



A clustered randomized controlled trial for the prevention of alcohol misuse among Maltese teenagers

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This study was designed to evaluate the effectiveness of a brief Alcohol Expectancy Challenge, with the aim of reducing the prevalence of alcohol consumption amongst Maltese teenagers. 119 students were randomly allocated to a control or a 3-hour expectancy challenge session. Alcohol consumption and alcohol expectancies were investigated via a self-report questionnaire delivered at baseline, immediately after the intervention and at 4 months follow-up. Despite significant differences in alcohol expectancy scores at the post-intervention, no significant reductions in alcohol consumption were observed in the experimental group. On the other hand, a significant increase in alcohol consumption was observed in the control group at post-intervention. This study failed to support the effectiveness of alcohol expectancy challenge (AEC) to curb alcohol misuse, but it is still possible that AEC may help prevent the increase of alcohol consumption. Possibly, the teaching of alcohol refusal skills and educational efforts to help dispel prevalent misconceptions related to alcohol expectancies amongst both parents and students can yield more effective long-term outcomes. Targeting school children from an earlier age might also be needed since alcohol expectancies are often formed in childhood.

Keywords: alcohol, adolescents, prevention, Alcohol Expectancy Challenge, brief intervention

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Introduction

Alcohol is a popular drug of choice amongst most youths. Drinking from an early age can have serious social implications including unwanted pregnancy, aggression, low school grades and drop-outs, suicidal attempts,

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traffic-related deaths and date rape (Hingson, Heeren, Winter, & Wechsler, 2005; Hingson, Zha & Weitzmann, 2009). Adolescents who start drinking from an early age have a higher risk of developing alcohol problems later on in life (Geels et al, 2013). Frequent episodes of binge drinking can also cause a number of health concerns including memory problems, sexually transmitted diseases, cancer, depression, and permanent damage to brain structures (Cao, Willett, Rimm, Stampfer & Giovannucci, 2015; Shield, Parry & Rehm, 2014).

Teenage alcohol consumption is an alarming yet common practice in Malta. According to the latest European School Survey on Alcohol and other Drugs (ESPAD) (Arpa, 2015) alcohol is a popular substance among Maltese teenagers, with alcohol use and heavy episodic drinking in the past 30 days being higher than the EU average. The prevalence of alcohol consumption seems higher amongst boys. Overall, the survey reveals that alcohol consumption for both genders is higher than the EU average, despite the legal drinking age in Malta being 17 years.

Various studies have investigated the efficacy of interventions aimed to reduce alcohol consumption amongst teenagers. Schools are a viable setting to target unhealthy behaviours, offering the advantage of external and ecological validity (Winters, Leitten, Wagner & Tevway, 2007). School-based programs can be helpful in preventing the onset of drinking problems. They also offer diverse advantages including the elimination of transport problems or other difficulties revolving round the scheduling of appointments. Popular school-based programs include the European Drug Abuse Prevention Study (EU-DAP) (Caria et al, 2011) and Botvin's (1985) Life Skills Training Program. Programs incorporating high refusal self-efficacy skills are associated with increased abstinence from alcohol (Foster, Yeung & Neighbors, 2014). It seems that interventions focusing on low-risk drinking yield better outcomes than those aiming for total abstinence (Hawkins, Catalano and Arthur, 2002). A zero-tolerance approach is unlikely to be effective and may increase drinking patterns due to feelings of rebelliousness in adolescents (Marlatt & Witkiewitx, 2002).

Existing research has contributed to a wealth of knowledge for preventing substance misuse. A recent systematic review reveals that psycho-social programs are effective in reducing drunkenness and binge drinking among young people (Foxcroft & Tsertsvadze, 2011). A main drawback of some interventions is the length of programs. Although schools are ideal for delivering timely interventions, timetable restrictions, ongoing school activities, holidays and over-loaded syllabi often render the delivery of such programs difficult. Apart from that, universal preventive programs are unlikely to be effective since they fail to

incorporate the social and cultural elements that play a crucial role in behaviour modification (Bandura, 1977). An ideal intervention is one that can be delivered in the minimum amount of time whilst targeting the needs of the given population.

A promising approach that can easily incorporate a cultural framework is the one based on Expectancy Theory, a derivative of Social Cognition Theory (Bandura, 1986). It is based on the notion that individuals develop 'if...then' relations or anticipatory perceived outcomes when engaging in particular behaviours. These expectancies are likely to influence the occurrence of a behaviour. Thus, individuals holding the expectancy that alcohol will make them more sociable are more likely to consume alcohol than those holding negative expectancies. Expectancies develop through acculturation and social learning. Alcohol expectancies (AE) can strongly influence not only the initiation but also the maintenance of drinking behaviour (Christiansen, Goldman & Inn, 1982). They often act as self-fulfilling prophecies and are often maintained in such a way as to have a reinforcing effect on behaviour.

The attempt to modify AE and reduce alcohol consumption is best illustrated by Darkes and Goldman's (1998) Alcohol Expectancy Challenge (AEC) where significant reductions in alcohol consumption and positive AE were observed at post-intervention. Although AE are often formed in childhood, they can predict adolescent drinking patterns. Expectancies are usually formed by observing others or from other sources in the surrounding environment. The media plays an important role in the formation of expectancies. Exposure to alcohol-related adverts seems to increase the risk of underage drinking and positive AE (DeBenedittis & Borjesson Holman, 2011). A prevention program based on a single AEC session in a primary school setting using a no-alcohol modified version revealed promising findings in terms of altering children's positive AE (Cruz & Dunn, 2003). Significant reductions in alcohol consumption amongst high-school students were observed in another study (Cruz & Dunn, 2005). It seems that challenging and modifying expectancies is likely to change drinking patterns (DeBenedittis, 2011). Interventions aimed to reduce alcohol consumption do not have to be lengthy to be effective. This is especially true of individuals who do not have severe drinking problems (Winters et al, 2007).

This study

Although AEC programs are widespread, few trials have been conducted with adolescents. It is possible that younger adolescents who have less experience with alcohol are more likely to benefit from such programs.

This research aims to examine the effectiveness of a brief school-based AEC program, with the aim of reducing alcohol consumption amongst secondary school students. It is the first AE study to recruit Maltese teenagers. Given the prevalent and permissive attitude towards alcohol consumption in Malta, a harm-reduction rather than a total-abstinence approach was adopted. Although the intervention was designed to incorporate culturally-sensitive criteria, it is based on trials that have been tested on multi-ethnic participants. This should allow for better generalization of results across adolescents from different populations.

The Health Belief Model (HBM) (Becker & Rosenstock, 1984) has been applied to a range of health behaviours. According to this model, the perceived severity of a health problem and susceptibility to developing particular health concerns influence the individual's decision to engage in health-related behaviours. When the perceived benefits for taking preventive action outweigh the costs, the behaviour is likely to be reinforced. This study will incorporate constructs from the HBM in an attempt to enhance the efficacy of the intervention and to raise awareness of the health hazards of alcohol abuse.

Based on the literature reviewed above, the three main hypotheses guiding the analysis were:

1. Participants with higher AE scores are more likely to consume alcohol than those with lower scores at pre-intervention.
2. Participants in the intervention group will exhibit lower levels of alcohol consumption at 4 months post-intervention than the control group.
3. The intervention group will show decreased AE at 4 months post-intervention when compared to the control group.

Method

Participants

Based on statistical power calculations for the detection of a medium effect size with a desired power level of 0.80 and a probability level of 0.05 (Scott-Sheldon et al, 2012), a total of 129 participants were needed for this study. Out of 175 students approached, 56 were lost for diverse reasons including being absent from school at some point throughout the delivery of intervention, failure to fill in the questionnaires correctly and failure to hand in the signed consent form. This resulted in a total of 119 participants. Eligibility criteria included: a) participants aged between 14 and 16 b) parental and informed consent c) proficiency in the

English language. Exclusion criteria were: a) insufficient mental capacity to understand and provide informed consent. This was assessed via information obtained from school professionals. Demographics of study participants are provided in Table I.

Table I: Demographic details of participants

Variable	Intervention	Control
Gender		
Male (N= 71, 60%)	29	42
Female (N = 48, 40%)	24	24
Age		
Mean	14.32	14.28
SD	0.471	0.456
Ethnicity		
Maltese (N = 118, 99%)	53	65
Other white background (N = 1, 1%)	1	0

Procedure

The research was approved by City University Senate Research Ethics Committee and by the Directorate for Quality and Standards in Education, Education Division Malta. Participants were treated according to the British Psychological Society (BPS, 2009) ethical guidelines. Participants' consent was obtained and baseline questionnaires were completed. Personalized codes given to participants were used to match data from subsequent questionnaires and maintain confidentiality. Participants were randomly allocated to AEC group (AEC-G) or information only-control group (IO-G). Follow-up assessments were conducted at post-intervention. No inducement was offered.

Study Design

Due to school setting restrictions, the random allocation of individual participants was not possible. This would have caused major disruption to time-tabled lessons and other school activities. Conclusively, a cluster randomized controlled trial methodology was used and classes were randomly assigned to experimental or

control condition. The manual method of drawing lots was used to achieve random allocation. A between-participants experimental design was employed throughout.

Measures

Demographics. Assessed demographics included gender, class/form, date of birth, age and ethnicity.

Alcohol use. This was assessed via the Alcohol Timeline Follow Back Calendar Method (TLFB) (Sobell & Sobell, 1992). It has a high test-retest reliability across multiple populations with participants of both genders and of varying drinking patterns, providing a good estimate of alcohol drinking traits. The TLFB was completed prior to the intervention, at 1 month and 4 months follow-up. For the analysis presented here, the number of drinks consumed in the past 30 days was calculated. To aid recall, students were asked to identify personal marker days such as any special occasions on their calendars where they might have consumed alcohol. A chart showing the typical number of units contained in different drinks was hung in the classroom to ensure accurate understanding of units of alcohol.

Alcohol Expectancies. The adolescent version of the standardized Alcohol Expectancy Questionnaire (AEQ-A) (Brown, Christiansen & Goldman, 1987) was used. Items are appropriate for adolescents between 12 and 19 years of age. The scale can be used in preventive efforts to reduce risks of addiction with adolescents who may or may not have any experience with alcohol. It can also be used to identify factors involved in the persistence of drinking problems. The AEQ-A is divided into different sub-scales designed to measure different positive and negative expectancies individuals may have about drinking. The original 90-item AEQ questionnaire is too lengthy to maintain adolescents' attention (Aas, 1993; Webb, Baer, Caid, McKelvey & Converse, 1992). Moreover, a 7-factor scale is too complex for adolescent participants, thereby failing to assess cognitive configurations of AE among this target group (Randolph, Gerend & Miller, 2006). Research reveals that enhancement in social behaviour is a major determinant of adolescent drinking patterns (Christiansen, Goldman & Inn, 1982). It seems that positive expectancies are strong predictors of future intentions to drink whilst negative ones are not (Zamboanga, Ham, Van Tyne & Pole, 2011). They are the most studied since the immediately perceived positive consequences of alcohol consumption are more likely to influence behaviour than long-term repercussions. Apart from that, they are also easier to access from memory than negative ones (Rohsenow, 1983; Stacy, Widaman & Marlatt, 1990).

Positive expectancies formed during adolescence are useful in predicting alcohol consumption in adulthood (Patrick, Wray-Lake, Finlay & Maggs, 2010). Manipulating social positive expectancies is more likely to yield effective outcomes with younger drinkers whereas manipulation of negative ones is more suited for older and more experienced drinkers (Leigh & Stacy, 2004). Webb et al (1992) found that negative expectancies as measured by some of the AEQ-A scales were not related to alcohol consumptions amongst adolescents. Due to reasons highlighted above and other school restrictions, only 4 sub-scales related to enhanced positive expectancies were used and scales focusing on negative expectancies were excluded. These included: Scale 2: *Enhanced or impeded social behaviour*, Scale 3: *Enhanced cognitive and motor abilities*, Scale 6: *Enhanced arousal* and Scale 7: *Enhanced relaxation and tension reduction*. The AEQ-A was completed at baseline, immediately after the intervention and at 4 months follow-up.

Scales in the AEQ-A are scored using a unit weight system (Brown, Christiansen & Goldman, 1987). A subject's score on a particular scale is the number of statements on that scale to which s/he responds true. Scores ranged for each sub-scale since scales varied in the number of items. Scale 3 scales were generated by counting the number of points scored on the scale, with the maximum number of points being 17. Higher scores reflect the belief that alcohol enhances cognitive and motor abilities. Scores for this scale ranged between 2 and 13. The same was true for Scale 6, with the possible maximum score being 4, where higher scores indicate increased arousal expectancies as a result of alcohol consumption. Scores for this scale ranged between 0 and 3. On the other hand, the maximum score for Scale 7 was 13. Higher scores encompass the belief that alcohol induces relaxation and reduces tension. For this scale, scores ranged between 0 and 11. As a bi-directional scale, Scale 2 was the only exception to this scoring scheme. On this scale, replying *True* to the positive items earns a point on the scale, while replying *False* to the negative items also earns a point on the scale. The maximum score that could be obtained for this scale was 17. Higher scores indicate a stronger belief in enhanced social behaviour expectancies. Scores for this participant group ranged between 0 and 12.

Intervention

The intervention followed a format similar to that of other trials (e.g. Musher-Eizenman & Kulick, 2003) but with some modifications. The program consisted of three 45-minute sessions delivered in a group format. Number of students in each group ranged from 8 to a maximum of 28 pupils.

AEC-G: Participants were asked to generate lists of the 'good' and 'not-so-good things' about drinking alcohol. The concept of expectancies was introduced. A group discussion on the role of expectancies in drinking behaviour followed. A presentation with information about health hazards of teenage drinking was shown. Assertiveness tips were provided and healthier ways of spending time in Malta were discussed.

IO-G: Participants in the control group received information about the hazards of alcohol abuse. Apart from that, no additional advice or material was provided.

Person delivering intervention & setting: Sessions were delivered in a school setting by a health psychology doctorate student with 2 years of experience in the field of addiction. Supervision by a psychotherapist with a doctoral degree in supervision was in place.

Analysis

Data were subject to statistical analysis using the Statistical Package for Social Sciences (SPSS) version 19. Score distributions were investigated using histograms to assess the skewness and peakedness of each distribution compared to the normal curve. Moreover the Shapiro Wilk test was used to determine whether this normality assumption is satisfied. The test yielded p-values less than the 0.05 level of significance indicating that each score distribution was skewed and did not satisfy the normality assumption. For this reason non-parametric tests were used throughout. In all statistical tests, a 0.05 level of significance was adopted, where statistical significance was attained when p-values were less than the 0.05 criterion.

Results

Relationship between AE and alcohol consumption. Results of Spearman's rho correlation coefficient (R) revealed a statistically significant relationship between Scale 2 AE scores and alcohol consumption at pre-intervention ($R = 0.47$, $N = 118$, $p < 0.001$). The hypothesis that enhanced social behaviour expectancies are associated with increased alcohol consumption was supported. Spearman's rho also revealed a statistically significant relationship between Scale 3 AE scores ($r = 0.19$, $N = 118$, $p = 0.02$) and Scale 7 AE scores ($R = 0.17$, $N = 118$, $p = 0.03$). The hypotheses that alcohol consumption is associated with expectancies revolving enhanced cognitive/motor abilities and enhanced relaxation/tension reduction were supported. On the other hand, no statistically significant relationship was observed between alcohol consumption and Scale 6 AE

scores ($R = 0.144$, $N = 118$, $p = 0.06$). Conclusively, the hypothesis that alcohol consumption results in enhanced arousal was not supported.

Group differences in alcohol consumption. Histograms for the two conditions were inspected separately. Since data was skewed, the most appropriate statistical test to compare differences in alcohol consumption between the experimental and control groups was the Mann Whitney. The effect size (r) is a quantitative measure based on the 'standardised mean difference' between these two groups.

One month pre-intervention. Statistical analysis revealed that at one month pre-intervention, the amount of alcohol consumed by the intervention group ($Mdn = 7$) did not differ significantly from that of the control group ($Mdn = 4$), $U = 1567$, $p = 0.20$, $r = 0.80$.

One month, two months & 4 months post-intervention. No significant differences in alcohol consumption were observed at 1 month post-intervention between the intervention ($Mdn = 1$) and the control group ($Mdn = 3$), $U = 1558$, $p = 0.18$, $r = 0.09$. Similarly, no significant differences in alcohol consumption were observed at 2 months follow-up between the experimental ($Mdn = 5.0$) and the control group ($Mdn = 4.5$), $U = 1708$, $p = 0.41$, $r = 0.02$. Finally, no significant differences in alcohol consumption were observed at 4 month post-intervention period between the intervention ($Mdn = 5.5$) and the control group ($Mdn = 6.0$), $U = 1313$, $p = 0.26$, $r = 0.06$. The hypothesis that the intervention would result in significant reductions in alcohol consumption was not supported.

Group differences in alcohol expectancies (AE). Given the fact that the data was not normally distributed, the Mann Whitney was the most appropriate test to compare median differences between the two groups at different time intervals. The effect size (r) is a quantitative measure based on the 'standardised mean difference' between these two groups.

One month pre-intervention. Statistical analysis failed to reveal any significant differences in Scale 2 AE scores between the intervention ($Mdn = 8$) and the control group ($Mdn = 8$), $U = 1655$, $p = 0.30$, $r = 0.05$. No significant differences in Scale 3 AE scores were observed between the intervention ($Mdn = 1$) and the control group ($Mdn = 2$), $U = 1458$, $p = 0.06$, $r = 0.15$. The same was true for Scale 6 AE scores, where no differences between the intervention ($Mdn = 2$) and control ($Mdn = 2$) were observed, $U = 1695$, $p = 0.38$, $r = 0.03$. Finally, Scale 7 AE scores did not differ either, with no significant differences observed between the intervention ($Mdn = 9$) and control groups ($Mdn = 9$), $U = 1651$, $p = 0.29$, $r = 0.05$. This means that participants in the two groups were drawn from the same population.

Immediately after the intervention. Statistical analysis revealed a significant difference in Scale 2 AE scores in the intervention group ($Mdn = 6$) when compared to the control group ($Mdn = 8.5$), $U = 1013$, $p < 0.001$, $r = 0.40$. A significant difference in Scale 3 AE scores was also observed between the intervention ($Mdn = 2$) and the control group ($Mdn = 3$), $U = 1264$, $p = 0.004$, $r = 0.02$. Scale 7 AE scores also revealed significant difference between the intervention ($Mdn = 7$) and control group ($Mdn = 9$), $U = 1106$, $p < 0.001$, $r = 0.32$. Thus, group differences in AE scores for Scales 2, 3 and 7 were not due to sampling error but to differences between the two populations. On the other hand, Scale 6 AE scores did not reveal any significant differences between the intervention ($Mdn = 2$) and control ($Mdn = 3$), $U = 1544$, $p = 0.13$, $r = 0.11$. Thus, the intervention was not effective in modifying Scale 6 AE scores. On the other hand, the hypothesis that the intervention group would exhibit lower AE scores than the control was partly supported.

4 months post-intervention. Significant differences in Scale 2 AE scores between the intervention ($Mdn = 7$) compared to the control group ($Mdn = 8$) were observed, $U = 1123$, $p = 0.03$, $r = 0.18$. On a similar note, a significant difference in Scale 3 AE scores was observed between the intervention ($Mdn = 1$) and the control group ($Mdn = 4$), $U = 876$, $p < 0.001$, $r = 0.32$. The same was true for Scale 7 AE scores where significant differences between the intervention ($Mdn = 7$) and control groups ($Mdn = 9$) were evident, $U = 1042$, $p = 0.01$, $r = 0.21$. Thus, group differences in Scales 2, 3 and 7 AE scores were not due to sampling error. On the other hand, Scale 6 AE scores did not reveal any significant differences between the intervention ($Mdn = 2$) and control ($Mdn = 2$), $U = 1199$, $p = 0.11$, $r = 0.12$. On the other hand, the hypothesis that the intervention group would exhibit lower AE scores than the control was partly supported.

Group differences in alcohol consumption across time. Given the fact that data was skewed, the most appropriate test to use was the Wilcoxon Signed Ranks Test. The effect size (r) is a quantitative measure based on the 'standardised mean difference' between the pre- and post-intervention groups.

Alcohol consumption in the intervention group. A significant reduction in alcohol consumption was observed at 1 month post-intervention ($Mdn = 2$) period compared to the pre-intervention period ($Mdn = 7$), $T = 29$, $p < 0.001$, $r = 0.40$. Similarly, a significant reduction in alcohol consumption was observed at 2 months post-intervention ($Mdn = 5$) period compared to the pre-intervention period ($Mdn = 7$), $T = 23$, $p = 0.02$, $r = 0.20$. Nonetheless, no significant differences in alcohol consumption were observed at 4 months post intervention ($Mdn = 5.5$) compared to prior the intervention ($Mdn = 7$), $T = 13$, $p = 0.18$, $r = 0.09$.

Alcohol consumption in the control group. No significant differences in alcohol consumption were observed for the control group at 1 month post-intervention ($Mdn = 3$) period compared to the time prior to the intervention ($Mdn = 4$), $T = 25$, $p = 0.07$, $r = 0.13$. Similarly, no significant difference in alcohol consumption was observed at 2 months post-intervention ($Mdn = 4.5$) compared to the pre-intervention period ($Mdn = 4$), $T = 21$, $p = 0.40$, $r = 0.02$. On the other hand, the control group significantly consumed more alcohol at a 4 month post-intervention ($Mdn = 6$) period compared to the pre-intervention period ($Mdn = 4$), $T = 16$, $p = 0.02$, $r = 0.20$. It therefore seems that the intervention may have prevented an increase in alcohol consumption at 4 months follow-up period in the group that had been exposed to the AE challenge.

Discussion

AE are learned associations between the consumption of alcohol and the expected outcomes of drinking. These associations seem to form at a very early age before the individual starts experimenting with alcohol (Dunn & Goldman, 2000). AEC aim to challenge expectancies individuals may have about alcohol. Rather than erasing former expectancies, it is hoped that introducing new information about the negative effects of alcohol may compete with pre-existing positive expectations individuals may have, thereby reducing the person's drinking patterns (Goldman, 1999). The aim of this study was to prevent the early onset of alcohol use and problem drinking.

Results from this research reveal that overall, Maltese adolescents seem to endorse positive expectancies in relation to alcohol consumption. This is especially true when it comes to enhanced social behaviour and enhanced cognitive/motor abilities. Alcohol consumption also seems to be associated with tension reduction and increased feelings of relaxation. Such findings are consistent with those reported by Christiansen, Goldman & Inn (1982) whereby high AE scores were also found to be related to increased alcohol consumption. Nevertheless, the significant association between alcohol expectancies and alcohol consumption observed was not a strong one. Thus, apart from expectancies, other variables seem to influence the uptake of alcohol. Dahlgren and Whitehead's Social Model of Health (1991) may help explain these findings. The model holds that individual, social and environmental factors are interconnected in such a way to play a crucial role in health and illness. Factors influencing the initiation of substance misuse include genetic predispositions, boredom, a desire for experimentation, stress, lack of parental supervision, family conflict, incomplete brain development that influences the individual's ability to take decisions and judge of

the outcome of one's behaviour and accessibility to substances (Velazquez, 2015). The latter is especially true in a country such as Malta where alcohol is easily accessible from pubs, supermarkets, coffee shops and other venues of entertainment. Moreover, despite legal restrictions forbidding the selling of alcoholic beverages to minors, the Maltese law is not strictly enforced.

Results also reveal that Maltese adolescents do not seem to associate alcohol consumption with enhanced arousal or the ability to stand up to others, with feeling stronger and more powerful. It is possible that the Maltese cultural milieu does not promote this kind of expectancy. It is worth noting that approximately 50% of participants had not consumed alcohol at 3 months pre-intervention. Conclusively, it is possible that these participants have less experience about the effects of the substance. Nonetheless, expectancies are not set in stone. A shift from negative to positive expectancies is possible once adolescents start drinking (Aas, Leigh, Anderssen & Jakobsen, 1998). This also means that drinking patterns may change with time.

Despite documented evidence favouring the effectiveness of AE challenges (e.g. Cruz & Dunn, 2005; Darkes & Goldman, 1998), the reduction in alcohol consumption observed at 2 months post-intervention was not maintained over time. Similar results were reported in other studies (Corbin, McNair & Carter, 2001; Wiers & Kummeling, 2004). These findings cannot be attributed to low power since the sample was large enough to detect significant changes in both variables under investigation. Several factors may contribute to these findings. For instance, it is possible that since half of the students did not seem to have a lot of experience with alcohol, they were less likely to have experienced some of the unpleasant immediate negative effects of drinking (e.g. hang-over, inability to concentrate). This could have decreased their motivation to modify existing drinking patterns. On the other hand, some participants claimed to having had more than 20 drinks a month at the pre-intervention period, with a small percentage consuming more than 40 drinks. It is possible that their drinking habits had become so ingrained that they had developed tolerance to the substance. As a result, they were less likely to perceive themselves as having problems with their drinking.

It is worth pointing out two factors that may have influenced the statistical data. First, some male participants claimed that they had not been out with friends for few weeks prior to the start of the intervention due to hunting season. Hunting remains a popular recreational activity amongst the Maltese. Secondly, the intervention was done a few weeks prior to Easter, a time where teens are more likely to engage in alcohol drinking. These factors could have skewed the data in such a way that the amount of alcohol consumed at pre

and post-intervention periods may not necessarily be a true reflection of the amount habitually consumed by participants.

Other factors could have contributed to the lack of reduction in alcohol consumption. For instance, stress has been identified as a major culprit for alcohol abuse amongst Maltese adolescents (Fenech, 2012). The strong social acceptance of alcohol may undermine school-based messages and interventions aimed to moderate its consumption (Foxcroft, Ireland, Lister-Sharp, Lowe & Breen, 2002). Children in Malta are exposed to alcohol quite early in their lives (Borg Ellul, 2008). The availability of alcohol at social gatherings such as village feasts, carnival celebrations, football matches, baptisms and other family reunions is the norm in Malta. Since alcohol is so much ingrained in Maltese culture, young people may find it difficult to understand the potential dangers of alcohol consumption. Thus, teens are being bombarded with mixed messages. Educational efforts aimed to deter problematic alcohol abuse could be a cause of confusion, especially if parents also drink. Changing alcohol consumption trends among teens requires an overall change in the cultural mentality of Maltese people, something which is not easy to modify.

Despite the lack of significant reductions in alcohol consumption in the intervention group, the significant increase in alcohol consumption at the post-intervention period in the control is interesting. It seems that the intervention could have prevented an increase in alcohol consumption in the group exposed to the AE challenge. Summer recess and other logistics did not make it possible to assess alcohol consumption at longer follow-up periods, something worthy of further investigation. It is also possible that more intensive interventions may be required with individuals who have more experience with alcohol. Since some students had already started experimenting with alcohol prior to the study, delivering AEC with younger students might yield promising results.

Findings from this study also seem to indicate that challenges of AE may not be enough to reduce alcohol consumption in youths. Individuals possessing higher drinking refusal self-efficacy skills (DRSE) are less likely to consume alcohol than those who do not (Foster, Yeung & Neighbors, 2014). Drinking refusal self-efficacy is more salient cognitive construct than AE and building these skills may be more effective than the mere challenging of AE (Connor et al, 2011). Incorporating the training of refusal skills and strengthening decision-making one can enhance the efficacy of prevention programs (Botvin, 2000). Individuals with low DRSE skills may benefit from interventions aimed to help them limit their intake of alcohol and slow the

speed of drinking, thereby reducing the impact of health hazards (Ehret, Ghaidarov & LaBrie, 2013). Parental monitoring may boost drinking refusal skills in adolescents (Watkins, Howard-Barr, Moore et al., 2006).

Active involvement from behalf of parents is an important part of preventive programs (Winters et al, 2007). Educational efforts to reinforce the important role that parents play in setting good examples by drinking in moderation and honest discussions about alcohol is important in shaping teen's attitudes towards alcohol consumption and in establishing safe limits of drinking (Jacob & Johnson, 1997). Conclusively, the delivery of parental educational programs in conjunction with adolescent interventions may maximize the effectiveness of preventive efforts.

The effectiveness of local health promotion messages aimed to raise awareness of the health hazards of excessive alcohol consumption amongst youths are worth investigating. Enforcing legal restrictions on the selling of alcoholic beverages to minors may partly help to curb the problem of binge drinking. Given Malta's small size and limited venues of entertainment for youths, activities encouraging healthier ways of spending time in Malta should be incorporated alongside educational programs.

Strengths and Limitations

This research adopts a clustered randomized controlled design which does not only allow the direct effects of the intervention to be evaluated but which also increases ecological validity. Another strength of this research is the use of a large sample that could have allowed the detection of an effect. The adequate follow-up period helped to determine a detailed assessment of long-term change in drinking behaviour and alcohol expectancies amongst study participants. Loss to follow-up was 16% which is considered as an acceptable attrition rate for evidence-based studies (Fewtrell et al, 2008).

As with other quantitative studies, this research has a number of limitations. It was not always possible to distribute questionnaires at the desired follow-up periods, mostly due to restrictions imposed by the school setting. Moreover, although sessions with the experimental group were conducted in the same week, the consecutive delivery of sessions on the same day was not possible as this would have caused major disruption to lessons. This means that the intervention may have lost some of its effectiveness. It would also have been ideal to repeat post-interventions measures at a longer follow-up period. Another limitation concerns the fact that control and intervention groups varied in size, with some groups having more

participants than others. Larger groups generated more discussion than smaller ones and this could have influenced the effectiveness of the intervention.

Although self-report measures are important research tools, participants may not always be honest in their replies (Catania, Gibson, Chitwood & Coates, 1990). Self-report tools are subject to social desirability bias (Cecil & Pinkerton, 1998). Although confidentiality was ensured, students may have felt uncomfortable disclosing certain information. During the process of data collection, a good number of participants wanted repeated reassurance that parents would not have access to the data collected. Boredom by the length of questionnaires could also have influenced participants' replies. Finally, although students were requested to complete questionnaires alone, one cannot exclude they could have worked in pairs.

Conclusion and future directions

Despite these limitations, some future directions have been identified. First, the intervention group exhibited lower levels of alcohol consumption at post-intervention. Although interventions do not necessarily have to be lengthy to be effective, experimentation with alcohol from an early age seems to have an impact on the effectiveness of AE challenges. It would be interesting to investigate whether a brief refresher or booster session at the post-intervention period would have made any difference in alcohol consumption and to conduct longer follow-up periods. Future research could also investigate whether programs and AEC incorporating parental involvement and the teaching of parenting skills could enhance the effectiveness of AEC. Good communication and family support have been found to reduce alcohol avoidance (Borg Costanzi, 2013).

Since alcohol consumption is deeply rooted in Maltese culture, educational efforts to help dispel common myths regarding the harmless nature of alcohol need to include both parents and students. These may be combined with extra-curricular family and community activities encouraging healthier ways of spending time. Future studies could also examine other ways of boosting DRSE skills in students, possibly via the use of role-plays where the skills to be mastered can be practiced. The incorporation of motivational approaches in combination with AEC is another area that merits further investigation and may enhance the effectiveness of the intervention.

Differences in health have a social origin (Whitehead, Dahlgren & Gilson, 2001). Certain factors may increase the risks of addiction including family history, psychological problems, lack of family involvement,

peer pressure and economic deprivation (Buu et al., 2009; Zucker, Donovan, Masten, Mattson & Moss, 2008). While it is not always possible to minimize risk factors, increasing protective factors may counteract risks. Delivering brief interventions in schools can help reduce health inequalities. This is especially true given the fact that the students attending local government schools in Malta come from diverse backgrounds. Finally, it is worth investigating whether AEC involving primary school students would delay the onset of early drinking behaviour.

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