Title:

A behavioural approach to adolescent cannabis use: accounting for non-deliberative, developmental and temperamental factors.

Abstract

Most behavioural models examine adolescent health risk behaviours using a reflective, deliberate social-psychological framework. In this study, adolescent cannabis use is investigated via an expanded social-psychological model of behavioural decision-making: the Theory of Planned Behaviour (TPB). The aim was to examine the contribution of non-deliberative (impulsivity), developmental (perceived parenting styles) and temperamental (moral norms, mental health, delinquency) factors in adolescent cannabis use. A longitudinal questionnaire with baseline and follow-up measurement (14-day interval) was used. Participants were Sixth Form College students (n=199) aged 16-18 (mean age= 16.44, SD=-0.55). At baseline (T1), demographics, TPB variables and additional socio-psychological variables were measured. Fourteen days later (T2) self-reported cannabis use was measured. Logistic regression analyses indicated that the impulsivity subcomponent of lack of premeditation and moral norms predicted self-reported cannabis use behaviour. Perceived parental rejection predicted cannabis use intentions. Adolescent cannabis use can be better understood through the expanding of behavioural models to account for non-deliberative, developmental and temperamental factors. Drug education interventions should aim at developing self-instruction training programmes teaching adolescents effortful thinking while family-based interventions should focus on encouraging open parent-adolescent communication which has shown to influence adolescents' cannabis use.

A behavioural approach to adolescent cannabis use: accounting for non-deliberative, developmental and temperamental factors.

1   Introduction

This study investigates whether our understanding of adolescent cannabis use can be enhanced by incorporating non-deliberative, developmental and temperamental antecedents in a behavioural model: the Theory of Planned Behaviour.

1.1   Background

Behavioural approaches to adolescent cannabis use

The United Nations Office on Drugs and Crime (UNODC) (2013) reports that cannabis use is becoming a normative risk-taking behaviour among young people worldwide. An extensive range of external (e.g. neighbourhood) and internal (e.g. self-esteem), risk (e.g. neglectful parenting) and protective (e.g. supportive parenting) factors have been associated with adolescent cannabis use (Chabrol et al., 2006; Fergusson, Horwood, & Swain-Campbell, 2002; Field, Mogg, & Bradley, 2004; McGee, Williams, Poulton, & Moffitt, 2000; Olsson et al., 2003).

Behavioural approaches to adolescent substance use maintain that the behaviour is an outcome of a deliberative process including an assessment of one's beliefs, evaluations of behaviour and perception of others' wants that ultimately create an intention to perform or not perform the behaviour. Some examples include the Health Belief model (Abraham & Sheeran, 2005), Protection Motivation Theory (Boer & Seydel, 1996) and the Theory of Planned Behaviour (Ajzen, 1991). While these models predict many types of health behaviour they are less effective in predicting health risk behaviours considered to be less premeditated, particularly among adolescents (Salovey, Rathoman, & Rodin, 1998). The Prototype/Willingness model (Gibbons, Houlihan, & Gerrard, 2009a) shows that by incorporating both heuristic (impulsive, non-deliberative) and analytical (effortful, deliberative) processing, adolescent health behaviour could be better explained. A study examining onset of smoking initiation among adolescents demonstrates how the Prototype/Willingness model is a reliable model in predicting spontaneous health risk behaviour (Gerrard, Gibbons, Stock, Lune, & Cleveland, 2005). This supports the idea that willingness to engage in behaviour, i.e. openness to opportunity, represents a more

spontaneous, reactive path to enacting behaviour, in contrast to the reasoned, planned path described in other health belief models, i.e. Theory of Planned Behaviour (TPB). However, two points are worthy of consideration here. Firstly, the TPB does not negate that people do not always carefully and systematically review all information before forming an intention to engage in the behaviour. Rather, the TPB recognises that in-depth processing is reserved for important decisions while spontaneous risky behaviours require less careful deliberation (Ajzen, 2011). Secondly, Fishbein and Azjen (2010) argue that empirical evidence neither prefers willingness over intention, nor does it support the idea that adding a measure of willingness improves prediction of behaviour. They explain that behavioural intentions are characterised as indications of a person's readiness to perform a behaviour that can be measured by asking people about their intentions, expectations, plans and/or willingness to engage in the behaviour. These different expressions of behavioural readiness are considered to root from the same underlying construct, i.e. intention. Therefore the construct of willingness is yet to be empirically supported as a separate index of behavioural intention. The results of a study comparing the TPB and the Prototype/Willingness model found that intention was a better predictor of health behaviour ($r = 0.49$) than was willingness ($r = 0.36$) (Matterne, Diepgen, & Weisshaar, 2011).

The Theory of Planned Behaviour (TPB)

According to the TPB (Ajzen, 1991) behaviour is directly predicted by intention, which is itself determined by three major constructs (see Figure 1): *attitude*, which is an individual's positive or negative evaluation towards a behaviour; *perceived norms,* which refers to the perceived social pressure from significant others (e.g., family, friends) in relation to the behaviour; and *perceived behavioural control (PBC),* which concerns the perceived ease or difficulty of performing the behaviour (Ajzen, 1991; Fishbein & Ajzen, 2010).

[INSERT FIGURE 1]

The utility and applicability of the TPB in explaining risky health behaviours such as cannabis use (Armitage, Conner, Loach, & Willetts, 1999) and binge drinking (Norman & Conner, 2006) has been established. However, while these findings indicate that TPB studies examining substance use provide accurate predictions of intention and behaviour,

there is a large proportion of variance that remains unexplained (Sheeran, 2002). A meta-analysis of 206 studies found that the TPB model explained 23.9% of the variance in behaviours such as physical activity, while it accounted for much less variance in risky behaviours such as safer sex (13.8%) and drug abstinence (15.35%) (McEachan, Conner, Taylor, & Lawton, 2011). Problems with predictive power arise through the absence of factors that represent facets of risky behaviour such as non-deliberative processing, as well as several developmental and temperamental antecedents.

Expanding the TPB to explain adolescent cannabis use

Non-deliberative processing: The role of impulsivity

Strack and Deutsch (2004) explain that some behaviours are not always determined by intention (e.g. drug use) and instead impulsive -processing tends to overrule any previous reflective deliberation. Churchill and Jessop (2011) raise the possibility that much of the unexplained variance of the TPB regarding health-related behaviours is attributed to individuals' tendencies to respond "to the hedonic quality of perceptual input in an immediate, automatic fashion, without thinking about the longer-term consequences of their action" (p. 258). The authors propose the inclusion of impulsivity within the TPB when predicting behaviours that are not adequately characterised by reflective decision-making. It is reasonable to assume that in relation to adolescent cannabis use such a proposition would hold true.

Impulsivity has been characterised as a multi-dimensional construct which covers definitions such as an inability to wait (*urgency*), failure to avoid temptations (*lack of perseverance*), need for immediate *sensation-seeking* and tendency to act without thinking (*lack of premeditation*) (Patton et al., 2002; Whiteside & Lynam, 2001). Fundamental differences have been noted in the way that non-deliberative, impulsive versus planned, rational cognitive processing influence behaviour (Strack & Deutsch, 2004). Essentially, highly impulsive people would be more sensitive to reward and therefore more likely to approach tempting stimuli without thinking about the possible negative consequences of their actions (Avila & Parcet, 2001). Moreover, it has been speculated that in comparison to adults, adolescents are much more likely to be driven by impulsivity as a result of fewer rational considerations and more affective associations (Gibbons, Houlihan, & Gerrard, 2009b). Given that impulsivity predicts the shift to

compulsivity, which characterises the development of addictive behaviour (Belin, Mar, Dalley, Robbins, & Everitt, 2008), it is worth exploring the role of this factor in adolescent cannabis use.

Developmental antecedents: The role of parenting styles

The TPB has been criticised for neglecting the developmental course of risky behaviour (e.g. family) in the context of young people's drug use (Petraitis, Flay, & Miller, 1995). Empirical evidence has demonstrated that perceived permissive parenting styles have been linked to a higher likelihood of cannabis use among young people (Becona et al., 2013) probably due to decreased parental supervision (Fletcher, Steinberg, & Williams-Wheeler, 2004; Vieno, 2009). The Parents as Social Context Questionnaire (PSCQ) (Skinner, Johnson, & Snyder, 2005) measures young people's perceived parenting style on six dimensions: parental warmth vs. rejection; structure vs. chaos; and autonomy support vs. coercion. Previous studies incorporating these dimensions have shown that adolescents who report perceived autonomy support also report safer sexual practices (de Graaf, Ine, Liesbeth, & Wim, 2011) while adolescents who experience parental warmth have lower levels of delinquency (Yu & Gamble, 2010). It is therefore anticipated that this parenting style measure (PSCQ) will situate the adolescent-parent relationship in the context of young people's cannabis use.

Temperamental traits: Moral Norms, Mental Health and Delinquency

Moral norms have previously been found to be a significant contributor of adolescent cannabis use (Conner & McMillan, 1999), yet the extent to which the behaviour considered to be 'morally driven' is controversial. In a qualitative investigation, young people reported that they do not perceive cannabis use as an ethically-driven behaviour, but rather based on social norms (Duffy, Schaefer, Coomber, O'Connell, & Turnbull, 2008). This study aims to explore the role of moral norms among an adolescent sample for the purpose of understanding whether or not it predicts cannabis use for this age group and subsequently whether or not it is based on a morally-driven decision-making process.

Moreover, in a report examining mental health difficulties among young people it was found that an overall 23% of young people with a conduct disorder had used cannabis in relation to 6% of those without the conduct disorder (Green, McGinnity, Meltzer, Ford, &

Goodman, 2005). The 'strengths & difficulties' questionnaire covers commons areas of emotional and behavioural difficulties faced by young people under the age of 15 (Bourdon, Goodman, Rae, Simpson, & Koretz, 2005). Although it has been used to identify young people's mental health, it has not been used within a TPB framework and in relation to cannabis use.

Alternatively, the evidence associating deviance, antisocial behaviour and delinquency with higher tendencies to use substances (Farrington, 2003) indicates the likelihood that higher delinquency levels could predict cannabis use in this study.

Overall, examining the TPB's ability to explain cannabis use in adolescence will contribute to the understanding of socio-psychological and individual variables that explain and predict this behaviour. Investigating supplementary constructs of interest could capture a significant portion in the explained variance of intention and/or behaviour and improve TPB's predictive utility regarding adolescent cannabis use, thereby enhancing our understanding of adolescent health risk behaviour and helping to inform the design of future interventions.

Aims

The aims of this study were:

(a) To explore the role of non-deliberative, developmental and temperamental factors in explaining adolescent cannabis use via the TPB behavioural decision-making model.

(b) To examine the relative contributions of impulsivity, perceived parenting styles, moral norms, mental health and delinquency in predicting adolescent i) cannabis use intentions and ii) cannabis use behaviour.

2 Methodology

2.1 Participants and Procedure

A total of 199 UK Sixth Form College students (98 males, 101 females) aged 16-18 years took part (with parental consent) in this study. Given that parental consent was required, adolescents may have been worried that their behaviour would be reported to

teachers/parents. However this was overcome by informing participants of confidentiality and anonymity.

The study was conducted at two time points (Time 1, and two weeks later, Time 2). A questionnaire was administered at Time 1 measuring the standard TPB constructs, and at Time 2, measuring self-reported cannabis use behaviour over the course of two weeks (see 2.2. for details of measures). During the second phase of the study, 51 did not take part (an attrition rate of 25% due to absence of students) leaving a total of 148 participants (69 males, 79 females). However after dealing with missing data (see section 3.1) sample size remained at 199 participants (mean age= 16.44, SD=-0.55).

2.2 Measures

A longitudinal questionnaire-based study assessed TPB constructs as well as impulsivity, perceived parenting styles, moral norms, mental health and delinquency. All constructs were measured using widely-used tools (see Table 1).

[INSERT TABLE 1]

TPB variables

The TPB constructs have been established in several meta-analyses as reliable and valid tools, especially in their prediction of health behaviours (Armitage & Conner, 1999a, 1999b, 2001).

Intentions were assessed using two items (e.g. 'Please indicate how often you intend to use cannabis in the next two weeks'). Higher scores indicated an intention to take cannabis more frequently.

Attitude was assessed using the choice between a pair of semantic differentials (e.g.' Using cannabis over the next two weeks would be bad/good'). Higher scores indicated a more favourable attitude to cannabis use.

Perceived norms were measured using three items (e.g. 'Most friends who are important to me think I should smoke cannabis in the next two weeks'). Higher scores indicated others' positive perceptions of smoking cannabis.

Perceived Behavioural Control (PBC) was assessed using four items (e.g. 'How much control do you have over whether or not you use cannabis in the next two weeks'). Higher scores indicated higher levels of PBC.

ADDITIONAL variables

Impulsivity was assessed using a measure created by Whiteside et al. (2005) which comprises 4 sub-dimensions: *urgency*, *lack of premeditation*, *lack of perseverance*, and *sensation-seeking*. Higher scores indicated higher impulsivity levels. This measure has been previously applied and found to be successful in predicting health-related behaviours (Fischer, Smith, & Anderson, 2003; Whiteside & Lynam, 2003).

Perceived Parenting Style was measured using a 24-item scale adapted from the PSCQ (Skinner, Wellborn, & Regan, 1986). This tool has been established in meta-analytic reviews examining parenting styles (Prinzie, Stams, Dekovic, Reijintjes, & Belsky, 2009) and in studies investigating the role of parenting styles in relation to children's health behaviour (Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011). It comprises six dimensions; warmth, rejection, structure, chaos, autonomy support and coercion (e.g. 'My parents let me know they love me') and higher scores indicate agreement with the statement.

Moral Norms was measured using three items similar to those used by Conner & McMillan (1999) (e.g. 'It would be morally wrong for me to use cannabis'). In meta-analyses examining the predictive power of additional factors in the TPB, this measure received support in its application (Manstead, 2000; McEachan et al., 2011). Higher scores indicated stronger moral norms not to use cannabis.

Mental Health was assessed by the 25-item Strengths & Difficulties questionnaire (Goodman, 1997). The reliability of the Strengths & Difficulties questionnaire has been supported by a nation-based US study examining adolescents' mental health (Bourdon et al., 2005).

Delinquency was examined using the delinquency self-report scale (Tarry & Emler, 2007). The measure has received support in its applicability and use in a review on violent offending (Estevez, Emler, & Wood, 2009). Higher scores indicated more frequent delinquent acts.

Self-reported behaviour was assessed in the follow-up questionnaire using the three items used by Conner & McMillan (1999) and other research examining illicit drug use (Mcmillan & Conner, 2003) (e.g.' Over the past two weeks how often have you used cannabis?'). Higher scores indicated higher cannabis use.

3   Results

3.1   Missing data

Missing data amounted to 25% and expectation maximization (EM)[1] was used as a means of dealing with missing data. Table 2 demonstrates the zero order correlations (Pearson's r) between the variables.

[INSERT TABLE 2]

3.2   Cannabis use intentions

As expected a large proportion of the sample scored towards the lower end of the intention and behaviour scale; both these variables were dichotomised and analysed using logistic regression. Of the 199 students, 60 (30%) stated their intention to use cannabis while 139 (70%) reported they had no intentions to do so.

3.3   Predictors of cannabis use intentions

In comparison to the standard TPB model (- 2 Log Likelihood: 91.348), the augmented TPB (-2 Log Likelihood: 87.161) demonstrated an improvement in predicting cannabis use intentions as indicated by a decrease in the log likelihood.

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[1] EM is a missing data technique that overcomes some of the limitations of other techniques, such as mean substitution or regression substitution (Schafer & Graham, 2002). These alternative techniques generate biased estimates-and, specifically, underestimate the standard errors. Due to the cumulative loss of participants that would have occurred due to listwise deletion biases estimates (Schafer & Graham, 2002), the maximum likelihood estimation was used so as to include all cases (Dempster, Laird, & Rubin, 1977). Because the proportion of missing values for most variables was small and/or did not appear to be systematic (p>.05), the assumption that the values are missing at random was considered plausible (Little & Rubin, 2002). The missing data were replaced using EM, so that all 199 participants' data were used throughout.

In Block 1 all three basic TPB variables (attitudes, perceived norms and PBC) were significant, with attitudes being the most significant predictor of intentions. Block 2 showed that no additional variable predicted intentions apart from the parenting style dimension of rejection (Wald χ^2= 3.882, p<.05) with Exp (B) = 2.113, indicating that with every one unit increase in intentions to use cannabis, there was a 2.113 unit increase in the odds of reporting higher perceived parental rejection. The -2 Log Likelihood decreased from 91.348 to 87.161, indicating how this model represents a better fit to the data than Block (1) with just the basic TPB variables. The Cox & Snell R square= .465 while Nagelkerke R square =.698, suggesting that between 46.5 % and 69.8% of the variability in intentions is explained by these predictors.

3.4   Cannabis use behaviour

Of the 199 students, a total of 25 (12.5%) students reported that they had used cannabis in the two-weeks preceding and 174 (87.5%) students reported that they had not done so.

A series of logistic regression analyses were conducted to examine the separate[2] contribution of each additional variable. In comparison to the standard TPB model (- 2 Log Likelihood: 53.358), the augmented TPB model including *lack of premeditation* (-2 Log Likelihood: 47.622) and moral norms (-2 Log Likelihood: 46.657) demonstrated an improvement in predicting cannabis use self-reported behaviour as indicated by a decrease in the log likelihood.

In order to examine the improvement of the TPB model resulting from each additional variable, each step was compared to Block 3, which included only the three basic TPB variables. The TPB model was significant χ^2 (4, N= 199) = 52.186 p<.001 showing how the basic TPB variables could distinguish those who had smoked cannabis and those who had not.

In Block 4 the model was significant χ^2 (5, N= 199) =58.887, p<.001 and moral norms significantly predicted behaviour (Wald χ^2= 4.473, p<.05) with Exp (B) = -.777. This shows

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[2] Each variable was measured against the basic TPB variable, separately from one another. Several models were run to test the significance of variables according to the order they were entered in the model. No differences were found regarding the significance. Therefore the final allocation of variables in each step was conducted according to theoretical relevance.

that moral norms negatively predicted behaviour meaning that those with weaker moral norms against cannabis use were more likely to report cannabis use. The -2 Log Likelihood decreased from 53.358 to 46.657, indicating how this model represents a better fit to the data than Block (3) with just the basic TPB variables. According to Cox & Snell R square and Nagelkerke R square between 32.8 % and 64.4% of the variability in behaviour is explained by these predictors.

Block 5 showed that impulsivity: lack of premeditation predicted behaviour (Wald χ^2= 4.766, p<.05) with Exp (B) = 1.959. This indicates that with every one unit increase in self-reported cannabis use there was a 1.959 unit increase in the odds of reporting higher lack of premeditation. The -2 Log Likelihood decreased from 53.358 to 47.662, indicating how this model represents a better fit to the data than Block (3) with just the basic TPB variables. According to Cox & Snell R square and Nagelkerke R square between 32.5 % and 63.5% of the variability in behaviour is explained by these predictors.

Blocks 6, 7, 8 examining perceived parenting styles, mental health and delinquency, respectively, showed no significant contributions to variance in behaviour.

4   Discussion

Beyond the basic TPB variables, perceived parental rejection predicted intentions to use cannabis, while lack of premeditation and moral norms predicted cannabis use self-reported behaviour (see Figure 2).

[INSERT FIGURE2]

Although 30% of students reported intentions to use cannabis at Time1, only 12.5% self-reported cannabis use two weeks later, at Time 2. This mismatch between intentions to use cannabis and actual self-reported drug use may be a result of under-reporting, such that students may have provided valid first reports (at Time 1) but invalid second reports (at Time 2) or indeed the other way round. It has been argued that in longitudinal studies, adolescents tend to under-report drug use as a way of editing their initial response in order to achieve social desirability (Percy, McAlister, McCrystal, & Thornton, 2005).

4.1 The role of perceived parenting styles in predicting adolescent cannabis use intentions

The findings demonstrate that attitudes were the strongest predictor of intentions, followed by perceived norms and PBC which is in support of previous empirical work (Armitage et al., 1999; Conner & McMillan, 1999). Adolescents' reports of unsupportive parenting were also associated with their intentions to use cannabis. This means that the behaviour of adolescents aged 16-18 is still very much affected by their perceived understanding of parenting styles which , as this study demonstrates, has impacts on their subsequent decisions to engage or not engage in substance use. This is in synchrony with an empirical review on parenting styles and drug use that demonstrates how the family plays a fundamental role in the prevention and treatment of adolescent substance use (Becona et al., 2012). Our findings imply that, theoretically, behavioural models such as the TPB could benefit from incorporating developmental antecedents such as perceived parental rejection when explaining adolescent cannabis use. However, perceived parental rejection represents a dynamic factor rather than a static one merely indicating an adolescent's perspective. Research has found a mismatch in adolescent and parental perceptions on family functioning with young people reporting less intimate and more conflicting family structures than their parents (Noller, Seth-Smith, Bouma, & Schweitzer, 1992). Family-based interventions on adolescent cannabis use should therefore try to incorporate both adolescents' and parents' reports on parenting styles so as to ensure an accurate representation of the construct. Promoting more honest and open intra-family communication (Partnership for a Drug-Free America, 2008) could indirectly reduce adolescents' intentions to use cannabis.

4.2 The role of impulsivity and moral norms in predicting adolescent cannabis use self-reported behaviour

Intentions were the strongest predictor of behaviour, followed by PBC which is consistent with other studies examining cannabis use (Conner & McMillan, 1999). Among the additional variables, the impulsivity subcomponent of *lack of premeditation* was the strongest predictor of self-reported cannabis use, followed by moral norms.

The finding that none of the impulsivity subcomponents were associated with intentions to use cannabis suggests that adolescents' ability to engage in premeditation does not

impact intentions but is rather only important when adolescents are presented with the opportunity to use cannabis.

The *lack of premeditation* subcomponent, referring to lack of thought before action, predicted cannabis use behaviour. This reaffirms the argument made by Churchill et al. (2008) that although the TPB focuses on the rational thought processes of human behaviour, for some people the decision to engage in certain behaviours is based on non-deliberative impulses. It is therefore suggested that in the case of 16-18-year-olds' cannabis use, behaviour is not sufficiently "reasoned", "rational" and, as under "volitional control" (Ajzen & Fishbein, 1980, p.5). Instead young people don't always consider the implications of their actions before they decide to engage or not engage in cannabis use which also explains our finding that impulsivity did not predict intentions to use cannabis. In support of Churchill, Jessop and Sparks (2008) the data here argues for the inclusion of heuristic level processing (impulsivity) in an analytical health-behavioural decision-making health model such as the TPB for a better understanding and explanation of adolescent cannabis use.

School-based interventions could implement programmes where young people undergo self-instruction training so as to increase the level of effortful thinking in decision-making tasks. In doing so, they can learn to size up the demands of a task, cognitively rehearse the task, guide their performance through self-instruction and give self-reinforcements where appropriate (Meichenbaum & Goodman, 1971). This would encourage effortful processing that could constructively adjust impulsivity levels and substantially reduce adolescent cannabis use.

Moral Norms

Adolescents who disagreed that cannabis use goes against their moral principles reported having used cannabis, while the opposite held true for those who agreed. This supports other drug-related research of illicit drug use and cannabis use work in particular (Conner & McMillan, 1999). This temperamental trait represents an underlying moral dimension that impacts adolescents' decision to use cannabis. Our finding that moral norms predicted self-reported cannabis use behaviour, but not intentions, suggests that ethical principles do not impact adolescents' intention-formation of cannabis use but rather have

a direct impact on whether or not to enact the behaviour. Given the importance of the behaviour's moral dimension, education-based interventions could apply motivational interviewing treatment-based programmes that can prevent drug use by informing choice (Burke, Arkowitz, & Menchola, 2003).

Mental health & Delinquency

The fact that neither the mental health measure nor delinquency predicted intentions to use cannabis nor cannabis use behaviour could be because these variables may be more highly associated with cannabis use dependency (Fergusson et al., 2002), which was not examined in this study.

4.3. Limitations & Future directions

One limitation to the present study was the reliance on a self-report measure of behaviour, in that the levels of honesty were compromised. Some empirical evidence suggests reasonable validity of self-reported drug use while other evidence shows that if the history of drug-use has not been examined, self-report measures are accounted as unreliable (Colon, Robles, & Sahai, 2001). Moreover, the Hawthorne effect (Noland, 1959) could also have taken place such that individuals may have under-reported cannabis use in response to knowing they were being experimentally measured. Future research could use more objective measures of cannabis use, by obtaining measures regarding 'history of use' to reduce potential measurement bias. Nonetheless, this study gave young people the unique opportunity to report on their own cannabis use behaviour.

Another limitation concerns the setting in which the questionnaire was administered upon prior instructions from the College (i.e. assembly hall). Students may have felt that this compromised their privacy. This could explain the attrition rate at the follow-up questionnaire. Despite the fact that most English young people attend school (Department for Education, 2011), it is true that with the economic crises faced nowadays there is a proportion of young people especially between 16-18, who do not attend school. Future work examining adolescent cannabis use could recruit same-age cohorts that attend vocational schools, universities or paid jobs.

5   Conclusion

Behavioural models attempt to explain adolescent substance use and, like the TPB, emphasise deliberative, reflective decision-making. This study has demonstrated that by incorporating non-deliberative factors (e.g. impulsivity), developmental antecedents (e.g. perceived parenting styles) and temperamental traits (e.g. moral norms) in behavioural models our comprehension of adolescent cannabis use is enhanced. Implications include the development of self-instruction training programmes teaching adolescents effortful thinking, and encouraging honest parent-adolescent relationships which have shown to influence adolescents' cannabis use.

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