UNIVERSITY OF TWENTE.

How are Personality, Implicit Behavioral Factors and Binge Drinking among Adolescents Related?

Bachelor thesis Psychology

Author:
Friedel, L.K

7/27/2011

Tutors:
Dr. P.M. ten Klooster
Dr. M.E. Pieterse

Samenvatting

Binge drinken bij jongeren is een groot probleem in het hedendaagse gezelschap. Overmatig alcoholgebruik heeft verreikende en gevaarlijke korte- en lange termijn gevolgen.

Het doel van deze studie is het verifiëren van delen van het Twente Model of Binge Drinking (TMBD). Dit model werd opgesteld om het tot stand komen van binge drinken bij jongeren te kunnen voorspellen en verklaren.

In deze studie werd onderzoek gedaan naar de predictieve rol van persoonlijkheid en het impulsieve gedrags pad, gelijkgesteld aan het sociale reactie pad, afkomstig uit het Prototype Willingness Model (PWM), in het ontstaan van binge drinken. Er werd gebruik gemaakt van een cross-sectionele steekproef van 212 jongeren tussen de 16 t/m 21 jaar (67.5% vrouwen; M=18.00, SD= 1.43).

Het concept persoonlijkheid was samengesteld door de 4 persoonlijkheidsdimensies impulsiveness, sensation seeking, anxiety sensitivity en hopelessness/introversion, gemeten door de Substance Use Risk Scale (SURPS).Om het sociale reactie pad te meten waren vragen over prototype favorability, prototype similarity en willingness in de vragenlijst opgenomen. Binge drinken was in dit geval geoperationaliseerd naar hoe vaak de deelnemers in de afgelopen vier weken meer dan 6 standard glazen alcohol hebben gedronken.

Univariate en multivariate analyses werden uitgevoerd om de verbanden tussen de constructen na te gaan en de voorspellende waarde van persoonlijkheid en het impulsieve gedrags pad op binge drinken te bepalen. Multiple regressie analyses werden uitgevoerd om te toetsen of willingness als mediator dient en hierdoor de relatie tussen persoonlijkheid en binge drinken beïnvloedt. Dit gebeurde door gebruik van SPSS 16. en de resultaten werden geverifieerd door een Sobel test.

De persoonlijkheidstrekken impulsiveness en sensation seeking waren positief gecorreleerd met binge drinken, terwijl voor anxiety sensitivity en hopelessness/introversion een negatief verband werd aangetoond.Het verband tussen impulsiveness en binge drinken werd deels gemedieerd door willingness. Verder werd ook de relatie tussen sensation seeking en binge drinking deels gemedieerd door willingness. Ook toonden de resultaten aan dat er tussen anxiety sensitivity en binge drinken een volledige mediatie plaats vind. De relatie tussen de persoonlijkheidsdimensie hopelessness/introversion en binge drinken werd niet gemedieerd.

Het testen van het sociale gedrags pad liet zien dat willingness wel van prototype similarity werd voorspeld maar niet door prototype favorability. Het laatst genoemde was ook niet gecorreleerd met binge drinken (r= .071). Het Twente Model of Binge drinking werd in een groot deel van zijn assumpties bevestigd en biedt een goed kader voor verder onderzoek.

Summary

Binge drinking among adolescents is a major issue in today's society. The short- and long-term effects of excessive alcohol use are extensive and hazardous. The present study tries to verify the Twente Model of Binge Drinking (TMBD), designed to explain the origin of binge drinking. This survey was conducted to examine the predictive role of personality and the impulsive pathway, analog with the social reaction path of the Prototype Willingness Model (PWM,) in binge drinking using a cross-sectional sample of 212 adolescents (67.5% women) aged 16 to 21 years (M=18.00, SD=1.43). The concept personality contained the 4 dimensions impulsiveness, sensation seeking, anxiety sensitivity and hopelessness/introversion, measured with the Substance Use Risk Scale (SURPS). The impulsive pathway was measured by questions about prototype favorability, similarity and willingness. Binge drinking was operationalized by how often the participants consumed 6 or more units of alcohol during the past four weeks.

Univariate and multivariate analysis were conducted to examine the associations of the constructs and the predictive value of personality and the social reaction path towards binge drinking. Multiple regression analyses were carried out with SPSS and verified with the Sobel test in order to examine whether willingness serves as a mediator between personality and binge drinking.

The personality dimensions impulsiveness and sensation seeking were positively correlated with binge drinking, whereas anxiety sensitivity and hopelessness/introversion were negatively correlated with the alcohol measure.

Willingness served as a partial mediator between the relationships of impulsiveness and binge drinking and sensation seeking and binge drinking. Anxiety sensitivity was fully mediated in its association with binge drinking. For hopelessness/introversion no mediation was found.

Testing of the social reaction path showed that prototype similarity predicted willingness, but not prototype favorability. Additionally the latter was not correlated with binge drinking (r= .071).

The results verified the TMBD in most of its assumptions, which provides a good framework for further investigations.

Contents

1. Introduction

After caffeine, alcohol is the second most commonly used psychoactive substance in the world (Morrison & Bennett, 2006). In today's society, alcohol is a controversial and often discussed issue. On the one hand, it is a legal substance used by many people and can be, if consumed moderately, conducive for better health. In many studies the moderate use of (red) wine is linked to better health. Amongst others, improved performance on cognitive tasks is a positive outcome of moderate use (Arntzen, Schirmer, Wilsgaard & Mathiesen, 2010). On the other hand, alcohol has high addictive potential and is harmful when consumed excessively. It is known that binge drinking serves as a serious risk factor for cardiovascular diseases such as stroke. Mainly patients with hypertension are at higher risk for all types of stroke (Hillbom, Saloheimo & Juvela, 2011).

The behavior of excessive alcohol consumption is described by the term binge drinking. There are different definitions of this term. According to the WHO binge drinking is "a pattern of heavy drinking that occurs in an extended period set aside for the purpose. In population surveys, the period is usually defined as more than one day of drinking at a time. A binge drinker or bout drinker is one who drinks predominantly in this fashion, often with intervening periods of abstinence" (WHO, 2011). Wechsler and Nelson (2001) defined binge drinking as consuming (per event) more than five units for men and more than four units for women. However, this reveals nothing about the intention to get drunk (Wechsler & Nelson, 2001).

Especially for adolescents alcohol is hazardous. They are very sensitive to alcohol and little amounts can lead to life threatening alcohol intoxication. In general alcohol entails disinhibition, increasing readiness assuming risks and decreasing reactivity. The main causes of death in 15 to 20 year old people are car crashes, with one third under the influence of alcohol. Moreover, their body is not yet entirely developed and this psychoactive substance causes great damage to the brain; with every heavy intoxication millions of brain-cells are destroyed. In contrast to adults in adolescents not only brain-cells are destroyed, also the brain development gets affected and other organs, especially the liver suffers from frequent and extreme alcohol consumption. The brain damage in turn leads to lack of concentration and impairment of memory (Thomasius, Nessler & Häsler, 2009).

Therefore, especially for adolescents there are preventive measures taken by laying down age limits for buying alcohol and visiting discos. In the Netherlands the age limits are loosely attended to. The ministry of public health, welfare and sports states it as lack of control by the

venders. An intervention is needed, because most of the earlier attempts were ineffectual (Ministerie van Volksgezondheid, Welzijn en Sport, 2011). The Dutch institution Trimbos regularly publishes the status quo of adolescents alcohol related behavior. The percentage of adolescents' lifetime-prevalence of alcohol always was between 69 and 85 %. For the alcohol month-prevalence the percentage fluctuated between 45 and 58 % (Trimbos-instituut, Utrecht, 2009). It is alarming that half of the 12 year old students have already drunk alcohol and the percentage rises up to 89% for 15 year olds (Monshouwer, Verdurmen, van Dorsselaer, Smit, Gorter, & Vollebergh, 2008). According to a study of Grant, Stinson and Harford (2001) there is a strong relationship between the age of onset of consuming alcohol and the later patterns of drinking and alcohol-related problems. Also, Barnes and Welte (1986) found out that the average amount of alcohol consumption of people per day rises with decreasing age of onset. Additionally, an early onset and frequent heavy drinking can lead to many severe psychological problems. It is not uncommon that adolescents experience states of anxiety and even depression, which increases the risk of suicidal behavior. Starting to drink alcohol at an early age is also dangerous, because they experience alcohol as a solution of problems and therefore, do not develop adequate coping strategies to solve their problems (Thomasius et al., 2009).

Nowadays it is not unusual that adolescents link excessive alcohol consumption with fun and therefore make appointments to get drunk (Pavis, Cunningham-Burley & Amos, 1997; Kuntsche, Knibbe, Gmel & Engels, 2005). Alcohol consumption is highly influenced by social factors such as family, friends and peer groups. The likelihood of engaging in binge drinking is much higher if the social environment of a person also performs this behavior. Whereas peers and friends play an active role in the formation of a person's behavior, parents influence children indirectly through their parenting style (Urberg, Degirmencioglu & Pilgrim, 1997; van der Vorst, Engels, Meeus & Dekovic, 2006).

In order to prevent harmful effects of binge drinking and therefore the behavior itself, it is of great interest to understand which adolescents engage in this behavior. Many theories have been used to explain how binge drinking arises. One of them is the Theory of Planned Behavior (TPB). It provides insight in the process of rational decision making and the underlying determinants. The individual's attitude towards a behavior, as well as the descriptive and subjective norm, influences the intention, which is essential for engaging in this behavior. This model shows that personal and socio environmental factor play a major role in decision making (Ajzen, 1991). However, this rational model of the decision making process is not able to explain everything. The Prototype Willingness Model (PWM) tries to

add a second and more irrational path of decision making, the social reaction path. It explains behavior in a more irrational and emotion guided way, than does the TPB (Hofmann, Friese & Wiers, 2008). According to Gerrard, Gibbons, Houlihan, Stock & Pomery (2008) adolescents' willingness is higher correlated with substance use and other risky behavior than the intentional part of the TPB (Pomery, Gibbons, Reis-Bergan & Gerrard, 2008; Spijkerman, van den Eijnden & Engels, 2005; van Empelen & Kok, 2006). This would imply that the PWM may be a more appropriate model explaining and predicting adolescents' risky behavior.

There is one last but not less important factor influencing human behavior, personality. It is the most stable property of human beings and nearly unchangeable. Some personality traits are said to be more related to substance use than others. Many studies support that the four personality traits sensation seeking, impulsiveness, anxiety sensitivity and hopelessness/introversion are highly related to substance use and other related problems.

1.1 The current Research

The aims of this study were to examine whether the implicit behavioral factors from the impulsive pathway have a mediating role in the relationship between the personality factors and binge drinking, or if there is only a direct link from personality to the outcome behavior binge drinking. Here, the impulsive pathway is similar to the social reaction path of the PWM, consisting of prototype images (favorability and similarity) and the willingness to engage in binge drinking. In the present study personality reflects the four personality traits of the Substance Use Risk Profile Scale (SURPS), namely: sensation seeking, impulsiveness, anxiety sensitivity and hopelessness/introversion. If the impulsive pathway serves as a mediator we would find an influence of the personality variables on this pathway and this in turn would influence binge drinking. A mediation of willingness between personality and binge drinking would be an eligible outcome, due to the fact that personality is a stable attribute of a person. The willingness engaging in a behavior is easier changeable than are resilient personality traits.

2. Theoretical framework

To examine risk factors for binge drinking in adolescents in its whole context the Twente Model of Binge Drinking (TMBD) has been developed at the University of Twente in Enschede (Netherlands). It is a hypothetical model based on earlier studies, theories and relevant literature. The following model describes all important concepts which are potential risk factors for binge drinking in adolescents.

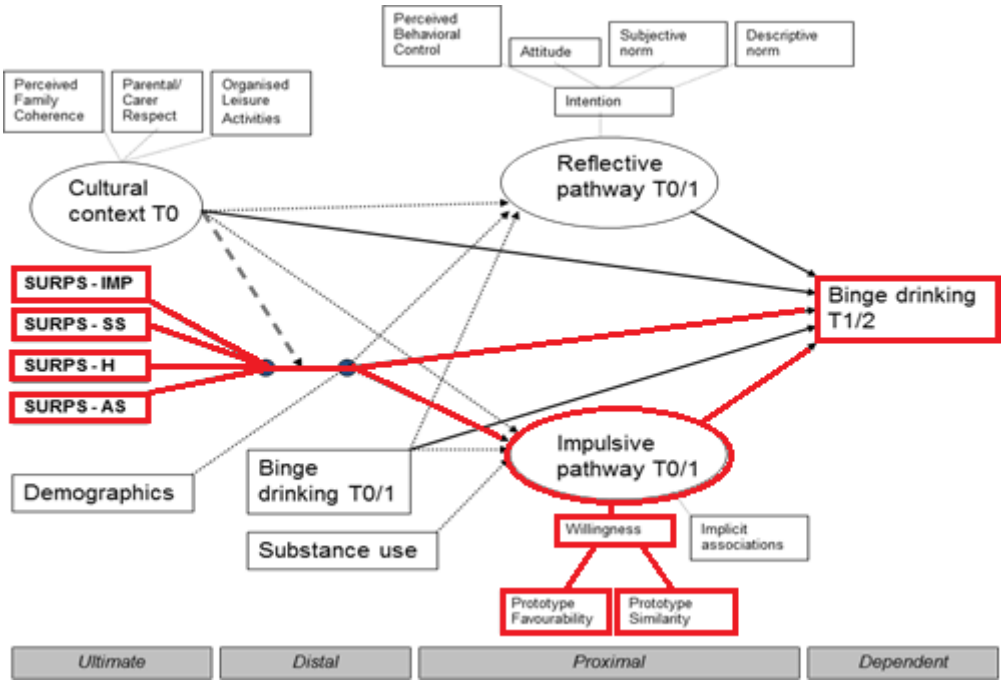


Figure 1: Twente Model of Binge Drinking. The red (bold) variables and paths are examined in this study.

The TMBD tries to combine all the risk factors in order to explain the phenomenon of binge drinking amongst adolescents. It includes four personality traits, demographics, cultural context, substance use and the two information- processing systems. The factors are divided by their level of influence on binge drinking. The cultural context, the personality factors and the demographic information are ultimate variables. Ultimate variables are not or only to a minor extent influenced by the individual itself and serve more as background variables for the development of long term risk factors. The demographics include information about gender, age and educational background. The concept of personality consists of the personality traits impulsiveness, sensation seeking, hopelessness/introversion and anxiety sensitivity. Another ultimate variable is the concept of the cultural context. It contains two variables, namely, parenting style and organized leisure activities. Parenting style refers to the way in which parents raise their children regarding the level of parental control and support. The different parenting styles do not only influence the general development of a child but also its attitude and relation to substance use (Patock-Peckham, Cheong, Balhorn & Nagoshi, 2001). The second variable, organized leisure activities, such as playing in a football team, are activities adolescents engage in after school time. According to Vicary, Smith, Caldwell and Swisher (1998) there are differences between all kinds of activities in conjunction with alcohol use. It is obvious that social activities such as dating, partying and being in a group increase usage of alcohol. Furthermore, Vicary et al. (1998) showed in their study that

females' consumption of alcohol increases, if time spent on religious activities, sports and hobbies decreases.

Substance use represents a distal determinant and influences the information processing systems, which in turn influences binge drinking (Kaplan, Martin and Robbins, 1984).

The TMBD states that these ultimate determinants influence the proximal determinants and also the dependent variable binge drinking. In this model the proximal determinants are the two information-processing systems which have a more direct influence on binge drinking. They are presented as a dual process model and both are assumed to influence binge drinking. The impulsive pathway is the more affective and unconscious way of information processing and relies mostly on intuition, whereas the reflective pathway is much more rational and conscious.

2.1 Personality factors

The personality factors included in this model are seen as ultimate determinants. Thus they influence behavior through distal determinants such as the impulsive pathway or directly without any mediation.

It is not new that personality is related to substance use, but there is evidence that specific personality factors are more of interest, in conjunction with substance use, than general dispositions. This is why the already mentioned personality variables sensation seeking, impulsiveness, hopelessness/introversion and anxiety sensitivity are added to the TMBD. All of them evidently appeared, in many studies, to be related to substance misuse as potential risk factors (Malmberg, Overbeek, Monshouwer, Lammers, Vollebergh & Engels, 2010; Woicik, Stewart, Pihl & Conrod, 2009; Kuntsche, Rehm & Gmel, 2004). Sensation Seeking implies a person's need for novel, intense and diversified sensations and experiences in life (Zuckerman, 1994). High sensation seeking is related to higher frequency and amount of alcohol consumption, as well as the greater likelihood of adolescents to engage in careless behavior, such as drinking alcohol to experience novel states of mind (Urbán, Kökönyei & Demetrovics, 2008; Ball, Carroll & Rounsaville, 1993; Arnett, 1996). Earlier studies ascertained that sensation seeking is much higher in adolescence then in adulthood, which supports the higher alcohol consumption in this period of life and the greater risk to consequentially develop alcohol related problems such as substance dependence, social difficulties and mental health problems later in life. (Arnett, 1996; Lubman, Hides, Yücel & Toumbourou, 2007). According to Moeller, Barratt, Dougherty, Schmitz & Swann (2001), impulsiveness is unplanned acting without thinking about consequences. People with high

impulsiveness are more often likely to cave in to seductive stimuli, in this case drinking alcohol, than do people with low impulsiveness. The ones with low impulsiveness seem to be more able to control their drinking behavior and think more about their acting (Application Testing the Model of Binge Drinking, 2010). Similarly to sensation seekers, impulsive people mostly use binge drinking to augment positive affects. As demonstrated in earlier studies, substance dependent people show higher levels on impulsiveness measures (Moeller et al., 2001). Another personality variable, hopelessness/introversion, is found to be a risk factor for development of depression in individuals scoring high on this trait. These individuals are more likely to slip from normal alcohol use into problematic drinking habits, caused by negative affect coping. Furthermore, higher levels of hopelessness/introversion increase the chance of an earlier onset of using alcohol (Application Testing the Model of Binge Drinking, 2010; Malmberg et al., 2010). Anxiety Sensitivity, the fourth personality variable, refers to exaggerated and arbitrary fear of i.e. bodily sensations. Individual, high on anxiety sensitivity tend to interpret these sensations in a way that they are more threatening than they really are. A change in heartbeat is rapidly catastrophized into an upcoming heart attack. These misinterpretations are responsible for increased problem drinking due to its anxiolytic characteristics to control fear (Testing the Model of Binge Drinking, 2010; Kuntsche, Knibbe, Gmel & Engels, 2006). Increased levels of drinking and problem drinking are in respect to high anxiety sensitivity as well as impulsiveness (Malmberg et al., 2010).

Several studies found that the personality traits sensation seeking and impulsiveness are more connected to binge drinking than hopelessness/introversion and anxiety sensitivity, which are said to be especially linked to long term problematic substance use. Sensation seeking and impulsiveness is expected to have the strongest relationship with binge drinking. Most probably there will be a positive relation, implicating the more sensation seeking and impulsive a young person is, the more likely he is to engage in binge drinking. With regard to the other two personality dimensions a weaker positive relationship is expected, if the assumptions of the associations between the two traits and alcohol are correct. On the other hand it would be possible binge drinking has a negative relation with these two personality traits, due to the fact that they seem to be more related to depression proneness and long term problematic substance use in order to reduce anxiety and cope with hopeless thoughts (Testing the Model of Binge Drinking, 2010; Kuntsche et al., 2006; Malmberg et al. 2010).

H_1: *The four personality traits are related to binge drinking*

H_2***:*** *Sensation seeking and impulsiveness have a stronger relationship with binge drinking than do anxiety sensitivity and hopelessness/introversion*

2.2 The impulsive pathway

The implicit behavioral factors are extracted from the Prototype Willingness Model (PWM; Gibbons & Gerrard, 1995). In the TMBD the impulsive pathway is a proximal determinant and therefore, it has a more direct influence. According to Steinberg (2007), there are two different networks in the brain. The interaction of the two networks is responsible for higher levels of risk taking in adolescents. The first is characterized by sensitivity for social and emotional stimuli and therefore called the socio-emotional network. The latter is a more controlling network, responsible for cognitive functions such as planning, forecasting, and self-regulation (e.g. TPB). In adolescence, the socio-emotional network is more dominant and is activated enough to reduce the control of the cognitive control network. Rooke and Hine (2011) stated that adolescents mostly rely on the impulsive information processing system. The reason for this is that the frontal lobes are not yet entirely developed in adolescence. They are related to executive functions such as problem solving, rational and analytic thinking, and impulse control. Adults use their frontal lobes during i.e. decision making processes more often than adolescents do. In the period of adolescence, individuals mostly rely on the amygdala, responsible for emotions and impulses (Rooke, Hine & Thorsteinsson, 2008).

A stronger relation between willingness and use of substances is established, than it is the fact with intention, which is a variable of the reflective pathway in the TMBD (van Empelen et al., 2006; Spijkerman et al., 2005). In this model the impulsive pathway consists of 3 different concepts: willingness, prototype favorability and prototype similarity. The first of the three concepts refers to the willingness to drink alcohol in situations where alcohol is present. Willingness is less rational and planned than intention (Gibbons, Gerrard, Blanton& Russell, 1998). The willingness to drink alcohol is highly influenced by prototype favorability and similarity. The former is the way in which a person has negative or positive views towards a typical user of alcohol, whereas the latter is his own evaluation of congruence with this typical user. According to earlier studies by Rivis, Sheeran and Armitage (2006) we know that the higher the perceived similarity to the prototype, the more a person has the willingness to engage in certain behaviors such as binge drinking. Important to mention is that a positive prototype image is not essential. Therefore, it would not be remarkable if a majority of individuals is not willing to adopt the prototype image. More important in engaging in behavior is the acceptance of the image. Risk taking behavior is dependent of willingness, the

higher the willingness, the lower the adolescent reflects on possible risks as a consequence (Gerrard, Gibbons, Houlihan, Stock & Pomery, 2007; Gibbons et. al, 1998).

H_3: *The impulsive pathway is linked to binge drinking*

H_4: *Willingness has the strongest relationship with binge drinking*

2.3 The impulsive pathway as mediator between personality and binge drinking

Human personality factors are stable behavior patterns and unchangeable. The four personality dimensions admitted to the SURPS are ultimate determinants which serve as a background for the development of risky behavior. Therefore, it would not be surprising if they influence the dependent variable binge drinking via the mediator and proximal determinant willingness. More than that, it would be desirable in order to develop interventions aiming at changing the adolescents' willingness to drink, because of the unchangeableness of the human personality.

H_5: *Willingness serves as mediator between the four personality factors and binge drinking*

3. Methods

3.1 Design and Procedure

To test the complete model a longitudinal study was conducted. The data in this study was collected by using only data of the first measurement of the two measuring points. The data of this study is cross-sectional and gathered at a defined time with a representative subset of Dutch-speaking adolescents ranging from 16 up to 21.

The first measurement was promoted by spreading 5000 flyers and 100 posters at typical places to encounter the target group (i.e. at schools, universities, cafes, bars, restaurants, stores, youth centers and sport clubs) in the cities Hengelo and Enschede (Netherlands). The adolescents were also directly contacted in the city center of Enschede. Additionally, the link was spread via social media (i.e. Facebook and Hyves), as well as contacting first year students of the University of Twente via email. For the second measurement, which is left out of consideration in this study, the email addresses were collected at the end of the first survey. After four weeks they received a reminder to participate in the second survey.

All participants approved the informed consent after getting information about the study in general, the aims and the procedure. Furthermore, the second measurement four weeks later was mentioned. After participating in both of the surveys, adolescents received a 10 Euro gift coupon.
Most of the data was collected online 158 (71.2%) and only a minority 64 (28.8%) filled in a paper and pencil based version of the survey. Data collection was collaborative, indicating that not all data was used and analyzed in this study.

3.2 Measures

The survey consisted of 58 questions and sub questions for 6 different constructs, relevant in this study.

3.2.1 Demographics

First demographic information was collected, including questions about sex, age, living situation, educational level and regular occupation.

3.2.2 Alcohol

Questions concerning alcohol use were assembled in two different ways. Due to the major difference between the epidemiological and subjective definition of binge drinking, both were included. The questions about the objective amount of alcohol were obtained from Monshouwer et. al (2008). In these questions the amount of alcohol was expressed in standard glasses and the timeframe was the past four weeks. It is also assumed that every drink was served in the corresponding glass (i.e. beer in a beer glass), so that every glass contained the same amount of alcohol. To make this clear for the participants an explanation, with pictures and a table with the amount of alcohol in common drinks, was given at the beginning of the survey.
To examine the life-time prevalence, participants were asked if they ever had drunk in their life. The following questions concerned the weekly total alcohol consumption. The frequency of weekdays and weekends alcohol consumption was asked, as well as the amount of alcohol consumed at such a typical weekend and weekday. The cut-off point, between normal drinking and binge drinking, was defined as minimal five standard glasses of alcohol for males and four for females (Wechsler et al., 2001). To get clear how often they engage in this problematic behavior, two more questions were asked. To examine the monthly binge drinking frequency participants had to indicate how often they drunk more than six and ten

standard glasses the past four weeks. Hereby drinking more than six glasses refers to binge drinking and drinking more than ten glasses to heavy drinking.

The subjective amount of alcohol consume was assessed by asking about the participants' individual limit of standard glasses (tax), the frequency of exceeding this limit and the attitude towards exceeding the own limit. The last question was about the frequency of experiencing the given effects. There were in total eight effects, ranging from the lowest severity to the most severe effects, from talkativeness to motor problems to passing out (α= 0.85).

3.2.3 Impulsive pathway

The variables prototype favorability, prototype similarity and willingness were assessed with one question each (Korte, Pieterse, Postel & Hoof, 2011). In the first question, the *favorability* of the prototype had to be rated. Here the prototype is a person of the same age, drinking minimally once a week six or more standard glasses per event. Participants had to answer how cool, interesting, good looking, popular and brave this person is, from their point of view. Also included were the characteristics of having lots of friends, often engaging in sexual activity and making out with a lot of boys and girls. Ratings were given in a 5 point scale, ranging from 'strongly disagree' to 'strongly agree' (α= 0.94).

The second question asked about the extent of ones similarity with this prototype. Measured by a 5 point scale again, ranging from 'not at all' to 'a lot'.

The third question was about willingness. The participants were asked how to react, if a friend offers another drink even though they already had at least six standard glasses of alcohol. Three possible reactions were given; take the drink and drink it, take the drink and put away afterwards, and reject the offer. The 5 point scales was ranging from 'definitely not' to 'sure' (α= 0.63).

3.2.4 Personality factors

The four personality traits were distinct and independently assessed with the 23 item Substance Use Risk Profile Scale (SURPS; Woicik et. al, 2009). In this study, the Dutch version SURPS-NL was used translated by TerMaat, Pieterse & Boer (2008). Each dimension was covered with five to seven items and a 4 point scale, ranging from "strongly agree" (1) to "strongly disagree" (4).

The questions of the trait impulsivity in the SURPS are characterized by the lack of control in behavioral responses (i.e. 'I often don't think things through before I speak'), with an internal consistency of α= 0.61 after deleting one item.

Anxiety sensitivity concerns questions about fear of bodily changes and physical arousal (i.e. 'It frightens me when I feel my heart beat change'), with an internal consistency of α= 0.64. The items for sensation seeking refer to the need for trying novel things (i.e. 'I enjoy new and exciting experiences even if they are unconventional'), with an internal consistency of α= 0.68. Finally, the hopelessness/introversion items ask about negative thinking, which is a risk factor for development of depression (i.e. 'I have faith that my future holds great promise'; Malmberg et. al, 2010), with a high internal consistency of α= 0.83.
See table 1 for a summary of the scores on the four dimensions of the SURPS scale.

3.3 Statistical analysis

Data analysis in this study will be intended to test the model and to investigate how the different factors are related to and influencing each other. All analyses, except for the Sobel test, were conducted with SPSS 16.0.
In order to examine a moderate alcohol measure to base all further analysis on, correlations were calculated.
To test the first four hypotheses univariate analyses were conducted. In order to get a general overview of possible mediations and predictive potential of willingness and the SURPS on binge drinking, multivariate analyses were performed. To test whether willingness serves as a mediator between personality and binge drinking, mediation analysis by using multiple regressions analysis was performed using the method of Baron and Kenny (1986). It is noteworthy that all the personality factors were analyzed separately in their relationship with willingness and binge drinking. With a first regression analysis the relationship between the personality factors and binge drinking was tested. The second regression analysis was performed with the personality factors as predictor and the mediator willingness as dependent variable. Another regression analysis was conducted by using both, willingness and personality as predictors and binge drinking as dependent variable. In case of mediation the effect of the personality factor in the first regression analysis should become insignificant, whereas willingness as mediator should maintain its significance.
To examine whether the differences in effect found with SPSS are significant, a Sobel test was conducted.

4. Results

4.1 Descriptives

The age of the participating adolescents ranged from sixteen up to and including twenty-one (M= 18.00, SD= 1.43; Table 1), whereof 67.5 % were female and 32.5 % male. 66.5 % of the sample lived with their parents and 32.5 % lived in living communities. 51.9 % of our participants were students and 44.8% were pupils. Since 40.1 % of the participating pupils were at VWO level, the majority of our participants had a relatively high educational level.

95% of the adolescent's drunk alcohol at least once in their life. Respondents consumed more standard glasses of alcohol during weekends (M= 4.7, SD= 4.2) than during the week (M= 1.7, SD= 2.2). More than half of the sample (54.7%) had at least once consumed more than six standard glasses of alcohol the past four weeks, which is per definition binge drinking. Almost one-third (31.6%) had engaged in heavy drinking, thus drinking more than ten standard glasses, minimally once in the past four weeks.

The mean perceived personal limit ('tax') were 9.4 standard glasses (SD= 7.4). About 40% of the participants exceeded their personal limit during the last four weeks, but only about 7% of the sample exceeded it more than twice.

Concerning the questions about the impulsive pathway, the majority of the participants had a negative image of a typical binge drinker (M= 1.98, SD= 0.91). A mean of 1.98 indicates that most of the participants answered to questions as for example "a typical binge drinker is cool" with "disagree". Also, the perceived similarity of them with this image was low (M= 1.75, SD= 0.92), indicating the majority answered the question whether they are similar to the person they described in the previous question with "barely". The willingness to engage in binge drinking was relative high (M= 3.28, SD= 0.86), though. The mean indicates that most of the participants would maybe/ probably not reject a drink or put it away after accepting it, although they drunk six or more standard glasses of alcohol already. Also, they maybe/probably would accept the drink and drink it. 12.4 % of the participants surely would take the drink and drink it, whereas only 1% would surely accept the drink, but not drinking it. And, only 9% would surely reject the offer immediately.

Table 1: Summary of mean scores on alcohol measures and SURPS

N= 212	M	SD
Age	18	1.4
Alcohol units week	1.7	2.2
Alcohol units weekend	4.7	4.2

Personal limit ('Tax')	9.4	7.4
Drinking more than 6 units (Frequency)	1.8	2.4
Drinking more than 10 units (Frequency)	1	1.8
Prototype favorability	1.98	0.91
Prototype similarity	1.75	0.92
Personality		
Impulsiveness	11.1	2.2
Sensation Seeking	15.2	3.3
Anxiety Sensitivity	11.4	2.5
Hopelessness/Introversion	12.2	3.3

4.2 Alcohol measure

Correlations between predictors and alcohol measures were calculated to examine which of the alcohol measures was the most appropriate one to base all further analyses on. The highest significant correlations between all the relevant factors out of the personality scale and the impulsive pathway, with the alcohol measure were "drinking more than six standard glasses the past four weeks" and "average amount of standard glasses on a weekend day". The correlations with the latter were slightly higher, but due to scientific relevance further analyses are based on "drinking more than six standard glasses the past four weeks". Thereby it is more comparable with other studies, since this alcohol measure is the most common used in studies about binge drinking, which is per definition, drinking more than five standard glasses. For a correlation matrix with a summary of correlations between all variables see Appendix (Table 4).

4.3 The relationship between personality and binge drinking (H1 & H2)

All of the four personality traits correlated significantly with the above mentioned alcohol measure for binge drinking. The dimensions of sensation seeking ($r = .303$, $p < .001$) and impulsiveness ($r = .292$, $p < .001$) were positively correlated with binge drinking. Thus, adolescents scoring high on these personality dimensions tended to engage in binge drinking more often than adolescents scoring low on these scales. The other two dimensions, namely anxiety sensitivity ($r = -.202$, $p = .003$) and hopelessness/introversion ($r = -.227$, $p = .001$), showed a negative correlation with binge drinking, indicating a lower score coming along with more binge drinking.

Out of all the personality dimensions of the SURPS sensation seeking and willingness have the strongest relationship with binge drinking, even more they are the only ones with a positive relationship with binge drinking. These findings are in accordance with our first and

second hypotheses, which state that all the four personality factors are related to binge drinking, but sensation seeking and impulsiveness have a stronger link.

4.4 The relationship between personality and the impulsive pathway

Willingness correlated significantly with all personality dimensions except for hopelessness/introversion (r= -.132, p= .056). The traits sensation seeking (r= .262, p <.001) and impulsiveness (r= .254, p <.001) showed a significant positive correlation with willingness, indicating that a higher score is associated with higher willingness. Anxiety sensitivity pointed out a significant negative correlation with willingness (r= -.285, p <.001). Thus, the more anxiety sensitive an adolescent is the less willing he is engaging in binge drinking.

4.5 The impulsive pathway and binge drinking (H3 & H4)

Prototype favorability had no significant correlation with the alcohol measure (r= .071, p >.05). The correlation between prototype similarity and the alcohol measure was positive and significant (r= .344, p= .001). The higher the perceived similarity with the image of a typical alcohol consumer the more adolescents engaged in binge drinking. A similar pattern was found for willingness. It was positively correlated with binge drinking (r= .569, p <.001). Out of all the components of the impulsive pathway it had the strongest relationship with binge drinking, warranting the use of willingness in the mediation analysis. These findings are in accordance with the expectations in the third and fourth hypotheses.

4.6 Testing the impulsive pathway

Testing the impulsive pathway with its three components showed that there was a low, but significant correlation between prototype favorability and willingness (r= .175, p= .05), indicating increasing willingness while prototype favorability was also increasing. Prototype similarity and favorability were significantly and positively correlated (r= .377, p= .001), showing higher prototype similarity coming along with higher favorability of the prototype image.

After conducting a regression analysis with prototype favorability and similarity on willingness the relationship of prototype similarity and willingness remained significant (β= .387, p <.001), whereas the relationship of prototype favorability and willingness became insignificant (β= .029, p >.05). Thus, prototype favorability had no additional value if prototype similarity was added to the model of the impulsive pathway.

4.7 General overview of the relationship between personality, impulsive pathway and binge drinking

Results of the multivariate regression analysis (see Table 3) showed that the model including the 4 personality dimensions of the SURPS had additional value predicting binge drinking ($\Delta R^2 = .175$, $p < .001$). Furthermore, they indicated that the effect of hopelessness/introversion (Step1: β=
-.179, p= .005; Step 2: β = -.131, p= .019) and impulsiveness (Step 1: β= .263, p< .001; Step 2: β= .146, p= .018) decreased from step 1 to step 2. Similar results were found for sensation seeking (Step 1: β = .169, p= .013; Step 2: β= .109, p= .07) and anxiety sensitivity (Step 1: β= -.207, p= .001; Step 2: β= -.079, p= .178), whereas in these two cases the relationship with binge drinking became insignificant in the second step. The decreasing effect of the personality dimensions supported the expectations of willingness mediating the relationship between the SURPS and binge drinking.

Table 3: *Summary of Hierachical Regression Analysis for Variables (SURPS and Total Willingness) Predicting Binge Drinking (N= 210)*

Variable	B	SE B	β	p
Step 1				
Hopelessness/Introversion	-.132	.046	-.179	.005
Impulsiveness	.287	.073	.263	<.001
Sensation Seeking	.122	.049	.169	.013
Anxiety Sensitivity	-.203	.062	-.207	.001
Step 2				
Hopelessness/Introversion	-.097	.041	-.131	.019
Impulsiveness	.159	.067	.146	.018
Sensation Seeking	.079	.043	.109	.070
Anxiety Sensitivity	-.078	.058	-.079	.178
Total Willingness	.433	.057.	.465	<.001

Note: $R^2 = .211$ for Step 1; $R^2 = .386$ for Step 2; $\Delta R^2 = .175$ for step 2 ($p < .001$)

4.8 The mediating effect of willingness on the relationship of personality and binge drinking (H5)

To examine if willingness served as a mediator between personality and the outcome variable binge drinking several regression analysis were conducted following the method of Baron and Kenny (1968). In the following regression analysis only three of the four personality dimensions were used, due to the fact that the above mentioned analysis between hopelessness/introversion and willingness was insignificant (r= -.132, p= .056). To examine the significance of the mediation effects, Sobel tests were conducted.

The mediation analyses were conducted separately for each of the three personality variables. However, the steps to be accomplished were the same in each of the analyses. Therefore here is a general overview about the procedure. The individual outcomes will be presented in detail in Fig. 2, Fig. 3 and Fig. 4.

In the first regression analysis the personality traits sensation seeking, impulsiveness or anxiety sensitivity served as the independent variable with binge drinking as the dependent variable. The second analysis was conducted in order to test the relationship between the personality traits and the presumed mediator willingness. In this case willingness served as dependent variable and one of the personality traits as independent variable. The last step was a regression analysis with both, the personality trait and willingness, as independent variables and binge drinking as dependent variable. In case of a mediating role of willingness the effect size of the personality factor on binge drinking had to be smaller when willingness was affiliated in the model, than if it was not. Thus, the effect size (Beta;β) of the personality dimension had to be smaller in step 3 than in step 1.

For both, sensation seeking and impulsiveness, willingness serves as a partial mediator between personality and binge drinking, due to the fact that the relationship between the personality trait and binge drinking became weaker but remained significant (see Fig. 2 and Fig. 3). The mediation effect size of willingness, for the partial mediation between sensation seeking and binge drinking is 0.138. For the partial mediation between impulsiveness and binge drinking, willingness has a mediating effect of 0.135.

In the case of anxiety sensitivity, willingness serves as a full mediator. The relationship between this personality dimension and binge drinking became insignificant after adding the mediator to the model as independent variable (see Fig. 4). The mediating effect of willingness is 0.156.

To validate the results a Sobel test was conducted. The results of the Sobel test supports the mediating effect of willingness between the personality traits and binge drinking as mentioned above. The means of the Sobel test confirmed the mediating role of willingness between impulsiveness and binge drinking ($Z= 3.58$, $p< .001$), as well as the mediating role between sensation seeking and binge drinking ($Z= 4.22$, $p< .001$). The results also support the finding of willingness as a full mediator between anxiety sensitivity and binge drinking ($Z= -3.93$, $p< 001$).

Figure 2: Mediation of willingness between sensation seeking and binge drinking

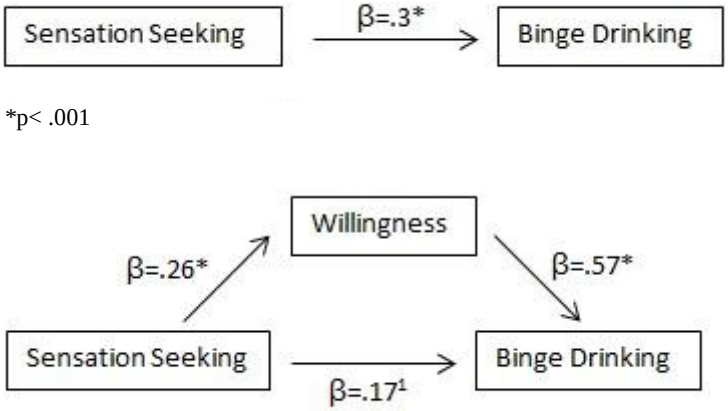


Figure 3: Mediation of willingness between impulsiveness and binge drinking

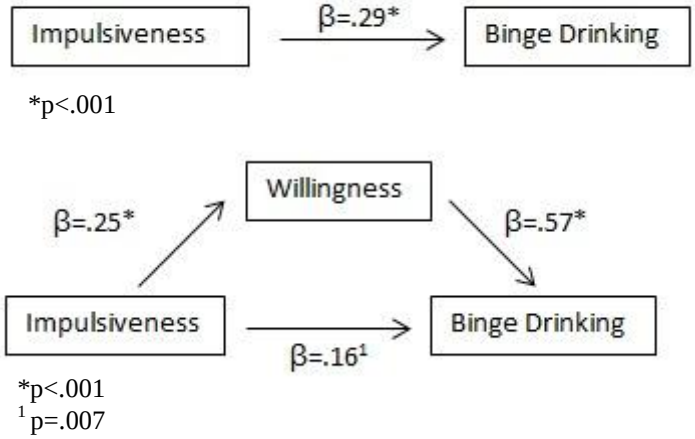
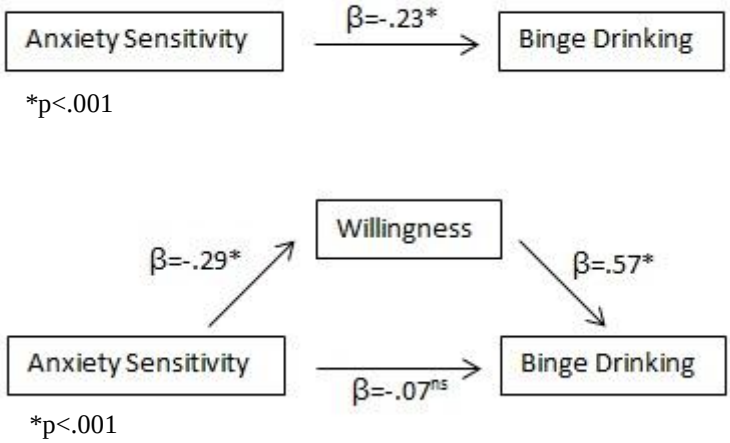


Figure 4: Mediation between anxiety sensitivity and binge drinking



5. Discussion

5.1 General discussion

This study was conducted to test parts of the TMBD among adolescents. The results indicate that most of the models' assumptions are correct. The findings of the study confirmed that the four personality dimensions and two of the three factors of the impulsive pathway are significantly related with binge drinking. Adolescents scoring high in sensation seeking and impulsiveness tend to engage more often in binge drinking, whereas high scores on anxiety sensitivity and hopelessness/introversion tend to prevent from binge drinking. Furthermore, the relationship between three of the four personality traits and binge drinking was found to be mediated by willingness.

Testing the impulsive pathway showed that willingness had the strongest relationship with binge drinking and had the highest predictive value. However, the results did not support the impulsive pathway as it is described in the PWM. Only prototype similarity predicted willingness, whereas prototype favorability had no predictive value as well as no relationship with binge drinking.

5.1.1 The relationship between personality and binge drinking (H1 & H2)

As previously expected, binge drinking depends on personality. The results revealed a positive relationship between the two personality traits sensation seeking and impulsiveness, which means the more sensation seeking and impulsive an adolescent is, the more likely he engages in binge drinking. These findings are in accordance with findings from other studies (Malmberg et al., 2010). Due to the fact that sensation seekers are permanently searching for novel experiences it is not surprising that the results of the present study showed this relationship. Experimenting with novel substances, as in this case alcohol, can be seen as typical behavior (Monshouwer et al., 2010).

Contradictive to our expectations, based on earlier literature, anxiety sensitivity and hopelessness/introversion were negatively related with binge drinking. The less anxious and hopelessness a young person feels, the more likely he or she engages in binge drinking. Contrary to our findings Woicik et al. (2009) stated that high scores on hopelessness/introversion are also related to later development of problematic drinking, caused by negative affect coping, and depression proneness. This discrepancy may be explained by the fact that the used sample of participants had an age range from 16 till 21, which might be too young to draw any conclusion about this. The sample of the above

mentioned study by Woicik et al. (2009) was much older than the sample used in our study. Thus, it would be possible that a positive relationship will develop over time. In this period of life, low scores on hopelessness/introversion could yet serve as a protective factor from binge drinking (Dhuse, 2006). According to a study by Monshouwer et al. (2010), who used a sample of 11 to 15 year old individuals, there was a positive relationship between hopelessness/introversion and alcohol use. Those results confound the just mentioned possible explanation. Hence, a third variable explanation must be taken into consideration. What causes the relationship in Monshouwer et al.'s (2010) study and is missing in the present study? It might be possible that other factors included in the TMBD could influence this relationship. For example an influence of parental aspects regarding hopelessness/introversion would be conceivable. Analyzing this would be above the scope of this research, so further investigation is needed.

Alternatively, the negative relation of hopelessness/introversion with binge drinking could be explained by the association of a high score on hopelessness/introversion with depression proneness and development of alcohol addiction in the future course of life. Binge drinking mostly occurs in social situations such as meeting up with friends or going out, whereas people with a tendency for depression are introvert and do not find themselves drinking in this kind of situations. Also, alcohol addiction is not acted out in public and kept private because of feelings of shame (Rheinische Kliniken Bonn, 2007).

Concerning the found negative relationship of anxiety sensitivity, the findings of a study by Conrod, Castellanos & Mackie (2008) correspond with the present results. Here, as well, higher anxiety sensitivity comes along with less drinking at this stage of life. Malmberg et al. (2010) stated that, high levels of anxiety sensitivity are linked to increased levels of drinking and problematic drinking. In contrast, our results do not support these findings. High anxiety sensitive people tend to catastrophize bodily sensations and these misinterpretations are responsible for using alcohol to experience its anxiolytic characteristics to control fear (Testing the Model of Binge Drinking, 2010; Kuntsche et al., 2006).

According to a study of Woicik et al. (2009) the link between anxiety sensitivity and drinking becomes more robust if older samples of heavier drinkers are used. In the beginning, drinking might be forced by social pressure, but later on it might be elicited by internal, physical sensations, if an anxiety disorder or anxiety-related substance use disorder has been developed. Another possible explanation might be alcohol dependence as consequence of an avoiding anxiety management. Apart from that, the tendency to experience anxiety might be elicited by internal sensations when not drinking alcohol in persons with addiction issues in the past.

These findings would support the negative relationship between anxiety sensitivity and binge drinking found in this study. Additionally, the present results correspond with a previous study that found this negative relationship between anxiety sensitivity and binge drinking, too. The authors stated, that anxiety sensitivity is a preventive factor, with the effect that high anxious adolescents are afraid of bodily changes caused by the effects of consuming alcohol (Monshouwer et al., 2010). Therefore, it would be possible that high anxiety sensitive individuals know about the alcohol induced changes to the body and are afraid of them and of losing control about their body in this way. If this assumption is true, the anxiety in turn would lead to abstain from drinking.

5.1.2 Testing the impulsive pathway and its relationship with binge drinking (H3 & H4)

The data of the present study did not fully support the modified version of the Prototype Willingness Model, the impulsive pathway, but there are reasonable explanations. The current model stated willingness to be influenced by prototype similarity and favorability. The results showed that only prototype similarity predicts willingness. Previous studies showed that the intensity of willingness also depends on the favorability of a prototype image (Gerrard, Gibbons, Stock, Van de Lune & Cleveland, 2005; Gerrard, Gibbons, Reis-Bergan, Trudeau, Van de Lune & Buunk, 2002; Spijkerman et al., 2005). However, a study of Hyde and White (2009), in which the impulsive pathway was applied to predict the willingness to donate an organ, is in accordance with the findings of this study. Here as well, prototype favorability did not predict the willingness, whereas prototype similarity did.

A possible explanation might be hidden behind the negative image the participants had of a typical binge drinker. At first sight prototype favorability seems to be essential, given the fact that a person engages in the same behavior as the prototype; thus it has to be good. According to Gerrard et al. (2008) an image is not necessarily positive. Often one is not pursuing to adopt the image and it is more important how acceptable/favorable this image is and its social consequences are.

As expected, willingness predicted binge drinking the most. The higher the willingness the more frequent and intense an adolescent engages in binge drinking. These findings are in accordance with our expectations, due to the fact that willingness is a direct antecedent of the behavior itself. For future investigation it would be interesting to examine whether willingness is a better predictor of binge drinking than intention out of the TPB, since earlier studies support this assumption (Pomery et al., 2008; Spijkerman et al., 2005). In order to design effective interventions it would be of great interest to know where to base them on.

Jessop and Wade (2008) made an attempt to influence the willingness to engage in binge drinking through fear appeals drawn on the Terror Management Theory. The results showed no changes in willingness after being faced with the mortality risks of binge drinking. However, it would be worth trying to combine this intervention with others.

5.1.3 The mediating effect of willingness on the relationship of personality and binge drinking (H5)

The results of this study showed that the influence of sensation seeking and impulsiveness on binge drinking is partially mediated by willingness. The personality traits seem to be very robust since personality still has a direct influence on the behavior itself. For the relationship between anxiety sensitivity and binge drinking, willingness served as a full mediator. Here, no direct relationship between the personality trait and binge drinking existed. It seems to be the only personality trait which is not robust towards the influences of a person's own willingness. In the relationship between hopelessness/introversion and binge drinking, willingness had no mediating role, indicating the direct relationship of hopelessness/introversion with binge drinking. As already mentioned above, the robustness of this personality trait towards a person's willingness could be a possible explanation.

These findings are important for future interventions because, apparently, willingness can be influenced and therefore binge drinking can be reduced. If there was a direct link only from all four personality dimensions to binge drinking it would nearly be impossible to design interventions based on changing personality considering that personality factors are stable and nearly unchangeable. It would be beneficial if future interventions could be targeted at both personality and influencing the willingness of adolescents. Earlier studies tried to reduce binge drinking in high-risk populations with personality targeted interventions using an almost comparable sample (Watt, Stewart, Birch, & Berner, 2006, as cited in Conrod et al., 2008; Conrod, Stewart, Comeau & Maclean, 2006). Now, the question rises, whether Health Promotion should focus on individuals who already are at risk and consume alcohol or on younger people to prevent them from drinking. Since the age of onset, just as some of the personality dimensions, is related to the development of alcohol use disorders in adulthood, it would be more sensible to start interventions in earlier stages of life. Grant et al. (2001) stated that with every year the onset of drinking is delayed, the adult alcohol dependence rate is reduced by 10%. A study of Conrod et al. (2008) tried to find out if an earlier intervention could delay the emergence of binge drinking. The intervention seemed to delay the onset of drinking especially for high sensation seeking individuals.

A possible intervention could consist of group sessions and should be focused on the four personality dimensions of the SURPS. It could include the three components as described in the study of Conrod et al. (2008): a psycho-educational, a motivational interviewing and a cognitive behavioral component. The participants will be enlightened about the possible problems arising with the different personality traits (e.g. substance use or avoidance). Facing them with their own experiences and linking them to the own biased cognitions belonging to the personality traits (e.g. catastrophization for anxiety sensitivity, not thinking through for impulsiveness and the liability for boredom in sensation seekers) will make them aware of the risk. This intervention will provide a lot of knowledge and coping strategies, which in turn might lead to reduced rates of binge drinking.

Perhaps is might be possible to include these kind of interventions in the curriculum. Surely beneficial about this intervention is the fact, that it is based on reducing the risk factors for future binge drinking, rather than focusing on binge drinking itself. This method is said to be more effective than other interventions based on the problematic behavior and not on its antecedents (McCambridge & Strang, 2005).

5.2 Benefits and Shortcomings

Certainly this study has several shortcomings influencing its results, hence making interpretation of the data difficult in some ways.

Conclusions are drawn for a Dutch-speaking sample where the nationality of the participants is unknown. Possibly many participants had another country of origin which makes it difficult to draw any conclusions about the Dutch society in general. In order to make statements for a more specific group of people, a question regarding nationality would have been convenient. Biases concerning different alcohol related laws, such as age limitations in discos and liquor stores or the prohibition to drink in public, could have been ruled out by this one question.

Another influencing factor might be the overrepresentation of adolescents with a high level of education. Previously the study was intended to focus primarily on a sample of adolescents with low SES, due to the fact that binge drinking, substance use, depression and other problematic behavior occurs more frequent in populations with lower SES (Goodman & Huang, 2002; Goodman, Slap & Huang, 2003; Friestad, Pirkis, Beihl, & Irwin, 2003; Reinherz, Giaconia, Hauf, Wasserman & Paradis, 2000). At first sight this clearly seems to be disadvantageous for the present study. Nevertheless, Humensky (2010) found that higher SES of adolescents is related with higher levels of substance misuse, mainly e.g. binge drinking and the use of marijuana and cocaine. It would be beneficial to replicate the study with a

sample of adolescents with lower SES in order to compare the results with those of the present study.

Additionally, the fact that the mean of consumed standard glasses during weekdays and the weekend was below the cut-off point of 6 standard glasses is also a clear weakness of this study. A sample of heavier drinkers would be more suitable to verify the present results in future studies.

The data regarding the amount of alcohol is based on the participants' own estimation. Therefore, it is a clear benefit of the study that examples of standard glasses are provided for different types of common drinks are provided at the outset of the survey. This leads to an equal understanding of the concept of "standard glasses", rules out biases of misunderstanding and increases reliability.

5.3 Implications

Finally, the results showed that the personality dimensions and the components of the impulsive pathway of the TMBD provide a good framework for understanding the emergence of binge drinking. The model possibly has to be adjusted in the way that prototype favorability will be removed in further investigations.

The findings of this study are of great interest for future interventions in order to decrease binge drinking among adolescents.

6. Appendix

Table 4: Correlationmatrix of all variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Gender																							
2 Age	,137*																						
3 Housing Situation	,183**	,525**																					
4 Regular Occupation	,238**	,607**	,400**																				
5 Educational Level	,226**	,666**	,531**	,535**																			
6 Lifetime Prevalence	-,072	,150*	,109	,046	,046																		
7 Weekly Total (Days)	-,109	,286**	,501**	,283**	,351**	,180**																	
8 Weekly Total (Glasses)	-,187**	,242**	,431**	,263**	,315**	,150*	,676**																
9 Weekend Total (Days)	-,211**	-,221**	-,127	-,169*	-,287**	,290**	,206**	,105															
10 Weekend Total (Glasses)	-,424**	-,166*	-,187**	-,209**	-,276**	,253**	,078	,162*	,571**														
11 Tax (Personal Limit)	-,403**	-,081	-,020	-,108	-,078	,274**	,240**	,292**	,348**	,518**													
12 Passing this Limit	-,120	-,032	-,021	-,050	-,159*	,122	,236**	,193**	,373**	,450**	,178**												
13 Opinion Passing Limit	-,124	-,171*	-,158*	-,120	-,202**	,139*	,044	,013	,314**	,292**	,082	,358**											
14 Drinking more than 6	-,432**	-,022	,067	-,018	-,050	,150*	,481**	,518**	,536**	,622**	,482**	,516**	,194**										
15 Drinking more than 10	-,404**	-,063	,016	-,043	-,121	,103	,361**	,442**	,423**	,581**	,501**	,436**	,191**	,844**									
16 Prototype Similarity	-,314**	-,129	-,052	-,111	-,111	,097	,227**	,264**	,337**	,419**	,255**	,366**	,257**	,344**	,260**								
17 Prototype Favourability	-,106	,061	,080	,032	,016	,018	,193**	,194**	,105	,112	,109	,118	,109	,071	,038	,377**							
18 Hopelessness	,037	,006	-,050	-,049	-,086	-,065	-,128	-,085	-,166*	-,141*	-,238**	-,064	,142*	-,202**	-,202**	,019	,227**						
19 Impulsiveness	-,025	-,176*	-,041	-,087	-,149*	,150*	,121	,125	,334**	,319**	,254**	,246**	,157*	,292**	,256**	,237**	,128	,057					
20 SensationSeeking	-,241**	-,085	-,017	-,196**	-,086	,112	,074	,129	,344**	,310**	,289**	,247**	,183**	,303**	,267**	,239**	,074	-,071	,342**				
21 AnxietySensitivit	,265**	,063	-,004	-,014	-,029	-,128	-,052	-,093	-,180**	-,247**	-,163*	-,070	-,122	-,227**	-,199**	-,084	,088	,125	,103	-,149*			
22 Willingness	-,369**	-,174*	-,089	-,135*	-,141*	,240**	,234**	,255**	,491**	,644**	,436**	,346**	,358**	,569**	,502**	,398**	,175*	-,132	,254**	,262**	-,285**		
23 Experiences With Alcohol	-,243**	-,112	,052	-,030	-,112	,220**	,372**	,413**	,510**	,498**	,422**	,535**	,297**	,602**	,538**	,431**	,224**	-,012	,275**	,167*	-,166*	,479**	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

7. References

Ajzen, I., (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*. *50*, 179-211

Application Testing the Model of Binge Drinking, 2010

Arnett, J.J. (1996). Sensation Seeking, Aggressiveness and Adolescent Reckless Behavior. *Personal Individual Differences*, *20*, 693–702.

Arntzen, K.A., Schirmer, H., Wilsgaard, T., & Mathiesen E.B. (2010). Moderate wine consumption is associated with better cognitive test results: A 7 year follow up of 5033 subjects in the Trømso Study. *Acta Neurologica Scandinavica, 122*, 23-29.

Ball, S., Caroll, K., & Rounsaville, B. (1994). Sensation seeking, substance abuse, and psychopathology in treatment-seeking and community cocaine abusers. *Journal of consulting and clinical psychology*, *62*(5), 1053-1057.

Barnes, G. M., & Welte, J. W. (1986). Patterns and predictors of alcohol use among 7th–12th grade students in New York State. *Journal of Studies on Alcohol, 47*, 53–62.

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology. 51*(6), 1173-1182

Conrod, P.J., Castellanos, N., & Mackie, C. (2008). Personality-targeted interventions delay the growth of adolescent drinking and binge drinking. *Journal of Child Psychology and Psychiatry*, *49*(2), 181–190.

Conrod, P. J., Stewart, S. H., Comeau, N., & Maclean, A. M. (2006). Preventative efficacy of cognitive behavioral strategies matched to the motivational bases of alcohol misuse in at-risk youth. *Journal of Clinical Child and Adolescent Psychology, 35,* 550 –563. doi:10.1207/s15374424jccp3504_6

Dhuse, S.R. (2006). Consequences of binge drinking: Risk and protective factors. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, *67*(1-B), 537.

Friestad, C., Pirkis, J., Beihl, M., & Irwin, C. (2003). Socioeconomic patterning of smoking, sedentary lifestyle and overweight status among adolescents in Norway and the United States. *Journal of Adolescent Health, 22*, 275-278.

Gerrard, M., Gibbons, F. X., Houlihan, A. E., Stock, M. L., & Pomery, E. A. (2008). A dual-process approach to health risk decision making: The prototype willingness model. *Developmental Review. 28*, 29- 61. doi:10.1016/j.dr.2007.10.001

Gerrard, M., Gibbons, F. X., Reis-Bergan, M., Trudeau, L., Vande Lune, L. S., & Buunk, B. (2002). Inhibitory effects of drinker and nondrinker prototypes on adolescent alcohol consumption. *Health Psychology, 21*, 601–609.

Gerrard, M., Gibbons, F. X., Stock, M. L., Van de Lune, L., & Cleveland, M. J. (2005). Images of smokers and willingness to smoke among African American pre-adolescents: An application of the prototype/willingness model of adolescent health risk behavior to smoking initiation. *Journal of Pediatric Psychology, 30*, 305–318.

Gibbons, F.X., & Gerrard, M. (1995). Predicting young adults health risk behavior. *Journal of Personality and Social Psychology, 69*(3), 505-517.

Gibbons, F. X., Gerrard, M., Blanton, H., & Russell, D. W. (1998). Reasoned Action and Social Reaction: Willingness and Intention as Independent Predictors of Health Risk. *Journal of Personality and Social Psychology. 74*(5), 1164- 1180

Goodman, E., & Huang, B. (2002). Socioeconomic status, depressive symptoms and adolescent substance abuse. *Archives of Pediatric and Adolescent Medicine*, *156*, 448-453.

Goodman, E., Slap, G., & Huang, B. The public health impact of socioeconomic status on adolescent depression and obesity. *The American Journal of Public Health, 93*(11), 1844-1850.

Grant, B.F., Stinson, F.S., & Harford, T.C. (2001). Age at onset of alcohol use and DSM-IV alcohol abuse and dependence: A 12-year follow-up. *Journal of Substance Abuse, 13*, 493–504

Hillbom, M., Saloheimo, P., & Juvela, S. (2011). Alcohol Consumption, Blood Pressure, and the Risk of Stroke . *Current Hypertension Reports, 13*(3), 208-213

Hofmann, W., Friese, M., & Wiers, R. W. (2008). Impulsive versus reflective influences on health behavior: a theoretical framework and empirical review. *Health Psychology Review*. *2*(2), 111-137. doi: 10.1080/17437190802617668

Humensky, J.L. (2010). Are adolescents with high socioeconomic status more likely to engage in alcohol and illicit drug use in early adulthood?. Substance Abuse Treatment, Prevention, and Policy, *5*(19).

Jessop, D.C., & Wade, J. (2008). Fear appeals and binge drinking: A terror management theory perspective. *British Journal of Health Psychology,13*, 773–788

Kaplan, H.B., Martin, S.S., & Robbins, C. (1984). Pathways to adolescent drug use: Self-derogation, peer influence, weakening of social controls, and early substance use. *Journal of Health and Social Behavior, 25*(3), 270-289.

Korte, J.J., Pieterse, M.E., Postel, M.G., & Hoof, J.J. van (2011). Private peer Group settings as an environmental determinant of alcohol use in Dutch adolescents. Submitted

Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review*, *25*, 841-861.

Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006). Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors, 31,* 1844–1857

Kuntsche, E., Rehm, J., & Gmel, G. (2004). Characteristics of binge drinkers in Europe. *Social Science & Medicine, 59,* 113–127

Lubman, D.I., Hides, L., Yücel, M., & Toumbourou, J.W. (2007). Intervening early to reduce developmentally harmful substance use among youth populations. *The Medical journal of Australia,187*(7), 22-25

Malmberg, M., Overbeek, G., Monshouwer,K., Lammers, J., Vollebergh, W.A.M., & Engels, R.C.M.E. (2010). Substance use risk profiles and associations with early substance use in adolescence. *Journal of Behavioral Medicine*, 33, 474–485. doi: 10.1007/s10865-010-9278-4

McCambridge, J., & Strang, J. (2005). Deterioration over time in effect of motivational interviewing in reducing drug consumption and related risk among young people. *Addiction, 100,* 470–478.

Ministerie van Volksgezondheid, Welzijn en Sport. (2011). *Vragen over slechte controle op leeftijdsgrenzen bij alcoholverstrekking*. Retrieved from http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/kamerstukken/2011/05/10/vragen-over-slechte-controle-op-leeftijdsgrenzen-bij-alcoholverstrekking/vragen-over-slechte-controle-op-leeftijdsgrenzen-bij-alcoholverstrekking.pdf

Moeller, F.G., Barratt, E.S., Dougherty, D.M., Schmitz, J.M., & Swann A.C. (2001). Psychiatric aspects of impulsivity. *The American Journal of Psychiatry, 158,* 1783–1793.

Monshouwer, K., Verdurmen, J., van Dorsselaer, S., Smit, E., Gorter, A., & Vollebergh, W. (2008). *Jeugd en riskant gedrag 2007. Kerngegevens uit het peilstationsonderzoek scholieren. Roken, drinken,drugsgebruik en gokken onder scholieren vanaf tien jaar*. Utrecht: Trimbos-instituut.

Morrison, V., & Bennett, P. (2006). *An Introduction to Health Psychology.* Essex: Pearson.

Patock-Peckham, J.A., Cheong, J., Balhorn, M.E., & Nagoshi, C.T. (2001). A Social Learning Perspective: A Model of Parenting Styles, Self-Regulation, Perceived Drinking Control, and Alcohol Use and Problems. *Alcoholism: Clinical and Experimental Research, 25*(9), 1284-1292

Pavis, S., Cunningham-Burley, S., & Amos, A. (1997). Alcohol consumption and young people: exploring meaning and social context. *Health Education Research, 12*(3), 311-322.

Pomery, E. A., Gibbons, F. X., Reis-Bergan, M., & Gerrard, M. (2008). *Experience as a moderator of the developmental shift from willingness to intentions*. Manuscript submitted for publication.

Reinherz, H., Giaconia, R., Hauf, A., Wasserman, M., & Paradis, A. (2000). General and Specific Childhood Risk Factors for Depression and Drug Disorders by Early Adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 39*(2), 223-231.

Rheinische Kliniken Bonn. (2007). *Interkulturelle Ambulanz in den Rheinischen Kliniken Bonn.*Retrieved from http://www.rk-bonn.lvr.de/Fachabteilungen/sucht/jahresbericht2007_interkulturelleambulanz.pdf

Rivis, A., Sheeran, P., & Armitage, C.J. (2006). Augmenting the theory of planned behavior with the prototype/willingness model: Predictive validity of actor versus abstainer prototypes for adolescents' health-protective and health-risk intentions. *British Journal of Health Psychology, 11*, 483-500

Rooke, S.E., & Hine, D.W. (2011). A dual process account of adolescent and adult binge drinking. *Addictive Behaviors*, 36, 341–346

Rooke, S. E., Hine, D. W., & Thorsteinsson, E. B. (2008). Implicit cognition and substance use: A meta-analysis. *Addictive Behaviors, 33*, 1314-1328. doi:10.1016/j.addbeh.2008.06.009

Spijkerman, R., van den Eijnden, R. J. J. M., & Engels, R. C. M. E. (2005). Self-comparison processes, prototypes, and smoking onset among early adolescents. *Preventive Medicine, 40*, 785-794, doi:10.1016/j.ypmed.2004.09.025

Steinberg, L. (2007). Risk taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science, 16*, 55−59.

TerMaat, A., Pieterse, M.E., & Boer, H. (2008) Monitoring drug use during nightlife: measuring drug use, violent incidents, and personality characteristics. Enschede (The Netherlands): University of Twente, Tactus Addiction Care.

Thomasius, R., Nessler, T., & Häsler, F. (2009). *Wenn Jugendliche trinken: Auswege aus Flatrate-Trinken und Koma-Saufen: Jugendliche, Experten und Eltern berichten.* Georg Thieme Verlag

Trimbos-instituut, Utrecht. (2009). *Nationale Drug monitor: Jaarbericht 2009.*Retrieved from http://www.rijksoverheid.nl/bestanden/documenten-en-publicaties/rapporten/2010/05/27/nationale-drugmonitor-2009/nationale-drugmonitor-2009.pdf

Urbán, R., Kökönyei, G., & Demetrovics, Z. (2008). Alcohol outcome expectancies and drinking motives mediate the association between sensation seeking and alcohol use among adolescents. *Addictive Behaviors, 33*, 1344-1352

Urberg, K. A., Degirmencioglu , S.M., & Pilgrim, C. (1997). Close Friend and Group Influence on Adolescent Cigarette Smoking and Alcohol Use. *Developmental Psychology, 33*(5), 834-844

Van der Vorst, H., Engels, R.C.M.E., Meeus, W., & Dekovic´, M. (2006). The impact of alcohol-specific rules, parental norms about early drinking and parental alcohol use on adolescents' drinking behavior. *Journal of Child Psychology and Psychiatry, 47*(12), 1299-1306. doi:10.1111/j.1469-7610.2006.01680.x

Van Empelen, P., & Kok, G. (2006). Condom use in steady and casual sexual relationships: Planning, preparation and willingness to take risks among adolescents. *Psychology and Health. 21*(2), 165- 181. doi: 10.1080/14768320500229898

Wechsler, H., & Nelson, T. F. (2001). Binge drinking and the American college students: What's five drinks?. *Psychology of Addictive Behaviors*. *15*(4) 287-291.

Woicik, P. A., Stewart, S. H., Pihl, R. O., & Conrod, P. J. (2009). The substance use risk profile scale: A scale measuring traits linked to reinforcement-specific substance use profiles. *Addictive Behaviors*, *34*, 1042–1055.

World Health Organization. (1994). *Lexicon of Alcohol and Drug Terms*. Retrieved from http://whqlibdoc.who.int/publications/9241544686.pdf

Zuckerman, M. (1994). Behavioral Expressions and Biosocial Basis of Sensation Seeking. Cambridge University Press, Cambridge.