		.8%	3.9%	+++	OR	5.08
Ketamine use		.2%	5.1%	++++	OR	30.40
LSD use		.2%	1.7%	++++	OR	10.39
Visits a big party twice a year or less		35%	13%	+	V	.28
- every two to six months		53%	60%			
- every month or more		12%	27%			
Visits a club/small party bimonthly		23%	23%	-	V	.05*
- every two to four weeks		52%	56%			
- every week or more		25%	21%			
Age in years	11–53	20.27 (4.53)	23.64 (6.06)	++	d	.60
Expectation to feel very good	1–5	2.56 (1.37)	4.40 (.76)	++++	d	1.84
Expectation to feel more connected	1–5	2.55 (1.39)	4.20 (.92)	++++	d	1.51
Expectation to make contact easy	1–5	2.76 (1.43)	4.06 (1.05)	+++	d	1.09
Expectation to understand self better	1–5	1.76 (1.03)	2.67 (1.17)	+++	d	.81
Expectation to have better sex	1–5	2.35 (1.27)	3.20 (1.25)	++	d	.68
Expectation to get a lot of energy	1–5	3.63 (1.34)	4.18 (.93)	++	d	.51
Expectation to live a more intense life	1–5	1.88 (1.10)	2.83 (1.29)	++	d	.78
Expectation to have a better life	1–5	1.65 (1.17)	2.49 (1.32)	++	d	.65
Expectation to damage health	1–5	4.31 (1.10)	4.06 (1.02)	+	d	-.24
Expectation to feel bad for a few days	1–5	4.11 (1.11)	3.53 (1.25)	+	d	-.48
Expectation to feel nauseous	1–5	3.33 (1.23)	1.93 (1.12)	+	d	-.22
Expectation to get stiff jaws	1–5	3.52 (1.23)	3.55 (1.23)	-	d	.03[ns]
Intention	1–5	1.55 (.89)[3]	3.92 (1.00)[3]	++++	d	2.50
Attitude	1–5	2.19 (.97)[3]	3.79 (.52)[3]	++++	d	2.09
Subjective norm	-2–2	-.87 (.64)[3]	-.03 (.45)[3]	++++	d	1.58
Perceived behavioural control	1–5	3.34 (1.33)[3]	4.72 (.51)[3]	++++	d	1.39
Descriptive norm	1–5	2.32 (1.07)[3]	3.79 (.79)[3]	++++	d	1.58
Moral norm	1–5	2.27 (1.33)[3]	4.41 (.86)[3]	++++	d	1.93
Anticipated regret	1–5	3.17 (1.39)[3]	1.46 (.74)[3]	++++	d	-1.56

[1] All differences are significant at an alpha of .001, unless specified otherwise, * $p < .005$, [ns] Not significant ($p > .05$), [2] Association strength labels: - trivial, + weak, ++ moderate, +++ strong, ++++ very strong [3] For the TPB determinants, the sample size is 234 for non-users and 260 for ecstasy users.

Table 5.2: Means, standard deviations, and correlation coefficients for the associations between all determinants (N = 494).

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	Means	3.65	3.52	3.49	2.31	2.85	3.92	2.46	2.09	4.12	3.76	2.57	3.50	2.80	3.03	-.43	4.07	3.09	3.40	2.27
	Standard deviations	1.37	1.40	1.37	1.20	1.32	1.16	1.33	1.31	1.08	1.22	1.35	1.24	1.52	1.11	.69	1.20	1.19	1.54	1.39
1	Helps to feel very good	-																		
2	Helps to feel connected	.73	-																	
3	Helps to make contact easier	.61	.72	-																
4	Helps to understand self	.48	.54	.53	-															
5	Sex enhancement	.43	.41	.41	.33	-														
6	Provides energy	.44	.39	.42	.24	.30	-													
7	Helps to live more intensely	.40	.40	.33	.40	.31	.13	-												
8	Helps to live a better life	.29	.21	.16	.27	.23	-.02	.45	-											
9	Damages my health	-.14	-.11	-.08	-.11	-.03	.13	-.11	-.10	-										
10	Induces down period	-.17	-.17	-.15	-.14	-.12	.02	-.11	-.06	.47	-									
11	Makes me feel nauseous	-.49	-.44	-.32	-.22	-.27	-.14	-.27	-.15	.23	.32	-								
12	Makes my jaws feel stiff	.07	.08	.11	.06	-.05	.11	.08	.08	.18	.23	.27	-							
13	Behavioural intention	**.66**	**.57**	**.46**	**.35**	**.31**	**.23**	**.41**	**.30**	**-.20**	**-.30**	**-.52**	**.03**	-						
14	Attitude	.78	.70	.57	.45	.40	.34	.46	.27	-.26	-.30	-.57	.03	**.79**	-					
15	Subjective norm	.56	.53	.37	.30	.34	.23	.34	.21	-.20	-.24	-.47	.03	**.64**	.70	-				
16	PBC	.60	.52	.42	.28	.33	.29	.33	.12	-.12	-.19	-.47	.00	**.60**	.69	.56	-			
17	Descriptive norm	.47	.47	.32	.27	.30	.16	.25	.18	-.08	-.15	-.39	.01	**.54**	.56	.63	.45	-		
18	Moral norm	.63	.56	.43	.34	.32	.23	.38	.22	-.27	-.31	-.49	.00	**.74**	.79	.62	.57	.49	-	
19	Anticipated regret	-.63	-.56	-.40	-.31	-.30	-.25	-.38	-.17	.29	.34	.54	.02	**-.69**	-.77	-.69	-.66	-.50	-.74	-

With N = 494, correlation coefficients below .09 have a p-value < .05; below .12 a p-value < .01; and below .15 a p-value < .001.

Table 5.3: Correlation coefficients and regression analyses to predict intention from traditional (step 1) and additional (step 2) TPB determinants.

	Non-users and users (N = 491)			Non-users (N = 231)			Users (N = 257)		
	r	β step 1	β step 2	r	β step 1	β step 2	r	β step 1	β step 2
Attitude	.80***	.64***	.43***	.67***	.61***	.47***	.44***	.38***	.29***
Subjective norm	.55***	.16***	.07	.45***	.14*	.07	.21***	.05	.02
PBC	.61***	.07	.05	.37***	.01	-.01	.27***	.11	.08
Descriptive norm	.55***		.10**	.26***		.05	.01		-.03
Moral norm	.75***		.25***	.53***		.12	.36***		.17*
Anticipated regret	-.70***		-.05	-.58***		-.13	-.30***		-.11
R^2		.66	.70		.48	.51		.20	.24
R^2 change		.66	.04		.48	.03		.20	.04
F of R^2 change		320.47***	18.16***		70.11***	3.67*		21.63***	4.44**
Df_F (change)		3	3		3	3		3	3
Df_F (error)		487	484		227	224		253	250

* p < .05, ** p < .01, ***, p < .001.

Table 5.3. In the first step of the regression analyses, in the combined sample, all three traditional TPB determinants achieve significance, whereas in both separate samples, only attitude achieves significance. In the second step, the significant determinants in the combined analysis are attitude, descriptive norm, and moral norm. Among the non-users, only attitude remains as significant determinant, and among users, only attitude and anticipated regret. In the combined analysis, the final model explains 70% of the variation in intention; among non-users, 51%; and among users, only 24% (parsimonious models containing only the significant determinants explain 69%, 47%, and 22%, respectively).

To assess the degree of overlap between the expectation approach and the TPB approach, we conducted two analyses. First, to establish the degree to which the expectations explain variation in TPB's attitude, attitude was regressed upon the expectations. The results are shown in Table 5.4. For the combined sample, the expectations together explain most variation in TPB's attitude measure (78%), but the proportion of explained variation is lower for non-users (62%) and lower again for ecstasy users (40%). The bivariate correlations show the same pattern: whereas for the combined sample, there are two very strong associations, three strong associations, and five moderate associations, for non-users, there are three strong associations and five moderate associations, and for users, there is only one strong association and no moderate associations. Thus, it seems that attitude consists of different

expectations for non-users and users, and that most relevant expectations for users have not been measured.

Second, we examined whether these expectations have additional predictive value over the TPB. We did this by saving, for every participant, their predicted intention to use ecstasy as predicted by the parsimonious models described above. The difference between each participants' measured intention and their predicted intention (the residual) represents the part of intention that cannot be explained by the TPB determinants. We then regressed this residual upon the expectations. This shows what percentage of intention, of the part that cannot be explained by the TPB determinants, can be explained by the expectations, providing a measure of their additional value. The advantage of this approach compared to conducting a hierarchical regression analysis is that in this way, only the variation in intention that is not already accounted for by the TPB determinants is considered, whereas in a hierarchical regression

Table 5.4: Correlation coefficients for association between ecstasy expectations and attitude, regression analyses where attitude was predicted from the ecstasy expectations, and regression analyses where the residuals were predicted from the ecstasy expectations (these residuals are the differences between measured intention and intention predicted by a parsimonious model consisting of the significant predictors in step 2 in Table 5.3.

	Non-users and users (N = 488)			Non-users (N = 232)			Users (N = 258)		
	r	βs for attitude	βs for residuals	r	βs for attitude	βs for residuals	r	βs for attitude	βs for residuals
Feel good	.81***	.45***	.09	.67***	.37***	.10	.51***	.41***	.10
Connected	.73***	.18***	-.09	.62***	.19**	-.14	.23***	.05	-.03
Easier contact	.60***	.04	.05	.53***	-.02	.01	.24***	.12	.05
Insight	.48***	.01	-.05	.47***	.06	.01	.20**	.00	-.08
Better sex	.43***	.04	-.10	.41***	.03	-.08	.16**	.09	-.03
Energy	.35***	.01	-.05	.42***	.08	.07	.01	-.06	-.06
Intense life	.50***	.13***	.02	.46***	.17***	.03	.26***	.12*	.05
Nicer life	.31***	.02	.15**	.13	-.05	.11	.26***	.11*	.16*
Unhealthy	-.28***	-.10***	.11**	-.24***	-.11	-.03	-.25***	-.20***	.09
Down period	-.32***	-.09***	-.11**	-.28***	-.14**	-.13	-.14*	-.05	-.15*
Nauseous	-.58***	-.17***	-.09	-.34***	-.13*	.06	-.18**	-.10	.03
Stiff jaws	.03	.06*	.02	.03	.10	-.08	-.02	-.02	.07
R^2		.78	.06		.62	.05		.40	.07
F of R^2		136.67***	2.36**		30.06***	.98		13.75***	1.59
Df_F (model)		12	12		12	12		12	12
Df_F (error)		475	478		219	218		245	244

* p < .05, ** p < .01, *** p < .001.

analysis, it is possible that expectations' regression coefficients achieve significance by explaining variation that was previously explained by for example attitude. The results are shown in Table 5.4: in the combined sample, the expectations explain 6% of the unexplained part of intention; among non-users, 5%; and among users, 7%. For the combined sample, 30% of intention is unexplained; for non-users, 52%; and for users, 76%. Thus, of the total intention measure, the expectations explain an additional 1.5% in the combined sample; 2.6% among non-users; and 5.3% among users. However, the model only achieves significance in the combined sample, where the expectations that using ecstasy makes one lead a nicer life, that it is unhealthy, and that it makes one feel down for a few days after use achieve significance, explain variation in intention that was not explained by TPB's direct attitude measure.

Discussion

Participants' intention was highly predictive of subsequent ecstasy use, rendering it expedient to map the determinant configuration underlying this intention. When looking at differences in determinant scores between non-users and users, all TPB determinants and most ecstasy expectations were very strongly associated to user-group. Although this may be taken to indicate that all these determinants are viable intervention targets, closer inspections reveal different results. When mapping these determinants' associations to intention to use ecstasy, among the combined sample of both non-users and ecstasy users, indeed all TPB determinants were strongly or very strongly associated to intention. However, among non-users, only attitude, moral norm and anticipated regret were strongly associated, subjective norm and perceived behavioural control (PBC) were moderately associated, and descriptive norm was only weakly associated. Among ecstasy users, attitude, moral norm, and anticipated regret were moderately associated, subjective norm and PBC were weakly associated, and descriptive norm not at all. When investigating the multivariate associations, similar patterns emerge, with considerable less predictive power among non-users and users than in the combined sample, and with different predictors in the three analyses (in the combined sample, attitude, descriptive norm and moral norm; among non-users, only attitude; and among users, attitude and moral norm).

Regarding the ecstasy expectations, similar patterns were observed. In bivariate analyses, most expectations had moderate to strong associations with

TPB's attitude in the combined sample, but these associations were weaker among the non-users, and weaker again among the ecstasy users. This was also reflected in the variation in attitude these expectations explained together in multivariate analyses. Three final regression analyses showed that the expectations could offer only very limited additional predictive power over the TPB, and accordingly, the model was only significant in the combined sample.

The current study suffers three limitations. First, the behavioural measure relies on self-reports. Even though these have been shown to be reliable [112; 157], of course, it would have been desirable to eliminate all possibility of measurement error. Second, clearly, a number of relevant beliefs and determinants have not been measured. This is partly because results from a recent qualitative review [114] were not yet available. Third, the intention to use ecstasy was only measured for ecstasy users; for non-users, the intention to try out ecstasy was measured. Although it is unlikely that this inconsistency cased the differential results, future research should eliminate this inconsistency to rule our this explanation. Finally, the current sample was recruited purely by letting participants voluntarily participate. It cannot be excluded that certain groups of participants, for example non-users that are strongly inclined to remain non-users and have no interest in ecstasy at all, have not participated.

Despite these limitations, this study provides answers to all questions it set out to answer. First, it seems that indeed, determinants that distinguish between non-users and users are not necessarily the determinants predicting intention to use within either group. Similarly, not all determinants are equally strongly associated to intention to use among non-users and users (e.g. some determinants are strongly associated to intention among non-users, but only weakly among user). Second, the current data support the theoretical assumption that TPB's attitude encompasses the expectations from Social Cognitive Theory. Of course, this does not mean that these expectations need not be measured any more: on the contrary, it is these specific cognitive measures that can guide intervention development. However, future research should combine them with other TPB determinants. Third, although TPB determinants, both traditional and additional, have predictive value, only attitude and moral norm consistently retain predictive value in multivariate analyses. However, since interventions can generally not be certain to influence particular determinants, intervention targets should be based on bivariate analyses, rather than the conditional multivariate analyses. These bivariate analyses show attitude, moral norm and anticipated regret to be the strongest

predictors of intention among non-users, and, to a lesser degree, among users, followed by subjective norm and PBC. Fourth, these results are indeed in line with prior research. Bivariate associations between TPB determinants and intention were a bit higher than in the meta-analysis [35] in the combined sample, a bit lower among non-users, and lower again among users, reflecting the fact that most TPB studies so far studies combined samples. When comparing multivariate outcomes, the nonsignificance of PBC's beta does not seem in line with the results from most studies [56; 58; 60], but in another recent TPB study [61], PBC also fails to achieve significance multivariately. This could be explained if ecstasy has become easier to obtain, but such a conclusion would definitely require more research.

In conclusion, a number of lessons for future research emerge. First, user-groups should not be aggregated. Studies should examine either non-users or ecstasy users, or both, but not by combining the samples. Second, studies should measure both specific expectancies and the TPB determinants. The TPB approach can provide information as to the relative importance of the determinants, whereas the underlying expectations can provide interventions with specific targets if attitude proves sufficiently relevant. Third, more research is necessary to map the determinants of using ecstasy both among non-users and among ecstasy users. Although the proportion of explained variation is satisfactory when examining the combined sample ($R^2 = .70$; TPB reviews found mean R^2s of .39 [46] and .41 [33]), we understand the separate samples less well. It may be possible that indeed, it is necessary to not only be sufficiently specific about the population, but also about the behaviour of interest [114]: perhaps we should examine the determinants of 'trying out ecstasy' and of 'ceasing ecstasy use', rather than of the more generic 'using ecstasy'.