Implicit associations with regard to alcohol abuse among the mild intellectual disabled. An explorative study.

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Abstract

Alcohol abuse among people with an intellectual disability can pose several threats. Behavioural problems like criminal behaviour, antisocial and aggressive behaviour are all related to alcohol usage. Furthermore, current explicit measurements cannot easily be used in relation to the cognitive, social and practical problems. Based on current research, implicit association tests like the Approach Avoidance Test can give new insights in addiction among people with an intellectual disability. These studies indicate that, when using an approach avoidance task, group differences between high alcohol drinkers, social drinkers and non drinkers can be found. This study investigates the feasibility of an implicit association test among people with an intellectual disability.

Method. **Among eleven respondents the AAT was conducted. To measure the feasibility, an observational checklist was used. Furthermore, a student control group was used to compare the test outcomes. Internal consistency and group differences were calculated.**

Results. **Joystick handling seemed a problem among some of the respondents with an intellectual disability. Internal consistency was high among both PWaID and students. Group differences were not found among the people with an intellectual disability nor among the student group.**

Key words: Intellectual Disabillity, AAT, implicit associations, alcohol, addiction

Introduction

Alcohol abuse among people with an Intellectual Disability (PWaID) can be seen as a serious problem, since it is related to several serious complications. That is, research indicates that PWaID that are familiar with alcohol abuse tend to score high on criminal behavior, greater use of illicit substances (McGillivray & Moore, 2001; Poldrugo, 1998) and more aggressive and antisocial behaviour (Didden, Embrechts, van der Toorn & Naarhoven (2009). According to Poldrugo (1998), offenders with an intellectual disability are highly represented in prison. About half of these criminal offenders are related to alcohol abuse. Interestingly, PWaID that show alcohol abusive behaviour tend to be better informed about the side effects of the substances (McGillivray & Moore, 2001; Poldrugo, 1998) than non-drinkers (Didden, Embregts, van der Toorn & Laarhoven, 2009). However, research is not decisive on the direction of the relationship between criminal behaviour and the degree of substance use and knowledge. Whether high levels of criminal behaviour lead to high levels of

substance use and knowledge, or whether the direction of this relationship is in the opposite direction, remains unclear (McGillivray & Moore, 2001). Further research is necessary to determine the direction of this relationship.

Besides the behavioural problems regarding alcohol abuse, risks related to the actual alcohol using behaviour are significant among PWaID. Alcohol and smoking are identified by the World Health Organisation (2002) as two of the most significant behavioural risks to health. Research shows that PWaID are at higher risk for substance abuse and addiction (Moore & Polsgrove, 1991) and may also be more vulnerable to the risk of experiencing negative side effects as a result of the drug use (McGillivray & Moore, 2001). Additionally, evidence exists that heavy alcohol usage has serious negative effects on the wellbeing of the consumer. Serious alcohol use over years is related to the higher risk of bowel, throat and oesophagus cancer, liver and gastrointestinal disease, ulcers; pancreatitis; strokes; heamatogical disorders; and muscular and edocrine disoders (Davidson, 1989; National Institute on Alcohol Abuse & Alcoholism, 1997; Regan, 1990)., cited in Degenhardt, 2000). Moreover, in relation to alcohol abuse, bio-medical factors such as a compromised tolerance to substances (Rimmer, Braddock & Marks, 1995) and a negative influence of the combination of medication and alcohol (McGillivray & Moore, 2001) result in several risks for PWaID.

Among PWaID, drinking rates are highest among people living in group homes or boarding houses (Degenhardt, 2000). Within these homes, clients live with each other in a group. These clients are more independent, are given more freedom and have less supervision. With these privileges they are easier exposed to alcohol temptations. Furthermore, without direct supervision clients can drink at home or at their own rooms. Based on research done by Rimmer, Braddock & Marks (1995), these clients are at higher risk of the use and misuse of alcohol. Moreover, among the actual problem drinkers, problems resulting from the drinking were higher than compared to the non-disabled (Edgarton, 1995). Additionally, PWaID are more susceptible to social pressure (Zachofsky, Reardon & O'Connor, 1974). PWaID tent to score lower on a self-esteem scale and have an impaired self-regular behaviour (Didden, Embregts, van der Toorn & Laarhoven, 2009), leaving them more vulnerable to drug and alcohol influences.

Within the domain of health research, little is known about the actual quantification of alcohol drinking behavior among PWaID (Taggart, Mclaughlin, Quinn & Milligan, 2006; Didden, Embregts, van der Toorn & Laarhoven, 2009). Available research

suggests that alcohol drinking and the usage of other substances among PWaID is relatively low when compared to the non-disabled (Edgarton, 1986; Degenhardt, 2000). Based upon the guidelines set up by the Trimbos Instituut (Netherlands Institute of Mental Health and Addiction), alcohol drinking is considered as a problem, when more than 20 alcohol consumptions per week or 1 binge drink (6 alcoholic drinks per event) per 2 weeks are consumed. However, it should be noted that difficulties arise when comparing drinking behaviour among PWaID to the drinking behaviour of non-disabled people. Research done by Westermeyer, Kemp & Nugent (1996) suggests a lower threshold within alcohol abuse among PWaID. They state that, among PWaID with an alcohol drinking disorder, the amount of alcohol consumption is significantly lower than compared to the non-disabled. So, when comparing quantifications of alcohol consumption between PWaID and a non-disabled population, it is difficult to set an actual 'problem' amount of alcohol.

Based on the problems and risks related to alcohol usage among PWaID, it seems odd that no accurate figures exist about the range of the problem. Based on the studies of Christian & Poling (1997) and Mcgillicuddi & Blane (1999) cognitive capacities may play a crucial role. PWaID did not have an adequate level of reading skills, comprehension and abstract reasoning to undergo the regular alcohol treatment and therapy (Christian & Poling, 1997). Also, social skill deficits were highlighted as a major problem in regular therapy and prevention, as being a significant problem in group counseling. According to these limitations, PWaID could experience serious limitations with regard to the interventions compared to the normal populations.

In conclusion, alcohol usage or, moreover, alcohol abuse is a serious problem under PWaID. Behavioural problems like criminal behaviour, antisocial and aggressive behaviour are all related to alcohol usage. Furthermore, beside the general side effects of alcohol usage, PWaID seem more vulnerable to these side effects. When trying to make estimations on the actual size of the problem, cognitive and social problems within the PWaID make the use of general methods difficult. Nonetheless, it seems reasonable to quantify the problems with substance use among PWaID.

Generally in health psychology, when trying to asses this kind of information, research starts with identifying the cognitive factors underlying substance use and addiction (Rooke, Hine & Thorsteinsson, 2008). The basic assumption, on which a lot of this research is build, is that these cognitive factors could be measured using instruments tapping into the introspective, explicit decision making

factors (Rooke, Hine & Thornsteinsson, 2008). Based on the classical cognitive models like the Theory of Planned Behaviour (TPB) (Ajzen, 1991), the Health Belief model (Becker, 1974) and the Protection Motivation Theory (Rogers, 1983) addiction can be explained using introspective determinants. For instance, from the TPB, addiction can be explained using perceived behavioural control, social norm and attitude. These determinants can be measured using questionnaires which are aimed at assessing the explicit knowledge the person has on the relevant determinants. As a result, the scores on the classic models show a pure explicit measurement on addiction.

Based on new dual process models by Wiers & Stacy (2006), addiction can be explained by an interaction between explicit cognitive models, such as the TPB, but also by implicit models. Furthermore, research suggest that these implicit models play a large role in the maintenance of the addictive behaviour (Munafó en Albery, 2007; Gerrard, Gibbons, Houlihan, Stock & Pomery, 2007). These implicit models claim that addiction is influenced by the implicit associations with regard to substances. These implicit associations related to substances are explained as an impulsive urge to the addictive behaviour. Loewenstein (1996) stated that drug use is explained by uncontrolled, visceral urges, which overrules the explicit ratio. With regard to abuse, this can be explained as a subconscious preference towards alcohol related phenomena.

Within the implicit association tests, several tests are developed, all tapping into the subconscious mind of the respondents. In most of these studies relevant stimuli were presented, e.g. determinant-relevant stimuli versus opposite stimuli, according to verbal or pictorial ques. In most of these studies, the reaction times that are recorded are the dependent variable. Furthermore, Wiers and Stacy (2006), state several advantages with assessing implicit association in relation to addiction. First, it goes beyond the traditional view of assessing addiction determinants using introspective, explicit models. Second, implicit cognitions are far less, or not at all sensitive to social desirability. Third, the implicit cognitions can help explain the unexplained factors in addictive behaviour, such as the discrepancy between the addictive behaviour and the logics of the ratio. Fourth and final, Rooke, Hine & Thornsteinsson (2008) state that the use of both implicit and explicit cognitions can close the gap between social psychology, cognitive psychology and cognitive neuroscience.

Rinck & Becker (2007) developed an implicit association test based on approach and avoidance. The Approach Avoidance Task has been used in a variety

of studies. For instance, promising results were found to measure attitude toward spiders and smoking.

In this Approach Avoidance Task, participants are presented pictures of determinant relevant stimuli and the opposite of this determinant, like alcohol versus soda, on a computer screen. Furthermore, in the AAT on-screen determinant relevant pictures should be pushed or pulled with a given joystick, simulating an approach (pulling) and avoidance (pushing) reaction towards the stimuli. Moreover, using the joystick, the approach and avoidance simulation is enhanced in making an approaching arm movement like pulling, and avoiding arm movement like pushing (Palfai, 2006). Also, to enhance the approach and avoidance tendency, a zooming feature is added to the reaction on screen. For example, when reacting in an avoiding way, one pushes the joystick away and the onscreen stimulus is made smaller on screen, vice versa in the approach stimulus. To make a distinction between approaching and avoiding, a stimulus like a colored border or a tilted picture is added to give the respondent a cue for the correct response to the picture of the determinant. So for example, a blue border is given to an approach (pull) trial, and a yellow border is given to an avoidance (push) trial. In case of the alcohol versus soda example, two types of alcohol-stimuli (yellow and blue bordered) and two types of soda-stimuli are used. The reaction time of the given stimuli was measured and calculated in mean reaction times. Basic assumption of the AAT is that, based on the content of the determinant at hand, a preference towards approach or avoidance could be measured. In case of the alcohol-relevant pictures, people with a high level of alcohol consumption should show a preference towards approaching the alcohol stimuli (Wiers & Stacy, 2006).

At this time in research, no attempt has been made to use an implicit association test among PWaID. When looking at the promising results that have been made among a non-disabled population, and the need for a measurement to quantify alcohol consuming problems among PWaID, the AAT seems to be a good direction in research. Related to PWaID, the AAT overcomes most problems that come with regular measurement. Through tapping into the associations that people have with the different pictures of alcohol and soda, no social skills, reading skills and limited comprehension skills are needed. Therefore, the AAT seems to overcome most of the limitations that arise with explicit measures.

In conclusion, the main research question of this study is to test whether or not the AAT can be used as a measurement device for PWaID. To do so, first a feasibility study is conducted to

test whether the test can be carried out by PWaID. Furthermore, output data are analyzed to further test the usability. Because no research exists on this subject, no real estimation about the effect size of the implicit association can be made. Moreover, no data exists about the extent of usability of the AAT among PWaID. This study tries to give a first look at the feasibility of the AAT among an intellectual disabled group. Because of the lack of generalisability between ID-groups and non-disabled groups, all data used in the non-disabled AAT used by Wiers et al (2008) should be validated for the PWaID-group. Based on the possible limited attention span and the limited cognitive comprehension of the PWaID, the practical usability of the AAT should be measured. Based on the practical use of the AAT, these key points can be subdivided into four key elements. Although the AAT does not require a lot of instruction or explanation, the limited cognitive capacity of the PWaID could be a problem for the basics of the AAT. When instructions are forgotten, this could seriously affect the test outcomes. Therefore, at first overall test understanding should be measured. Furthermore, due to the length of the test and confrontation with errors, attention span and frustration tolerance are of importance. These two points are strong related. Due to the length of the test, more errors can be made due to the possible low attention span among PWaID. These errors can cause the PWaID to get more aroused and therefore experience less frustration tolerance. Furthermore, one of the most important aspects of the AAT is the usage of a joystick. Due to the multiple actions that are needed to operate the joystick (e.g. the usage of the trigger button at the correct moment, movement and centering of the joystick in reaction to stimuli), difficulties could arise when not performed correctly. Finally, general likeability of the test should be high. Because the test is only used among a general population, no real indication of the likability of an implicit test can be made. Because of the usage of the joystick and computer game interface of the test, high likeability is expected.

"Essence of this paper is to check whether potential observational problems lead could lead to biased results in relation to AAT scores."

To further test the usability of the AAT among PWaID, scores from PWaID are compared to scores from a non-disabled population. As successfully used in the study of Wiers, Rink, Dictus & van den Wildenberg (2008), a student control group is formed. Therefore, we conduct the next hypothesis:

H1: Internal consistencies between stimuli are the same for PWaID as for the control group

Based on research done by Wiers, Rinck, Dictus & van den Wildenberg (2008) and Palfai & Ostafin (2003) the AAT proved to be a sufficient predictor of alcohol using behaviour among a non-disabled population. Those studies showed that respondents with high alcohol usage show an approach preference toward the alcohol stimuli. Respondents without this high alcohol usage did not show this preference. Thus, when using the AAT as quantification measurement, based on the results of a non-disabled population, a distinction can be made between people with high alcohol consuming behaviour, and people without high levels of alcohol consuming behavour. From this, we deduce the second hypothesis:

H2a: Between group differences on heavy alcohol drinkers and non heavy alcohol drinkers exist between alcohol and soda RT's

Especially differences on pull reactions are of interest; therefore, we deduce the following hypothesis

H2b: Heavy alcohol drinking groups differ in alcohol pull reactions from non heavy drinking groups.

Method

Alcohol use

As in the study of Wiers, Rinck, Dictus & van den Wildenberg (2008) a self-report questionnaire was used to validate the actual alcohol use among the student group. This self-report questionnaire (Appendix I) was based on the Alcohol questionnaire used by the Trimbos Institution which proved to be a good predictor of actual drinking behaviour. Participants were asked about their every day drinking behaviour over the last week. They were asked whether they consumed an alcoholic consumption, the amount of standard sized consumptions, on which day they consumed it and what the reason for the occasion was.

In current research, no valid questionnaire about the drinking behaviour of PWaID is available. To get a reliable estimation of the actual drinking behaviour for the PWaID group, two different questionnaires were used. For the PWaID group (Appendix II), the same questionnaire structure as for the students was used, but it was simplified to meet the participant's level of vocabulary. The second questionnaire (Appendix III) was filled in by the personal supervisors of the participants. Goal of this supervisor-questionnaire was to get an estimation of the drinking behaviour from the person closest to the

participant. As an addition to the alcohol questionnaire of the supervisor, a question about the IQ-score of the client was added. Afterwards, the alcohol consumption resulting from the client-questionnaire was compared to the estimation made by the supervisors of the clients. Based on the amount of discrepancy between both questionnaires, no participants were excluded.

Participants

Non-disabled participants were recruited from Twente University. Two groups were formed; heavy drinkers, and not heavy drinkers (social drinkers + non drinkers). Participants were recruited through e-mail invitation and publicity during lunch breaks. The e-mail and publicity contained information about the study and the task to be performed. Furthermore, inclusion and exclusion criteria were presented. Inclusion criteria for the heavy drinkers were, drinking 20 or more standard alcoholic drinks per week, including at least one binge (drinking more than 6 alcoholic drinks at one event) for the past 2 weeks. Inclusion criteria for the social drinkers were, drinking less than 20 standard alcoholic drinks per week, without a binge in the past 2 weeks. Furthermore, non drinkers did not drink at all in the last 2 weeks. Exclusion criteria for both of the groups were dyslexia and colorblindness. Furthermore, error (incorrect response to the cue) was calculated. Respondents with an error of more than 25% were excluded. In total 11 non disabled participants were included in the test. From these eleven respondents, 3 respondents were heavy drinkers, 5 respondents were social drinkers, and 3 respondents did not drink at all. No non disabled respondents were excluded. Average error on the task in the non disabled group was 9.6%.

PWaID were recruited from three institutions for people with an intellectual disability in Enschede, Groesbeek and Zutphen. As with the student group, two groups were formed; heavy drinkers/ not heavy drinkers. Because of the delicate subject for the clients of the institution, a subtle way of approaching the clients of the institutions was needed. To get a reliable insight in the drinking habits of the clients, direct supervisors of the clients of the institution were asked to estimate the amount of drinking of the different clients. Based on this, participants were divided among the 2 groups. Inclusion/ seclusion criteria were the same as for the student group. In total 11 participants were included in the test. From these eleven respondents, 2 respondents were heavy drinkers, and 9 respondents were not heavy drinkers of did not drink at all. Based on the error, three respondents were excluded from the non-drinking group, due to >25% error. Average error

on the task in the PWaID group was 23.4%.

Observation checklist

The emphasis of this study was to conduct an observational study regarding the use of an Approach Avoidance Task among PWaID. To test the feasibility of the AAT among PWaID, the emphasis of the test is primarily on observed behaviours. This has been done, using an observation checklist (Appendix IV). With this checklist, observational cues about the feasibility, which cannot be measured through data analyzes, were noted down. The checklist taped into aspects like concentration, joystick usage, frustration tolerance and general likeability of the task. Aspects were noted down using dichotomous yes/no answers (e.g. Does the respondent centers the joystick correctly?). Furthermore, the amount of questions, complaints or (non-)verbal behaviours were noted down. Finally, at the end of the test, respondents were asked whether they enjoyed the test.

Pilot

An extensive pilot test has been conducted prior to the actual task to measure whether set-up and basic principles of the AAT were correct to be applied to the target groups at hand.

First, the alcohol and soda pictures that were selected to be used in the actual AAT, were printed on paper and presented to students (n=5) and PWaID (n=5) as a recognition task. Goal was to get an indication about the recognition of the different kinds of alcohol and soda. Pictures with a lower recognition of 4 per group were changed with different pictures. Printed substitute pictures were showed to replace the low-recognition pictures. In total, 3 of the 24 pictures were changed with a different kind of beverage and 2 pictures were changed with a clearer picture.

Second, a reduced version of the AAT was programmed to be used in the pilot. This version of the AAT consisted of a practice-block similar to the Alcohol-Soda AAT, and five shortened test-blocks. For the practice-block, two general neutral pictures were used (a cucumber and a car tire) and for the test-blocks five general positive (e.g. a smiling baby, shaking hands) and five general negative pictures (e.g. a snake, a crying girl) were used. The main purpose of this adapted version was four-fold. First, an estimation about the duration and the effectiveness of the practice-block had to be made to ensure a correct practice-block in the Alcohol-Soda AAT. This reduced version of the AAT was conducted among PWaID (n=4), their supervisors (n=3) and students (n=6). Within the practice-block, no notable problems occurred among the ID-group, the supervisors and the student-groups. Furthermore, each of the participants reached a level of

experience well enough to carry out the test.

Besides the efficiency, duration and recognition, also more practical matters were checked during the pilot. First of all, the angle and view towards the laptop-screen was checked to ensure a clear view. No problems in relation to the angle of the screen were found, but pictures were presented in the left side of the screen. Alterations were made with regard to the screen-resolution, to center the pictures that were presented. Furthermore, the usability of the Logitech Attack 3 joystick was tested. Problems occurred when respondents pushed or pulled the stick roughly, which resulted in a small turn-over of the joystick. This turn-over itself could return as an error in the RT. Alterations were made to overcome this problem.

Approach-avoidance task

A new variety of the Approach-avoidance task of Rinck & Becker (2007) was used to measure the effects among the different groups. Basic elements, like the joystick usage, zooming effect and the test lay out were maintained. As a cue to push or pull, a blue or yellow outer glow following the contours of the picture was chosen as a stimulus. Furthermore, certain adaptations towards the target groups were made. First of all, the visible background used in prior AAT's was replaced by a black background color, resulting in a stimuli-picture only appearance on the screen. Without the visible background, fewer distractions could intervene with the reaction times.

Moreover, the practice block was extended to improve the capability of the respondents in coping with the test. The practice block consisted of 40 trials, ten times pull stimuli, ten times push stimuli, 10 times push-pull-push-pull and 10 times randomization. Five different types of general neutral pictures were used. As showed in the pilot test, the practice phase proved to be sufficient.

The test phase consisted of five, randomized blocks of stimuli. Four different kinds of alcohol were used: beer, wine, strong liquor and mix-drinks. From each kind of alcohol, three different kinds of pictures were chosen. Twelve soda pictures were chosen to replicate the shape and color of the alcohol pictures in the best way. As showed in the pilot test, recognition of the different kind of pictures high. For each of the 24 alcohol and soda pictures, a yellow outer glow picture and a blue outer glow picture was made, resulting in 48 different stimuli. Each test-block consisted of all the 48 pictures that were available. Thus, in the five test-blocks, 240 trials were presented. During the test phase, between blocks two and three, a short pause was presented.

Finally, within the output, error reaction and RT's > 2 SD on pictures were

excluded from the test. Furthermore, to control for any cue effect, a general (yellow border = push, blue border = pull) and a counterbalanced group (yellow border = pull, blue border = push) were formed. These groups should be compared to control for any cue effects.

Results

Descriptive statistics

Table 1 shows the mean scores and standard deviations of the different mean RT scores of both the student group and the PWaID group after excluding error and outliers. For more detailed information about the RT on the different pictures, an extended table is added to Appendix V (PWaID) and Appendix VI (Students). As can be seen in both table 1 and Appendix V, for the PWaID group, the spread of the mean scores and standard deviations is high. This could indicate low consistency between the different respondents. For the student group, normal scores were obtained indicating higher levels of consistency.

Table 1: Descriptives PWaID (n=8) – Average Alcohol and Soda (error + outliers excluded)

Stimuli	Min	Max	Mean	Standard Deviation
Average Alcohol Pull	*631,50*	*924,50*	*793,27*	*90,94*
Average Alcohol Push	*640,58*	*922,42*	*803,24*	*103,99*
Average Soda Pull	*657, 67*	*876,17*	*787,22*	*84,90*
Average Soda Push	*658,58*	*1015,08*	*818,44*	*127,13*

Table 2: Descriptives Students (n=11) – Average RT & Relative score (error + outliers excluded)

Stimuli	Min	Max	Mean	Standard Deviation
Average Alcohol Pull	*554,33*	*735,67*	*616,67*	*51,48*
Average Alcohol Push	*568,83*	*756,00*	*614,68*	*57,19*
Average Soda Pull	*567,83*	*781,00*	*622,56*	*59,05*
Average Soda Push	*578,58*	*719,42*	*619,97*	*40,91*

PWaID

Feasibility

To test whether the AAT can be used among PWaID, a feasibility test was conducted. An observation checklist was established in order to monitor whether PWaID were able to execute the task at hand and to see whether, and which problems occurred during the test. The observation checklist consisted of scores that were given to five relevant categories; test understanding, frustration tolerance, attention span, joystick handling and general likability. Given scores can be found in table 2. When a person performed excellent, no checks were made on the observation checklist indicating no problems on the category. When overall performance was well, incidental checks were made on the checklist. For instance, respondent 101 had two complaints about the duration of the test, but did not show any fatigue or other discomfort. Respondents showing overall positive behaviour, but also reporting negative effects due to the test were labeled as 'ok'. For instance, respondent 201 had multiple complains about the test and the errors that were made. This resulted in a somewhat heightened level of frustration. Respondent 102 stopped several times during the test, due to frustration. This had a somewhat negative effect on the test results and thus was labeled 'not ok'. Serious negative effects were labeled as a bad performance. For instance, respondent 202 showed serious disturbance on frustration tolerance and test understanding, leading in serious negative effects for the test results. Furthermore, respondent 203 had serious tremors, resulting in disturbed joystick handling.

As can be seen in table 3, test understanding, frustration tolerance, attention span and general likeability did not result in any problems for included

respondents. Respondents were able to understand the general purpose of the test, did not show any major problems in frustration tolerance or attention span, and all respondents liked the test. However, the joystick handling among PWaID was somewhat problematic. For 62.5% of all included respondents with an ID, the joystick handling resulted in some kind of problem. The joystick handling problems resulted from the incorrect usage of the trigger button (for instance, multiple clicks when only one click was needed). Although this incorrect usage in essence should not lead to biased results, it may have contributed in the frustration tolerance and therefore did influence the results. Furthermore, respondents 105, 201 and 203 showed difficulties in correct centering of the joystick, resulting in a more 'pull' oriented position of the joystick. Multiple adjustments, like the joystick – desk positioning and extra advice about the joystick handling, had to be made by the experiment leader to overcome this problem. The problem could not have been corrected with respondent 203.

Table 3: Observation Checklist

Respondent	Test understanding	Frustration Tolerance	Attention Span	Joystick Handling	General Likeability
101	++	++	+	++	++
102*	++	-	-	+-	+
103	++	++	+	+-	++
104	++	++	++	++	++
105	+	++	++	-	++
201	+	+-	+	-	++
202*	--	--	-	-	+-
203*	+	+	+	--	+
204	++	++	++	++	++
205	++	++	++	++	++
206	++	-	-	-	+

* Respondents were excluded due to > 25% error rates

++ Respondent performed excellent
\+ Respondent performed well
+- Respondent performed ok
\- Respondent did not perform ok
-- Respondent performed badly

When comparing respondents 101 and 204 (proper joystick handling) with respondents 103, 105 and 201 (incorrect joystick handling) differences can be seen in RT (figure 1, 2 and 3 show RT's of respondent 101, 103 and 306, for more details see Appendix VII). Respondents that were able to handle the joystick

properly, showed lower RT's than the other respondents. This indicates that there could be a correlation between the joystick handling and RT.

Figure 1) Respondent 101 (proper joystick handling)

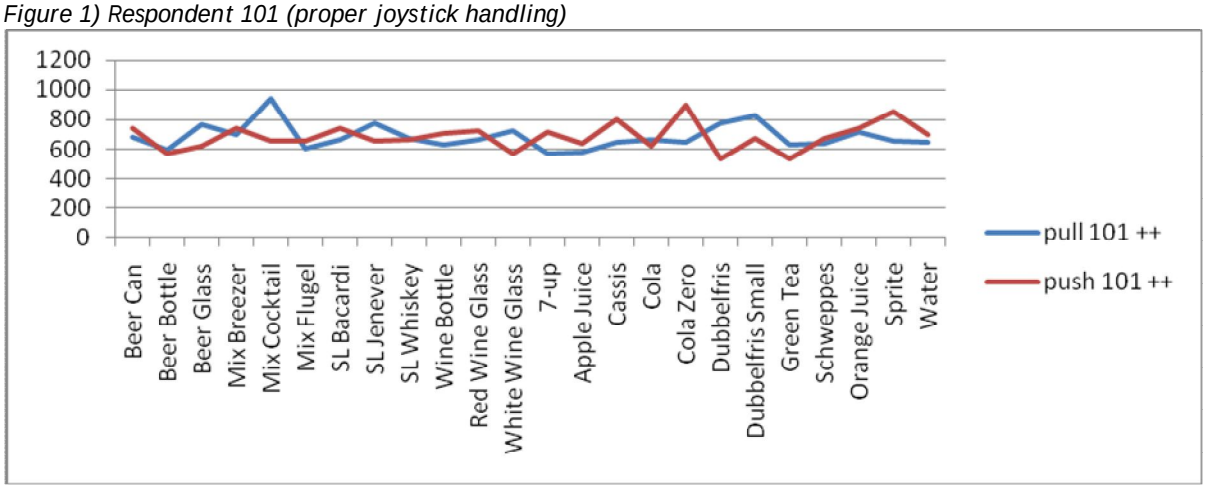


Figure 2) Respont 103 (incorrect joystick handling)

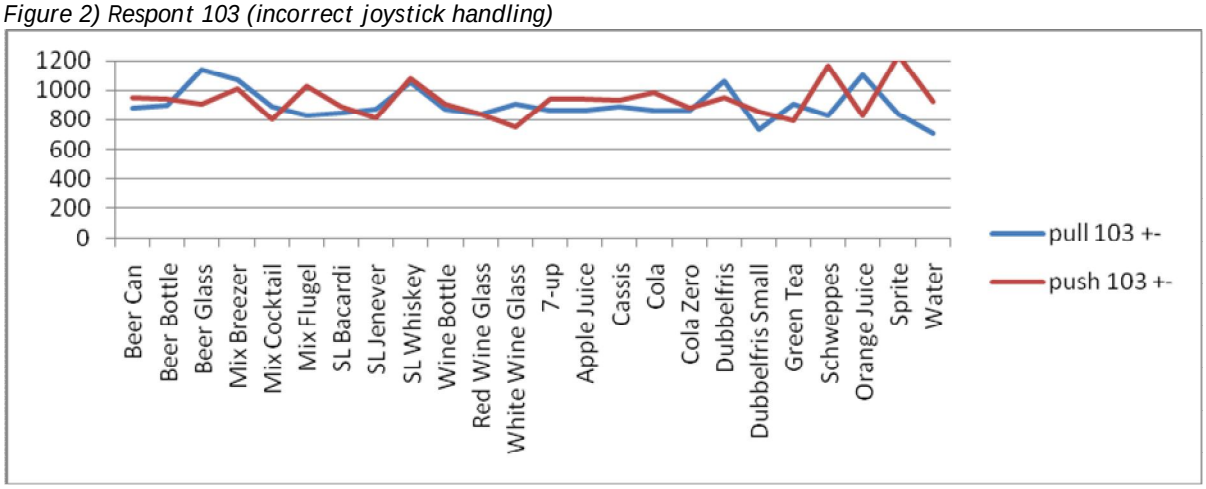
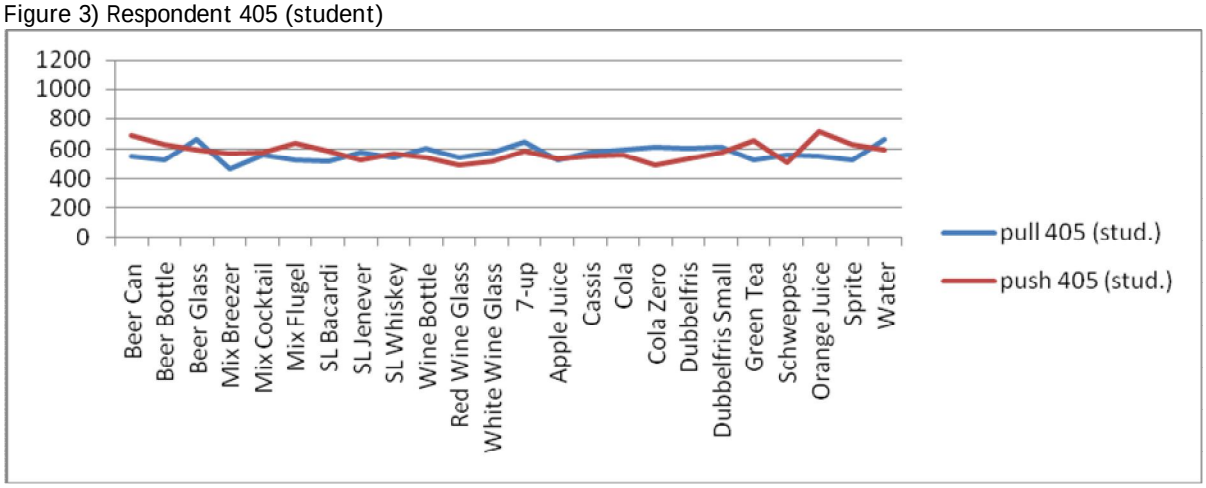


Figure 3) Respondent 405 (student)



Furthermore, when compared to the control group (students), RT's of the PWaID that showed incorrect joystick handling were much higher. However, PWaID with a proper joystick handling did not (all) show large differences.
Furthermore, figure 4 shows the alcohol push scores of respondents 101 and 104 (PWaID with correct joystick handling), 103, 105 and 201 (PWaID with incorrect joystick handling) and 306 and 405 (students).
As can be seen, PWaID with incorrect joystick handling showed higher RT's in push scores, when compared to PWaID with correct joystick handling and students. For the soda push stimuli, the same result can be found (see Appendix VIII). Because no differences can be found between the pull scores of both the alcohol stimuli (Appendix IX) and soda stimuli (Appendix IX), the incorrect joystick handling could account for the differences in scores. For instance, the improper joystick centering could explain this pulling preference. For instance, as can be seen in figure 5, respondent 105 tends to score higher on push stimuli than on pull stimuli. Due to the pull preference in joystick positioning (as described above), pull stimuli seem to have an advantage over push stimuli, resulting in low pull scores versus high push scores.

Figure 5) Respondent 105 (incorrect joystick handling)

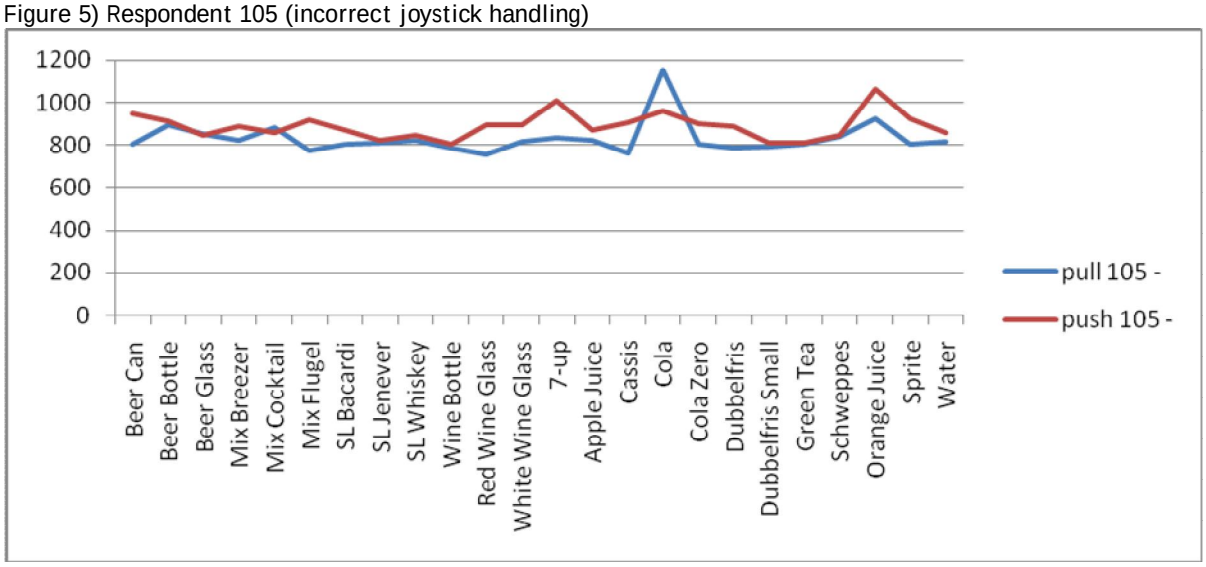
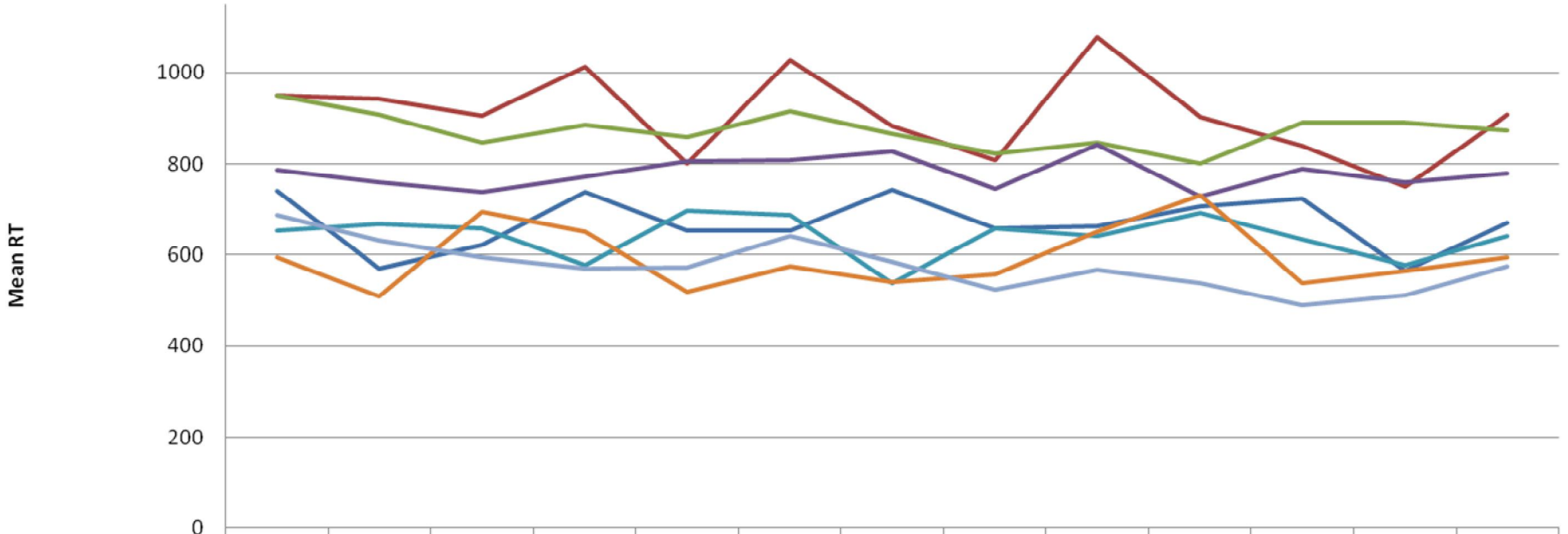


Figure 4: Mean Alcohol Push Scores - Per Picture



	Beer Can	Beer Bottle	Beer Glass	Mix Breezer	Mix Cocktail	Mix Flugel	SL Bacardi	SL Jenever	SL Whiskey	Wine Bottle	Red Wine Glass	White Wine Glass	Mean Resp Push
push 101 ++	740	570	622	739	653	653	742	659	664	707	724	566	670
push 103 +-	949	943	906	1012	801	1028	885	809	1078	903	840	750	909
push 105 -	949	909	847	887	859	916	867	824	848	801	891	891	874
push 201 -	787	760	738	773	806	810	828	745	844	728	789	759	781
push 204 ++	653	668	659	578	697	688	539	659	641	693	634	578	641
push 306 (stud.)	594	510	695	650	519	575	541	559	650	731	538	566	594
push 405 (stud.)	688	631	594	570	573	641	584	525	569	540	491	513	577

In conclusion, joystick handling seems to have some influence on the mean RT's of all the different pictures used in the AAT. Because no differences within the subjects exists between pushing and pulling, the between subjects differences cannot be explained by the joystick handling problems.

As can be seen in figure 4 and Appendices VII, VIII, no obvious problems within the respondents arise between pictures. In addition, to measure the internal consistency between the different pictures, a reliability analysis was conducted to measure Cronbach's Alpha.

Cronbach's Alpha was calculated for both mean scores of the alcohol (push and pull) and soda (push and pull) pictures. Results showed that high consistency exists among both alcohol pictures (pull $\alpha = 0.80$; push drinking group $\alpha = 0.93$) and soda pictures (pull $\alpha = 0.88$; push $\alpha = 0.94$).

Moreover, using a one way ANOVA, based on a mean score of the 12 different alcohol (push / pull) and soda (push / pull) pictures, group differences between the general and counterbalanced group were measured. Results indicate no significant differences between alcohol pictures (pull: $F(1,6) = 0.49$, $p = 0.50$, push: $F(1,6) = 1.26$, $p = 0.30$). Within the soda pictures, no significant differences exist between the general and counterbalanced group (pull: $F(1,5) = 0.68$, $p = 0.44$, push: $F(1,5) = 3.74$, $p = 0.101$).

Furthermore, to check for differences between alcohol (push / pull) and soda (push / pull) pictures between the heavy alcohol drinking group and the non heavy drinking group (social drinkers + non drinkers), a one way ANOVA was conducted. No significant differences in RT's were found between groups in alcohol (pull $F(1,6) = 0.79$, $p = 0.40$; push $F(1,6) = 1.87$, $p = 0.221$) and soda pictures (pull $F(1, 6) = 2.01$, $p = 0.19$; push $(F1,6) = 3.6$, $p = 0.10$).

Students

To measure internal consistency among the different pictures in the student group, Crohnbach's Alpha was calculated. Results indicated high internal consistency between alcohol pictures (pull $\alpha = 0.90$; push drinking group $\alpha = 0.91$) and the soda pictures (pull $\alpha = 0.91$; push $\alpha = 0.85$) among the student group. These results show that all respondents in the student group scored evenly on all pictures used within the AAT.

Furthermore, based on a mean score of the 12 different alcohol (push / pull) and soda (push / pull) pictures, within group comparisons were made between the general and counterbalanced group using ANOVA. Results indicate no significant differences between alcohol pictures (pull: $F(1,9) =$

0.23, p = 0.64, push: F(1,9) = 1.99, p = 0.19). Within the soda pictures, no significant differences exist between the general and counterbalanced group (pull: F(1,9) = 0.36, p = 0.56, push: F(1,9) = 0.75, p = 0.40).

Furthermore to check for differences between alcohol and soda pictures between the heavy alcohol drinking group and the non heavy drinking group (social drinkers + non drinkers) a one way ANOVA was conducted. No significant differences in RT's were found between groups in alcohol (pull F(1,9) = 1.35, p = 0.28; push F(1,9) = 0.43, p = 0.53) and soda pictures (pull F(1, 9) = 1.5, p = 0.25; push (F1,9) = 0.22, p = 0.65).

Comparison

Based on the within group (PWaID – students) results, relative AAT scores did not seem to predict alcohol drinking behaviour. Moreover, no group differences were found between mean alcohol scores (push / pull) or mean soda scores (push / pull), neither among PWaID nor among students. Furthermore, high internal consistency between pictures was found among students and PWaID.

Based on these findings, hypothesis 1 is accepted. Furthermore, based on the group differences, hypothesis 2a and hypothesis 2b could not be accepted or even calculated. Due to the low statistical power, no conclusive results can be drawn from this.

Discussion

This study examined the feasibility of an implicit association test, the Approach Avoidance Task, among people with an intellectual disability. At first, an observational checklist was used to measure practical usability of the test. Overall, this observation indicated problems only with joystick handling. Because of the possibility of biased results due to this incorrect joystick handling, results were further examined. Respondents with joystick handling problems (all PWaID) showed higher RT's on both alcohol and soda pictures (push and pull). Furthermore, differences between push and pull results were observed (see Appendix VII). Although this difference could have been the result of the incorrect joystick centering, these push and pull differences were not found within the respondents. Because joystick problems were related to lower RT's on most of the pictures, a relation with cognitive capacity and the capacity to correctly carry out the AAT can be made. Within the AAT, both visual and physical actions have to be carried out at the same time. When limited in cognitive resources, this combination could lead to difficulties within the AAT. Furthermore, other explanations can be found in side

effects from medication (tremors), possible physical discomfort, or distraction from the experiment leader. Within this study, the experiment leader was also in the experiment room, filling in the observation checklist. In further research, the experiment leader should be in a separate room.

Besides the practical feasibility of the AAT, responses on the pictures were analyzed. Cronbach's alpha was calculated to measure the internal consistency. Among both PWaID and the student group, high internal consistency was found between the different alcohol and soda pictures. Furthermore, no cue preference was found between the PWaID group and the student group.

Furthermore, no group effects were found, neither among the PWaID-group nor among the student group, between the heavy alcohol drinkers, social alcohol drinkers and the non-alcohol drinkers. Contrary to Wiers, Rinck, Dictus & van den Wildenberg (2009), no pull preferences were found among the heavy alcohol drinkers compared to the other groups. Although small alterations were made in the AAT like the extended practice phase, cue stimuli (yellow / blue borders), other aspects are more likely to have had a negative influence on the results. At first, due to the exclusion criteria, only eight PWaID respondents were used in the analysis. In the student group, only 11 respondents were included. Furthermore, from these respondents, two groups were formed. Based on the alcohol drinking rates, only two heavy alcohol drinkers from the PWaID group were selected and three heavy alcohol drinkers from the student group were selected. Due to this low group count, group effects were hard to find. So, to further analyze the between group effects, the number of participants should be enlarged.

In conclusion, one can state that the AAT cannot be used among an PWaID group without making the proper adjustments. First of all, a pilot test has to be conducted to check for any joystick handling problems. To overcome basic joystick handling problems, extended practice with the joystick handling could decrease the problems. Furthermore, respondent specific joystick positioning is desired to ensure proper functioning and usability. Moreover, when performing a repeating task like the AAT, attention plays a large role. Among PWaID this could result in boredom or distraction which will have negative effects on the reaction times. Therefore, in further research, AAT duration must be lowered and distraction has to be limited to (near) zero. This can be done by lowering the number of pictures or stimuli groups and placing the computer in a separate single room.

References

Ajzen, I. (1991). A theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50,* pp. 179-211.

Christian, L, Poling, A. (1997). Drug abuse in persons with mental retardation: A Review. *American journal on mental retardation*, 102 (2), pp 126-136

Degenhardt, L., (2000). Interventions for people with alcohol use disorders and intellectual disability: A review on the literature. *Journal of Intellectual & Developmental Disability,* 25 (2), 135 - 146

Didden, R., Embregts, P., van der Toon, M., & Laarhoven, N., (2009). *Substance abuse, coping strategies, adaptive skills and behavioral and emotional problems in clients with mild to borderline intellectual disability admitted to a treatment facility: A pilot study.* Research in Developmental Disabilities, 30 (5), pp. 927 – 932

Edgerton, (1986). Alcohol and drug use by mentally retarded adults*. American Journal on Mental Deficiency, 90,* 602-609.

Gerrard, M., Gibbons, F.X., Houlihan, A.E., Stock, M.L., Pomery, E.A. (2007) *A dual process approach to health risk decision making.* Department of Psychology, Iowa State University USA. Published in: Elsevier, 2007

Loewenstein, G. (1996). Out of control: Visceral influences on behavior. Organizational Behavior and Human Decision Processes, 65, pp. 272–292

Munafó, M.R. & Albery, I.P. (2007) *Cognition and addiction*. Dutch Journal of Psychiatry 49, 917-917

McGillevray, J.A., & Moore, M.R., (2001). Substance use by offenders with mild intellectual disability. *Journal of Intellectual & Developmental Disability, 26,(4), pp. 297–310,*

Moore, D., & Polsgrove, L. (1991). Disabilities, developmental handicaps and substance misuse: a review. *The International Journal of the Addictions*, *26*(1), 65–90.

Palfai, T.P. (2006) Activating action tendencies: the influence of action priming on alcohol consumption among male hazardous drinkers. *J Stud Alcohol* 67, 926–933.

Rinck, M. & Becker, E.S. (2007) Approach and avoidance in fear of spiders. *J Behav Ther Exp Psychiatry* 38, 105–120.

Rimmer, J., Braddock, D., & Marks, B., (1995). Health characteristics and behaviors of adults with mental retardation residing in three living arrangements. *Research in Developmental Disabilities, 16,* 489-499.

Rooke, S.R., Hine, D.W., & Thorsteinsson, E.B., (2008). *Implicit cognition and substance use: A meta-analysis.* Addictive behaviours, 33, 1314- 1328

Taggart, L., McLaughlin, D., Quinn, B., & Milligan, V., (2006). *An exploration of substance misuse in people with intellectual disabilities.* Journal of Intellectual Disability Research, 50 (8), 588-597

Tenneij, N., & Koot, H. (2007a). *Doelgroep in beeld*. Utrecht: De Borg

Wiers R.W & Stacy, A.W (2006). Handbook of implicit cognition and addiction. Thousand Oaks

Wiers, R.W., Rinck, M., Dictus, M., Wildenberg, van den, E. (2009). *Relatively strong automatic appetitive action-tendencies in male carriers of the OPRM1 G-allele*. Genes, brain and behaviour

Westermeyer, J., Kemp, K., & Nugent, S., (1996). Substance disorder among persons with mild mental retardation. *The American Journal on Addicitions, 5,* 23-31.

Zachofsky, T., Reardon, D., & O'Connor, G. (1974). *Response of institutionalized retarded adults to social pressure in small groups.* American Journal of Mental Defiency, 79 (1), 10-15

Appendix I + II – Questionnaire alcohol usage

1. Wat is je leeftijd

..... jaar

2. Wat is je geslacht

a. Man
b. Vrouw

3. Hoeveel dagen drink je, gemiddeld genomen, alcohol per week?

a. 0
b. 1-2
c. 3-4
d. 5 of meer

4. Als je alcohol drinkt, wat drink je dan meestal? Je mag meerdere antwoorden omcirkelen!

a. Bier uit een glas
b. Bier uit een flesje
c. Bier uit een blikje
d. Wijn uit een wijnglas
e. Sterke drank uit een borrelglas
f. Een mixdrankje (bijvoorbeeld wodka-redbull)
g. Breezer

5. Hoeveel glazen alcohol drink je, gemiddeld genomen, per week?

a. 0 – 5
b. 5 – 10
c. 10 – 15
d. 15 – 20
e. Meer dan 20

6. Hoe vaak drink je meer dan 5 standaardglazen alcohol op 1 gelegenheid?

a. Nooit
b. Maandelijks of minder dan 1 keer per maand
c. Twee tot drie keer per maand
d. Elke week
e. Meerdere dagen per week

Appendix III – Questionnaire supervisors

1. **Wat is de leeftijd van de client**

   ..... jaar

2. **Wat is het geslacht van de client**
   c. Man
   d. Vrouw

3. **Wat is het (geschatte) IQ van de client**
   a. Lager dan 50
   b. 50 – 60
   c. 60 – 70
   d. 70 – 80
   e. Hoger dan 80

4. **Hoeveel dagen drinkt de client, gemiddeld genomen, alcohol per week?**
   e. 0
   f. 1-2
   g. 3-4
   h. 5 of meer

5. **Als u de cliënt over een periode van 2 weken, bijvoorbeeld de afgelopen 2 weken, zou moeten omschrijven qua drankgebruik. Met welke stelling bent u het dan het meest eens?**
   a. Cliënt heeft (bijna) niks gedronken *(2 of minder keer gedronken)*
   b. Cliënt heeft gematigd gedronken zonder openbaar dronkenschap *(2 tot 3 keer gematigd gedronken in 2 weken)*
   c. Cliënt heeft een of meerdere malen zichtbaar te veel gedronken *(5 of meer keer te veel gedronken in 2 weken)*

6. **Hoe vaak schat u dat de cliënt meer dan 5 standaardglazen alcohol op 1 gelegenheid drinkt?**
   f. Nooit
   g. Maandelijks of minder dan 1 keer per maand
   h. Twee tot drie keer per maand
   i. Elke week
   j. Meerdere dagen per week

Appendix IV – Observation Checklist

Fase	Vraag	Ja/Nee	Opmerkingen
Instructie			
	1. Resp. kan de gelezen/gegeven instructie navertellen 2. Resp. heeft veel vragen over de instructie 3. Resp. kijkt veel naar de posters	Ja/ Nee Ja/Nee Ja/Nee	

Practise			
Joystick	4. Resp. maakt de joystick beweging niet volledig af	Ja/Nee	
	5. Resp. heeft moeite met het centreren van de joystick	Ja/Nee	
	6. Resp. drukt de trigger button op het verkeerde moment in	Ja/Nee	
Algemeen	7. Resp. laat door fysieke uitingen ongemak zien bij het maken van de training (frustratie tolerantie)	Ja/Nee	
	8. Resp. wil stoppen na de practise fase	Ja/Nee	
	9. Resp. vind de practise-fase onduidelijk (stelt vragen)	Ja/Nee	
	10. Resp. kijkt vaak naar posters voor reminder	Ja/Nee	
	11. Resp. reageert door fysieke en of verbale uitingen op fouten	Ja/Nee	

Testfase				
Trials (Blok 1)	10. Resp. reageert verbaal en/of fysiek op alcohol/fris stimuli 11. Resp. raakt en/of blijft opgewonden bij het zien van de alcohol/fris stimuli	Ja/Nee Ja/Nee		

	12. Resp. bekijkt de nieuwe stimuli lang (reageert niet adrem op kleur stimuli)	Ja/Nee	Blok 1+2: Blok 3tm5	
	13. Resp. maakt (zichtbaar) veel fouten bij duw of trek stimuli	Ja/Nee	Blok 1+2: Blok 3tm5	
	14. Resp. maakt (zichtbaar) veel fouten bij alcohol of fris stimuli	Ja/Nee	Blok 1+2: Blok 3tm5	
	15. Resp. laat door fysieke uitgingen ongemak zien bij het maken van de testfase (zuchten, kreunen, klagen)	Ja/Nee	Blok 1+2: Blok 3tm5	
Algemeen	16. Resp. kijkt veel om zich heen tijdens de testfase	Ja/Nee		
	17. Resp. vind het erg vervelend wanneer er fouten worden gemaakt	Ja/Nee		
	18. Resp. vraagt aandacht van de proefleider ter verduidelijking	Ja/Nee		
Nadien				

	19. Resp. vond de test moeilijk	Ja/Nee	
	20. Resp. vond de test lang duren	Ja/Nee	
	21. Resp. heeft de test niet afgemaakt	Ja/Nee	

Algemene opmerkingen:

Appendix V – Descriptives PWaID

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
gem_alc_bierblik_pull	8	573,00	1109,00	817,6250	156,02375
gem_alc_bierblik_push	8	653,00	1078,00	847,3750	137,26610
gem_alc_bierfl_pull	8	555,00	1250,00	823,5000	214,56401
gem_alc_bierfl_push	8	570,00	943,00	788,1250	122,90814
gem_alc_biergl_pull	8	547,00	1137,00	788,0000	177,49125
gem_alc_biergl_push	8	622,00	987,00	806,7500	124,24371
gem_alc_mix_bre_pull	8	597,00	1609,00	901,3750	316,52711
gem_alc_mix_bre_push	8	578,00	1037,00	821,5000	153,42937
gem_alc_mix_coc_pull	8	541,00	938,00	811,1250	127,34816
gem_alc_mix_coc_push	8	644,00	894,00	760,3750	93,64666
gem_alc_mix_flu_pull	8	602,00	832,00	730,3750	88,06643
gem_alc_mix_flu_push	8	653,00	1028,00	840,3750	142,45695
gem_alc_sd_bac_pull	8	661,00	848,00	786,2500	67,60547
gem_alc_sd_bac_push	8	539,00	958,00	825,2500	131,90446
gem_alc_sd_jen_pull	8	618,00	1073,00	822,5000	132,69622
gem_alc_sd_jen_push	8	659,00	1172,00	817,0000	161,20085
gem_alc_sd_whi_pull	8	656,00	1053,00	770,2500	132,01163
gem_alc_sd_whi_push	8	641,00	1078,00	792,6250	143,61649
gem_alc_wijn_fles_pull	8	492,00	1078,00	782,8750	174,72218
gem_alc_wijn_fles_push	8	691,00	1338,00	843,8750	217,09671
gem_alc_wijnr_fl_pull	8	587,00	834,00	724,5000	77,57945
gem_alc_wijnr_fl_push	8	634,00	891,00	766,5000	92,74851
gem_alc_wijnw_gl_pull	8	521,00	903,00	760,8750	118,52479
gem_alc_wijnw_gl_push	8	566,00	891,00	729,1250	115,51677
Valid N (listwise)	8				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
gem_fris_7up_pull	8	568,00	900,00	808,6250	109,93107
gem_fris_7up_push	8	633,00	1006,00	801,5000	123,39368
gem_fris_appelsap_pull	8	578,00	866,00	741,5000	89,68198
gem_fris_appelsap_push	8	635,00	940,00	771,0000	107,59448
gem_fris_cassis_pull	8	597,00	891,00	772,7500	105,48900
gem_fris_cassis_push	8	694,00	973,00	828,3750	103,20429
gem_fris_cola_pull	8	660,00	1152,00	868,7500	191,97228
gem_fris_cola_push	8	621,00	981,00	801,2500	142,93930
gem_fris_colazero_pull	8	644,00	859,00	768,0000	69,12101
gem_fris_colazero_push	8	656,00	1016,00	847,0000	114,86016
gem_fris_dubbelfr_pull	8	631,00	1063,00	801,1250	137,34777
gem_fris_dubbelfris_push	8	535,00	1287,00	816,0000	231,01701
gem_fris_dubbelfrisklein_pull	8	644,00	1073,00	817,2500	140,87456
gem_fris_dubbelfrisklein_push	8	603,00	948,00	771,5000	107,63032
gem_fris_grnthee_pull	8	512,00	903,00	726,1250	132,90860
gem_fris_grnthee_push	8	531,00	969,00	788,8750	128,36492
gem_fris_schwepp_pull	8	631,00	897,00	757,6250	103,60907
gem_fris_schwepp_push	8	537,00	1169,00	795,3750	214,75031
gem_fris_sinassap_pull	8	559,00	1110,00	785,7500	195,04706
gem_fris_sinassap_push	8	669,00	1062,00	839,6250	121,37773
gem_fris_sprite_pull	8	598,00	1012,00	820,5000	137,93477
gem_fris_sprite_push	8	600,00	1387,00	932,1250	256,74025
gem_fris_water_pull	8	647,00	950,00	778,6250	94,10319
gem_fris_water_push	8	599,00	1211,00	828,6250	189,00638
Valid N (listwise)	8				

Appendix VI – Descriptives Students

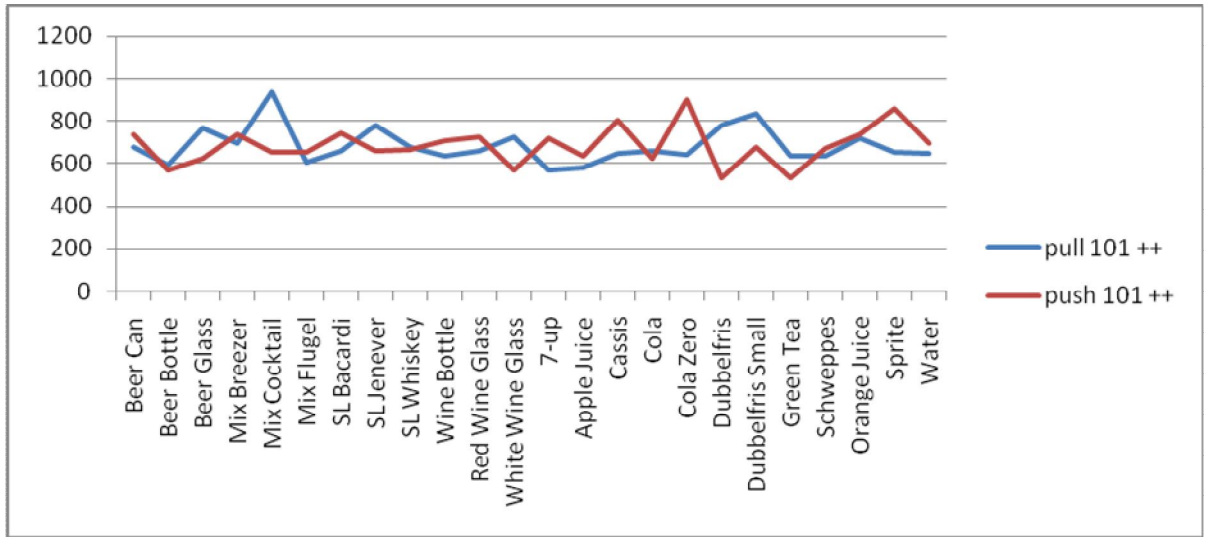
Descriptive Statistics

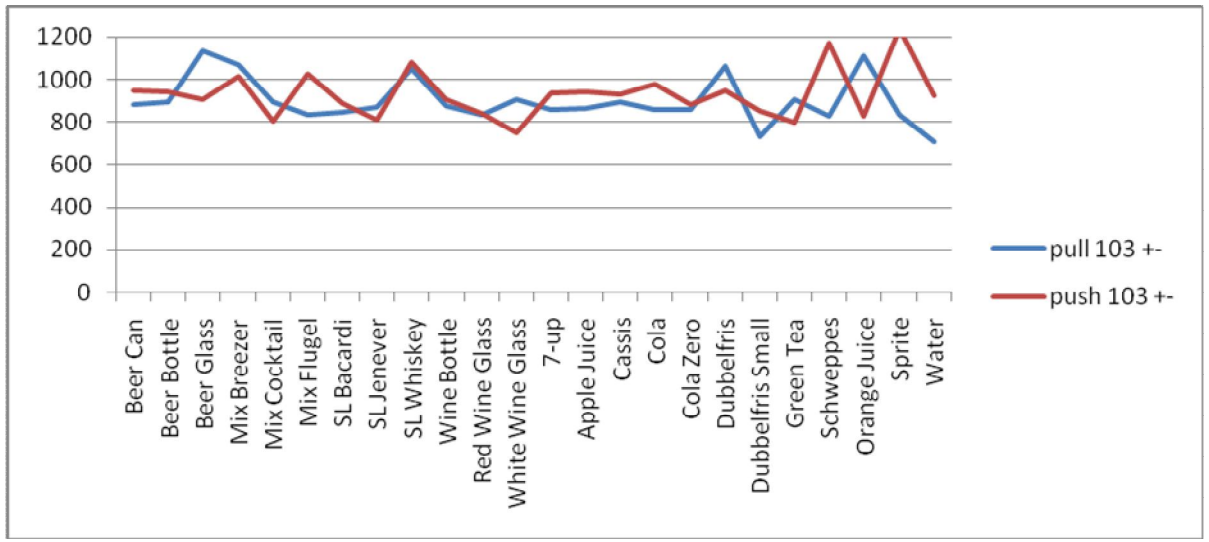
	N	Minimum	Maximum	Mean	Std. Deviation
gem_alc_bierblik_pull	11	475,00	681,00	600,3636	61,65918
gem_alc_bierblik_push	11	516,00	797,00	624,7273	93,03343
gem_alc_bierfl_pull	11	516,00	675,00	602,0000	51,28353
gem_alc_bierfl_push	11	510,00	709,00	593,4545	56,71748
gem_alc_biergl_pull	11	494,00	844,00	615,5455	99,80718
gem_alc_biergl_push	11	543,00	756,00	624,0909	63,26524
gem_alc_mix_bre_pull	11	462,00	794,00	641,3636	91,03765
gem_alc_mix_bre_push	11	570,00	781,00	643,4545	61,77437
gem_alc_mix_coc_pull	11	559,00	816,00	639,3636	72,73964
gem_alc_mix_coc_push	11	519,00	662,00	598,4545	49,04154
gem_alc_mix_flu_pull	11	528,00	695,00	623,3636	53,29216
gem_alc_mix_flu_push	11	508,00	969,00	623,7273	125,30769
gem_alc_sd_bac_pull	11	516,00	863,00	613,4545	96,35493
gem_alc_sd_bac_push	11	528,00	734,00	596,3636	69,49284
gem_alc_sd_jen_pull	11	516,00	853,00	645,1818	91,55743
gem_alc_sd_jen_push	11	525,00	741,00	602,4545	57,96096
gem_alc_sd_whi_pull	11	535,00	737,00	621,8182	69,71774
gem_alc_sd_whi_push	11	559,00	744,00	612,2727	59,58706
gem_alc_wijn_fles_pull	11	487,00	650,00	567,0909	55,78253
gem_alc_wijn_fles_push	11	506,00	784,00	625,8182	89,73942
gem_alc_wijnr_fl_pull	11	503,00	803,00	597,5455	81,07696
gem_alc_wijnr_fl_push	11	491,00	838,00	614,7273	102,29183
gem_alc_wijnw_gl_pull	11	578,00	710,00	633,0000	51,64107
gem_alc_wijnw_gl_push	11	513,00	788,00	616,6364	78,83435
Valid N (listwise)	11				

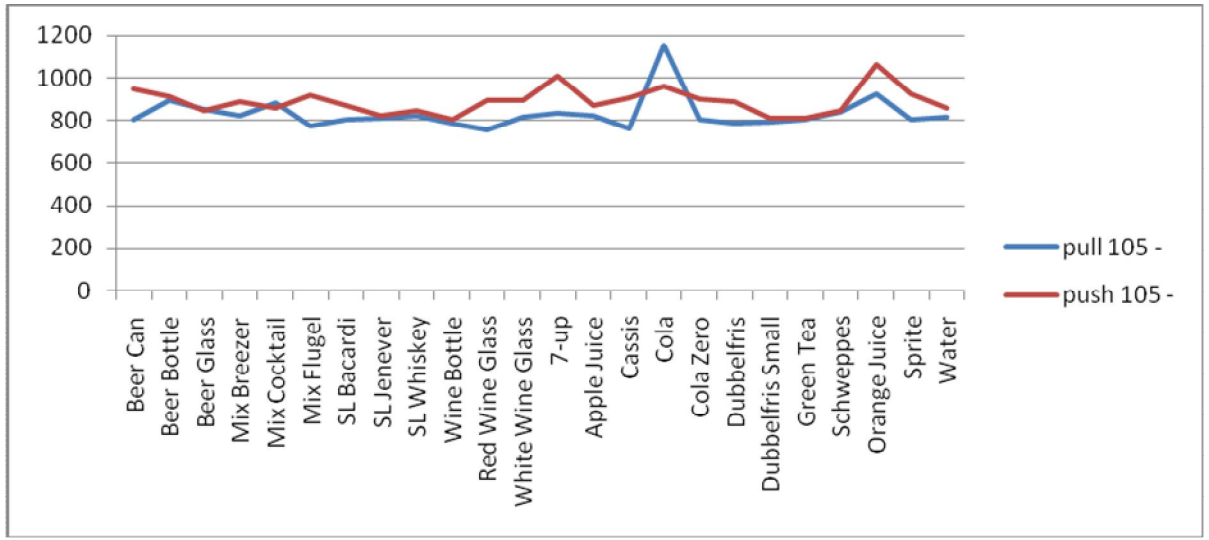
Descriptive Statistics

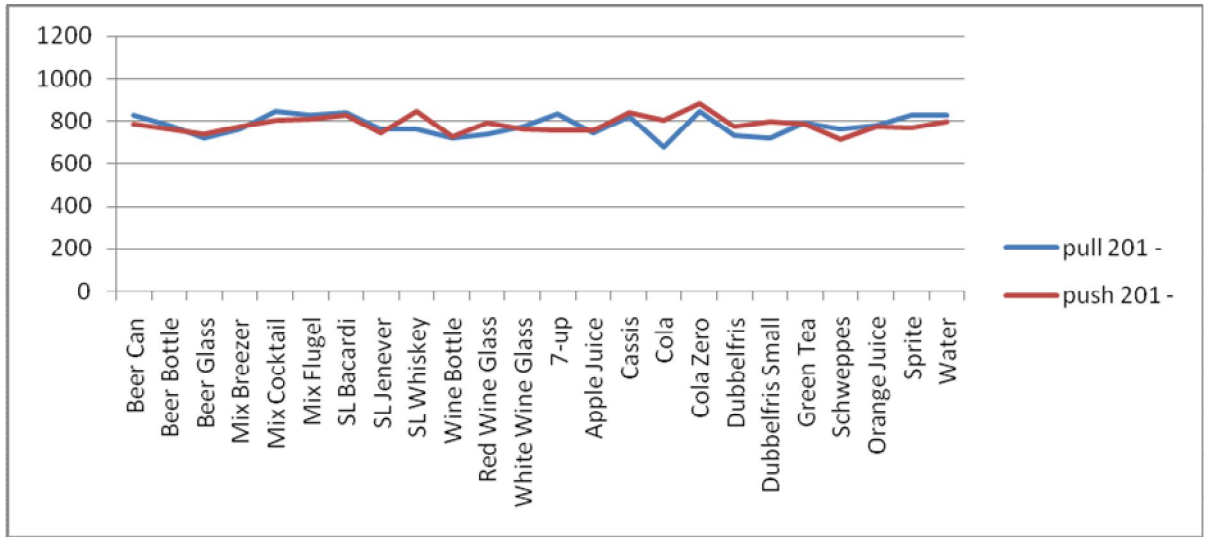
	N	Minimum	Maximum	Mean	Std. Deviation
gem_fris_7up_pull	11	556,00	916,00	649,6364	102,42585
gem_fris_7up_push	11	562,00	731,00	639,1818	53,49545
gem_fris_appelsap_pull	11	481,00	687,00	587,0909	63,27473
gem_fris_appelsap_push	11	537,00	738,00	614,0909	64,27201
gem_fris_cassis_pull	11	551,00	895,00	638,7273	98,70875
gem_fris_cassis_push	11	519,00	703,00	602,4545	55,97564
gem_fris_cola_pull	11	519,00	825,00	649,0909	79,39831
gem_fris_cola_push	11	556,00	853,00	670,5455	82,06383
gem_fris_colazero_pull	11	506,00	784,00	626,6364	87,97190
gem_fris_colazero_push	11	494,00	697,00	591,4545	57,31206
gem_fris_dubbelfr_pull	11	538,00	806,00	607,9091	77,70515
gem_fris_dubbelfris_push	11	527,00	734,00	609,0000	74,46879
gem_fris_dubbelfrisklein_pull	11	551,00	694,00	592,0000	48,09990
gem_fris_dubbelfrisklein_push	11	520,00	659,00	581,1818	42,18250
gem_fris_grnthee_pull	11	472,00	690,00	582,3636	62,19690
gem_fris_grnthee_push	11	505,00	797,00	623,7273	88,29733
gem_fris_schwepp_pull	11	534,00	859,00	630,3636	103,49519
gem_fris_schwepp_push	11	509,00	727,00	602,7273	62,75204
gem_fris_sinassap_pull	11	475,00	789,00	636,0909	83,36960
gem_fris_sinassap_push	11	531,00	797,00	645,5455	95,67274
gem_fris_sprite_pull	11	528,00	776,00	647,8182	63,39056
gem_fris_sprite_push	11	547,00	709,00	629,0909	41,63281
gem_fris_water_pull	11	494,00	844,00	623,0000	102,68009
gem_fris_water_push	11	543,00	756,00	630,6364	64,48608
Valid N (listwise)	11				

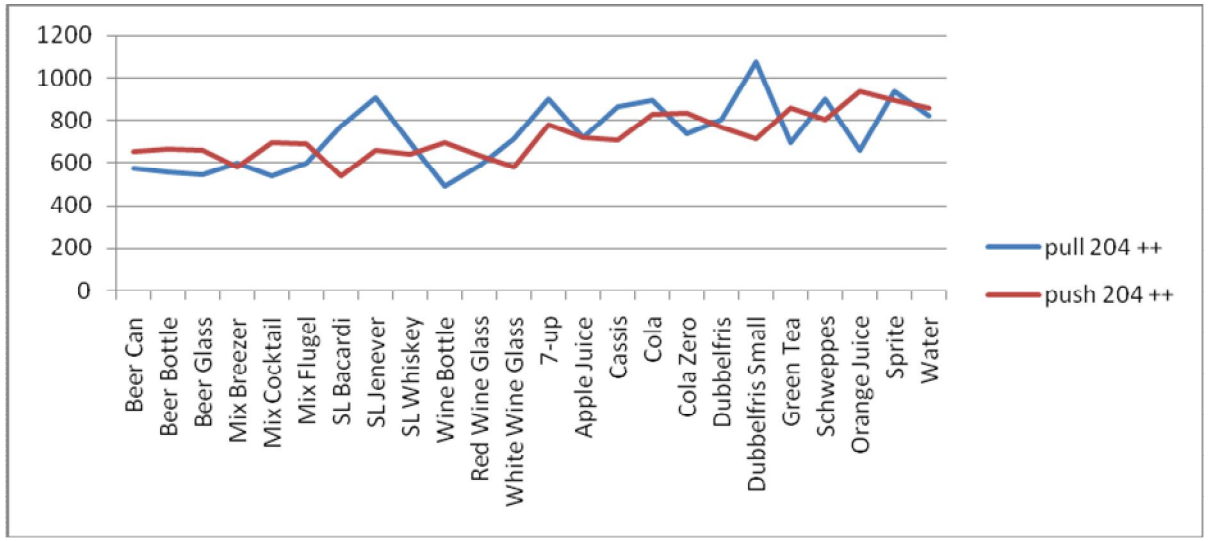
Appendix VII – Figures

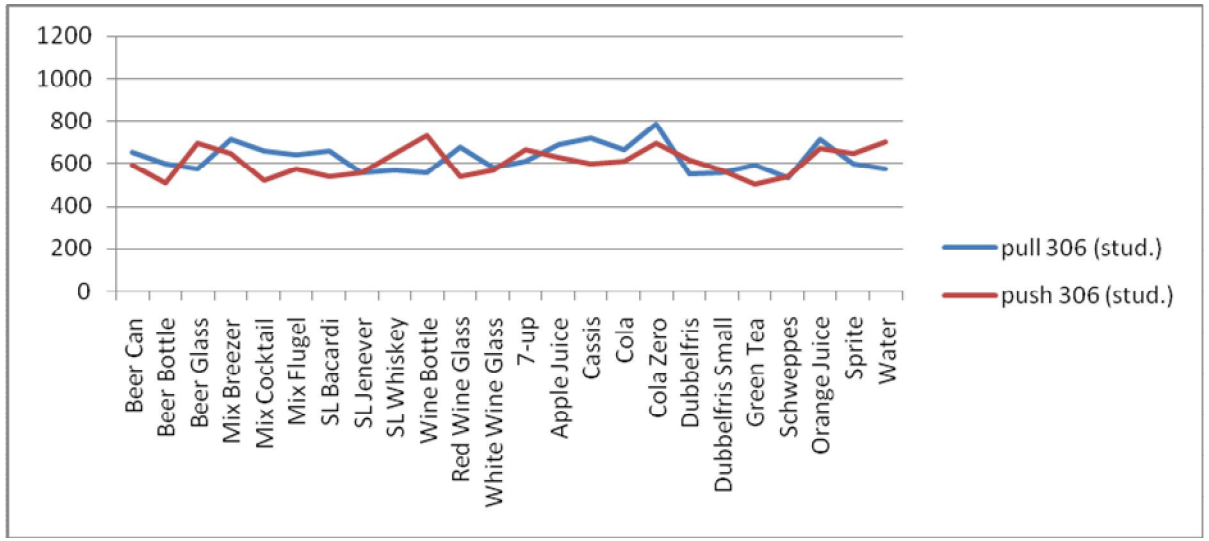


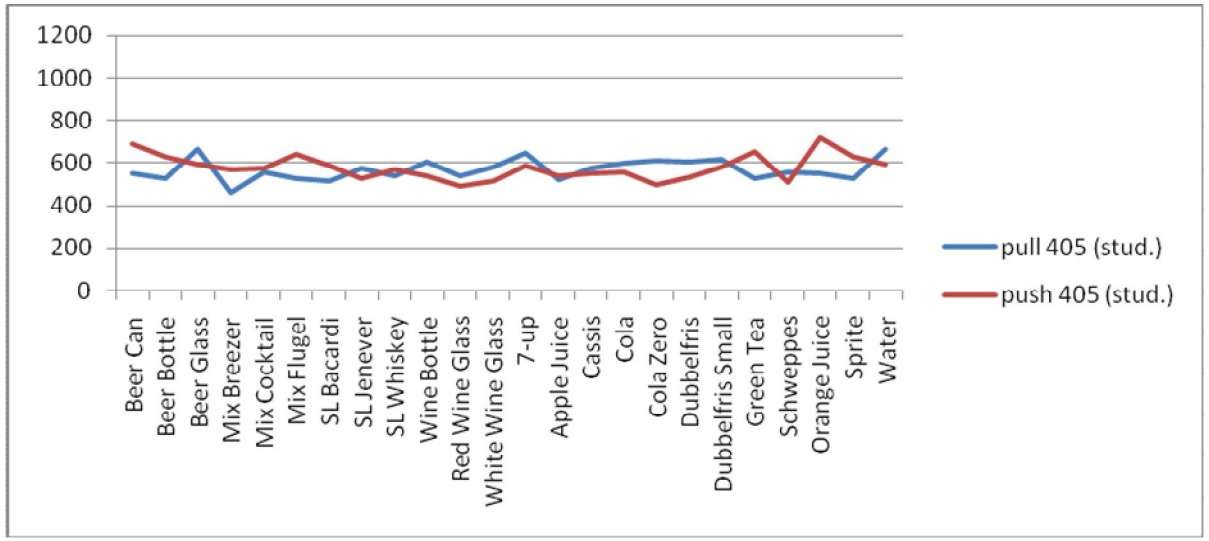



1200
1000
800
600
400
200
0
Beer Can
Beer Bottle
Beer Glass
Mix Breezer
Mix Cocktail
Mix Flugel
SL Bacardi
SL Jenever
SL Whiskey
Wine Bottle
Red Wine Glass
White Wine Glass
7-up
Apple Juice
Cassis
Cola
Cola Zero
Dubbelfris
Dubbelfris Small
Green Tea
Schweppes
Orange Juice
Sprite
Water
pull 105 -
push 105 -

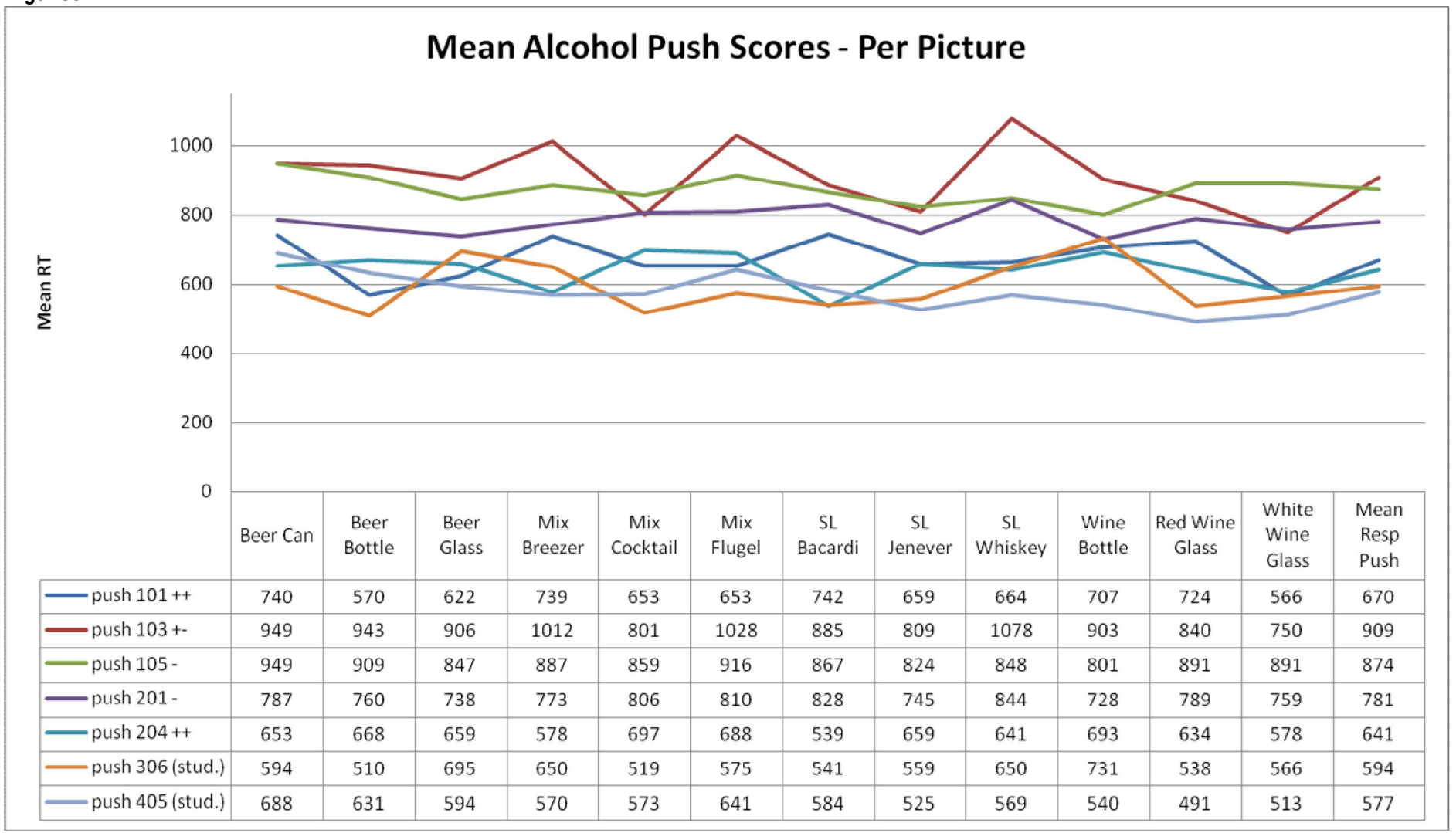

1200
1000
800
600
400
200
0
Beer Can
Beer Bottle
Beer Glass
Mix Breezer
Mix Cocktail
Mix Flugel
SL Bacardi
SL Jenever
SL Whiskey
Wine Bottle
Red Wine Glass
White Wine Glass
7-up
Apple Juice
Cassis
Cola
Cola Zero
Dubbelfris
Dubbelfris Small
Green Tea
Schweppes
Orange Juice
Sprite
Water
pull 201 -
push 201 -


1200
1000
800
600
400
200
0
Beer Can
Beer Bottle
Beer Glass
Mix Breezer
Mix Cocktail
Mix Flugel
SL Bacardi
SL Jenever
SL Whiskey
Wine Bottle
Red Wine Glass
White Wine Glass
7-up
Apple Juice
Cassis
Cola
Cola Zero
Dubbelfris
Dubbelfris Small
Green Tea
Schweppes
Orange Juice
Sprite
Water
pull 204 ++
push 204 ++


1200
1000
800
600
400
200
0
Beer Can
Beer Bottle
Beer Glass
Mix Breezer
Mix Cocktail
Mix Flugel
SL Bacardi
SL Jenever
SL Whiskey
Wine Bottle
Red Wine Glass
White Wine Glass
7-up
Apple Juice
Cassis
Cola
Cola Zero
Dubbelfris
Dubbelfris Small
Green Tea
Schweppes
Orange Juice
Sprite
Water
pull 306 (stud.)
push 306 (stud.)

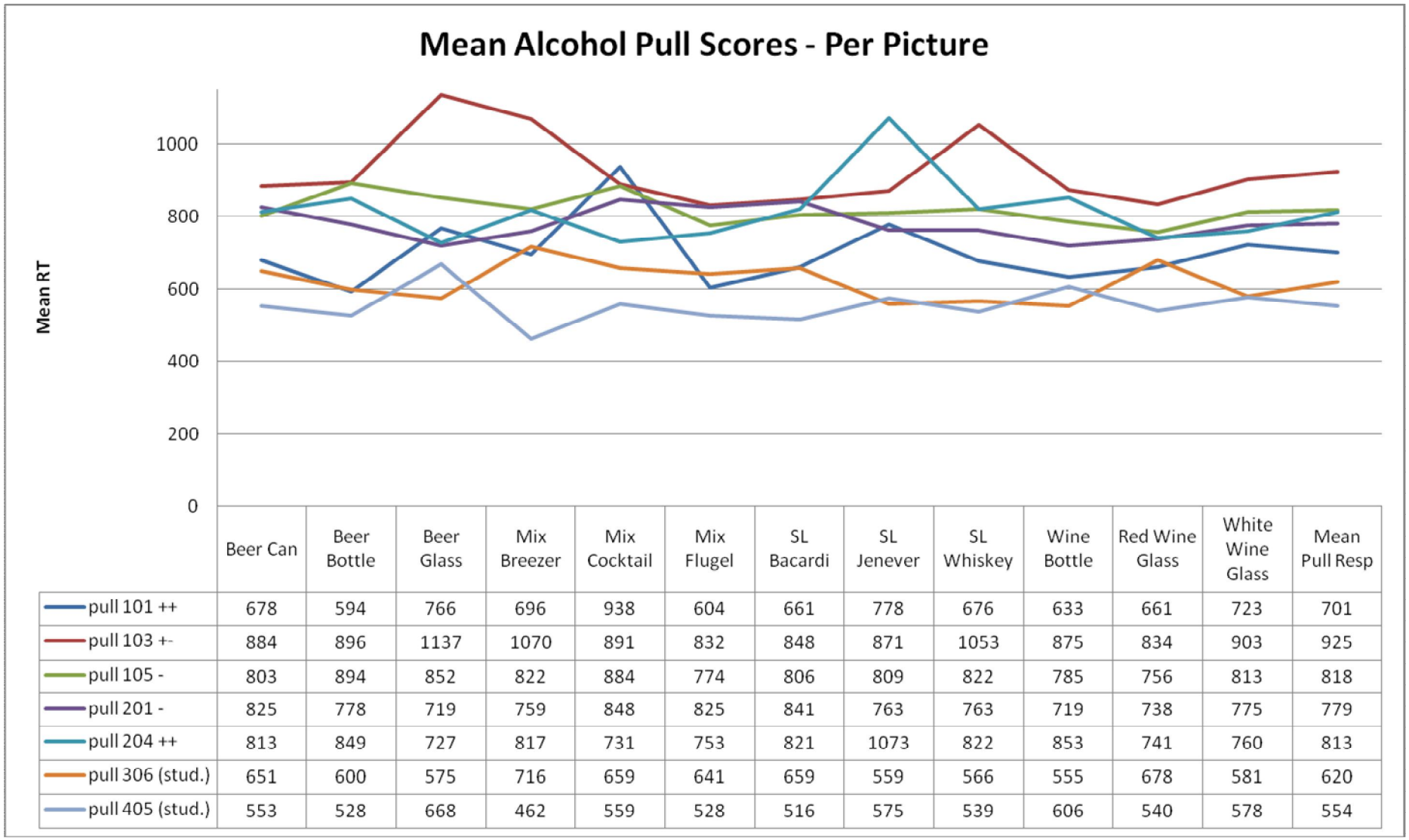

1200
1000
800
600
400
200
0
Beer Can
Beer Bottle
Beer Glass
Mix Breezer
Mix Cocktail
Mix Flugel
SL Bacardi
SL Jenever
SL Whiskey
Wine Bottle
Red Wine Glass
White Wine Glass
7-up
Apple Juice
Cassis
Cola
Cola Zero
Dubbelfris
Dubbelfris Small
Green Tea
Schweppes
Orange Juice
Sprite
Water
pull 405 (stud.)
push 405 (stud.)

Appendix VIII - Figures



	Beer Can	Beer Bottle	Beer Glass	Mix Breezer	Mix Cocktail	Mix Flugel	SL Bacardi	SL Jenever	SL Whiskey	Wine Bottle	Red Wine Glass	White Wine Glass	Mean Resp Push
push 101 ++	740	570	622	739	653	653	742	659	664	707	724	566	670
push 103 +-	949	943	906	1012	801	1028	885	809	1078	903	840	750	909
push 105 -	949	909	847	887	859	916	867	824	848	801	891	891	874
push 201 -	787	760	738	773	806	810	828	745	844	728	789	759	781
push 204 ++	653	668	659	578	697	688	539	659	641	693	634	578	641
push 306 (stud.)	594	510	695	650	519	575	541	559	650	731	538	566	594
push 405 (stud.)	688	631	594	570	573	641	584	525	569	540	491	513	577

Appendix IX – Figures



	Beer Can	Beer Bottle	Beer Glass	Mix Breezer	Mix Cocktail	Mix Flugel	SL Bacardi	SL Jenever	SL Whiskey	Wine Bottle	Red Wine Glass	White Wine Glass	Mean Pull Resp
pull 101 ++	678	594	766	696	938	604	661	778	676	633	661	723	701
pull 103 +-	884	896	1137	1070	891	832	848	871	1053	875	834	903	925
pull 105 -	803	894	852	822	884	774	806	809	822	785	756	813	818
pull 201 -	825	778	719	759	848	825	841	763	763	719	738	775	779
pull 204 ++	813	849	727	817	731	753	821	1073	822	853	741	760	813
pull 306 (stud.)	651	600	575	716	659	641	659	559	566	555	678	581	620
pull 405 (stud.)	553	528	668	462	559	528	516	575	539	606	540	578	554