

# Risk factors for adolescents developing substance use disorders; what should our prevention programs be targeting?

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## Abstract

This review identifies the main risk factors and high-risk groups of adolescents with substance use disorders (SUD). Furthermore, it presents the epidemiological data on SUDs in Malta and discusses possible ways of tackling prevention, whilst offering suggestions based seminal studies from published literature to service developers.

Adolescence is a developmental period of high risk, more than half individuals with SUDs identify that the problem began before the age of 20. 18% of adolescents in Europe have reported a lifetime use of illicit drugs, the prevalence rates in Malta are similar.

Risk factors for SUDs include; heritable factors; familial patterns and psychiatric disorders. Environmental factors include; family functioning, parenting practices, child maltreatment, peer influences, substance availability and consumption opportunities. One predictive phenotype for SUDs is psychological dysregulation characterised by cognitive, behavioural and emotional difficulties with daily challenges in childhood. The regular use of substances is associated with depression, anxiety, PTSD, behaviour problems. Highest risk groups as those having two parents with a SUD, living with single parents, sexual orientation differences, early use of substances, psychological dysregulation and an attitude of ambivalence towards the use of substances. Over 70% of adolescents receiving treatment for SUD had a history of trauma.

Parental practices such as knowledge, communication and awareness are an important protective factor which may help reduce the influential negative influence from peers on substance use.

Preventive programs should not focus on abstinence alone in treatment, since this is insufficient as adolescents present with; lower problem recognition, higher rates of binge use and co-morbid psychiatric problems compared to adults. Preventative measures should be targeted towards high risk adolescents, with the aim of correcting misperceptions as a primary focus. Honesty from professionals may reduce the general ambivalence with regards to drug use, thereby reducing the serious influence friends have on each other. Secondly, correcting misconceptions may lead to adolescents changing the assumption that one's friends are all positively predisposed to substance use. It's estimated that for every Euro invested in addiction treatment, 3 to 5 Euros are saved in drug related crime, theft and criminal justice costs.

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**Background*****Epidemiology of Substance use disorders***

The majority (58%) of individuals who develop substance use disorders (SUD) report their drug use began before age 20.<sup>1</sup> Adolescence is the developmental period of highest risk for onset of alcohol and substance use problems.<sup>2</sup> Some experimentation with alcohol may be considered normal within adolescences. However, substance experimentation in adolescence increases the risk of persistent substance use and dependence.<sup>3</sup> Adolescence has been described as "the critical period of addiction vulnerability" because during this period the brain pathways that enable people to experience motivation and rewarding experiences are still developing. During this period adolescents are more prone to risk taking and less prone to impulse control.<sup>4</sup>

In Europe, 18% of school aged children age 15-16 years reported lifetime use of illicit drugs.<sup>5</sup> Amongst young adults age 15 to 34 years, the lifetime prevalence use of cannabis is 32%, cocaine 6%, amphetamines 5%, ecstasy 6%.<sup>4</sup> The National Institute of Drug Abuse 2011 USA survey reported that the trend in daily marijuana use among adolescents has increased to its highest in 30 years with at least 25% of high school seniors using at least once per month.<sup>6</sup> Daily marijuana use has surpassed daily tobacco use, the latter trend is in decline. This raises a public health concern in the light of regular marijuana usage in adolescents showing to be associated with a reduction in 6 to 8 points in adult IQ.<sup>7</sup> Also, of note is that there has been a slight decline in the consumption of alcohol use in adolescents. Of public health significance is that early initiation of substance use is correlated with an increased risk of a constellation of behaviours, such as selling drugs, violence, driving under the influence, physical, sexual and emotional abuse, in addition to the increased risk of developing a substance use disorder (SUD).

The ESPAD 2015<sup>8</sup> reported data on prevalence rates and trends of alcohol and substance misuse in adolescents who were about to turn 16 years, in 25 EU countries. In this survey, data were collected on the whole population of Malta, for children aged 16 years ( $n=3,326$ ), there was a

response rate of 93% and the mean age was 15.7 years. ESPAD 2015 reported that the lifetime risk for alcohol use amongst Maltese adolescence over the past 30 days was 6.6% for males and 7.4% for females, placing the Maltese adolescents amongst the top 5 EU countries for alcohol consumption. The lifetime prevalence in 2015 was 86% however, it was reported that there was an overall slight decrease in trend of alcohol use from 1995. For the Maltese population surveyed, there was a decrease in the trend of cigarette smoking in adolescence with a lifetime prevalence of 29% and for any illicit substance (14%). The only reported drug in Malta with an increased trend was cannabis (13%), placing Malta mid table compared to other EU countries. The use of inhalants (8%) and pills (3%) in Malta was reported to have decreased over the past 20 years. The lifetime prevalence of cocaine was 3% and heroine 1% for adolescents aged 15.7 years in Malta. Lastly the prevalence of internet use was 6.1 days out of 7 days in Malta with most time being spent on social media; this places Malta amongst the top of the EU countries.

It is estimated that 1.5 million adolescents meet criteria for SUD but of these only 111,000 (7%) receive treatment for the disorder<sup>3</sup> possibly due to; poor health care coverage, low motivation from YP or parents, lack of specialised adolescent programs and inconsistent quality in adolescent services. Similar figures are not available for the Maltese population however, the authors are aware that services for adolescents are few and understaffed and under resourced in Malta. Another factor contributing to the unique challenge centred around adolescent drug use pertains to biological factors of the developing brain. The prefrontal cortex is still immature whilst the nucleus accumbens is also still developing. The latter is the centre for thrill seeking and acting impulsively. Therefore this could in part explain the disregard for negative consequences of alcohol and drug use, whilst reinforce the importance of individual tailored therapeutic approaches.<sup>9</sup> It is imperative to take hold in mind the higher rates of impulsivity of adolescents compared to adults when considering tailored made service development.

In this narrative review paper, the authors aim to highlight the identified risk factors and high-risk groups of adolescents for developing SUDs, from the published evidence in seminal papers within the literature. Furthermore, they seek to provide service

developers with an understanding of the more effective preventative models when providing care for this cohort for young people.

**Table 1:** Early onset of substance use: prevalence of students experiencing substance use at the age of 13 or younger (percentage)

	Malta	Average	Range
Cigarettes	13	23	9-47
Daily smoking	3	4	1-10
Alcohol	54	47	14-72
Intoxication	8	8	2-22
Cannabis	3	3	1-13
Ecstasy	1	1	0-2
Amphetamine/methamphetamine	0	1	0-3
Cocaine/crack	0	1	0-2

**Table 2:** Illicit drug use: lifetime prevalence of the use (percentage)

	Malta	Average	Range
Any drug	14	18	6-37
Cannabis	13	16	4-37
Ecstasy	2	2	0-5
Amphetamine	2	2	0-10
Methamphetamine	1	1	0-5
Cocaine	3	2	0-5
Crack	1	1	0-3
LSD/other hallucinogens	1	2	0-5
Heroin	1	1	0-3
GHB (gammahydroxybutyrate)	0	1	0-3

### Adolescents at risk for substance use disorder

Early childhood characteristics can increase the risk of adolescent SUD, thus identifying the characteristics can be important for prevention of

alcohol and substance use. Risk factors for developing a SUD are divided into heritable such as; familial patterns and psychiatric disorders. Environmental factors may include; family functioning, parenting practices, child maltreatment, peer influences, substance availability and consumption opportunities and phenotypic factors.<sup>10</sup> The presence of SUD in a parent has consistently been shown to be a strong risk factor (genetic and environmental) for adolescent alcohol and SUD.<sup>11</sup>

One predictive phenotype is psychological dysregulation for SUDs. Psychological dysfunction is characterised by a deficiency in cognitive, behavioural and emotional difficulties when it comes to addressing daily challenges in childhood. Furthermore, Clark 2004,<sup>12</sup> reported a link between parents with psychological dysregulation and their children as being at increased risk for SUDs. Psychological dysfunction in its more severe form presents itself as conduct disorder, oppositional defiant disorder (ODD), attention deficit hyperactivity disorder (ADHD), depression and later in life; antisocial and borderline personality disorders and is seen as a predictor for higher levels of alcohol use.

Several environmental factors have been identified as having an influence on increasing the risk of onset of SUDs (the timing), whilst genetic factors seem to accelerate the progression from initiation to heavier use. Some of these risk factors include; children maltreatment, traumatic experiences, parental practices and peer influence and these can in turn lead to manifestations of psychological dysregulation such as conduct disorder, ADHD and depression.<sup>13</sup>

### Traumatic events in childhood and development of SUDs.

Childhood traumatic events mimic environments with psychological dysregulation which in turn mediate the body's response to stress through the hypothalamic-pituitary-adrenal (HPA)-axis. Sartor 2007<sup>14</sup> reported in a study involving more than 3,500 female twins, that those who suffered childhood sexual abuse were associated with higher rates of alcohol use and dependence. Kaufman 2007<sup>15</sup> reported in a longitudinal study of 76 maltreated children compared to matched controls that the former were seven times more likely to use alcohol at age 12 (two years earlier

than controls). More than 70% of adolescents receiving treatment for SUD had a history of trauma exposure.<sup>16</sup> Increased shyness, anxiety, depressions, anger were found to be risk factors for initiating use of nicotine, alcohol, marijuana amongst adolescents aged 9-15 years.<sup>17</sup> Childhood trauma was reported to be a risk factor for transition from experimental to regular use. Lastly childhood trauma may increase the risk of relapse however, results were not consistent across studies and seem to be mostly limited to nicotine and alcohol.<sup>18</sup>

### ***The association between mental disorders and substance use disorders***

The association between mental disorders and SUDs has been well established. Adolescence is a risk period for substance use disorders.<sup>2</sup> The regular use of alcohol and substances is associated with depression, anxiety, PTSD, behaviour problems such as conduct disorder and further substance use.<sup>19</sup>

In early to mid-adolescence, the trends for female substance use is similar and sometimes extends the use by males however, by 17 years of age males outpace their female counterparts with respect to heroine, steroids, hallucinogens, marijuana and alcohol use, amphetamine use remains similar.<sup>17</sup>

### ***Substance use in adolescents with mental disorders and gender influences:***

Schwinn 2010<sup>20</sup> in a clinical trial of 400 adolescents, mean age 17.5 years (range 15-20 years) reported that although indices of mental disorders differed by gender, anxiety and depression was more common in females, whilst hostility symptoms of conduct disorder were more common in males. However, there was no evidence of gender being a risk factor on the relationship between mental disorders and past month drinking, binge drinking, cigarette smoking, marijuana use and substance use.<sup>18</sup>

### ***Racial and ethnic differences and SUD***

African-Americans are less influenced by their peers who drank alcohol but more influenced by parental support than Caucasians, which in part explains their different alcohol use patterns. African-American adolescents reported less SUDs than Caucasians while Hispanic adolescents reported more use.<sup>21</sup> Given the sudden increase in

population in Malta, one can no longer consider the population to be homogenous and with increase in heterogeneity within the island, public service commissioners should aim to target their preventive measures towards the higher risk ethnic groups.

### ***Sexual orientation and adolescent substance use***

Several decades of research have shown that there are high rates of SUDs in lesbian, gay and bisexual (LGB) adolescents.<sup>22</sup> However, large gaps still exist in the literature in understanding who is the most vulnerable within the LGB community. Published studies seem to be consistent in the findings that bisexual adolescents are at greater risk for substance misuse. In a meta-analysis of 18 published studies Marshall 2008<sup>23</sup> reported higher rates of SUDs compared to heterosexual adolescents (Odds Ratio=2.89, Cohen's  $d=0.59$ ). The effect size was large to very large with the average Cohen's  $d$  for relationship between sexual orientation and lifetime cigarette use and injection drug were  $>0.80$ . The odds for SUD in the LGB group was found to be on average 190% higher than for heterosexual adolescents and higher within some sub populations; highest females 400% and bisexual adolescents 340%. Furthermore, the gender of the participant was also a significant risk factor (Q16.6,  $d.f=1$ ,  $p<0.0001$ ), females were more at risk for SUDs than their male counterparts.

The most prominent theoretical and explanatory frameworks of the LGB health risk is the 'minority stress' model,<sup>24</sup> which proposes that LBG adolescents suffer from more harassment, maltreatment, discrimination and violence compared to their peers. For most LGB adolescents in addition to developing a healthy gay identity they may be faced with stress from social stigma and fear of discrimination, therefore they have greater challenges to use coping skills to protect themselves. When considering psychoeducation sessions aimed schools, one needs to be aware of the considerable higher risk of developing SUD adolescents with different sexual orientation face.

### ***Parenting practices***

A longitudinal study<sup>25</sup> reported that low levels of parents monitoring are a significant risk factor for adolescents to develop SUDs. Barnes 2000<sup>26</sup> reported the relationships between parenting practices and SUDs are due to environmental influences such as inadequate parental involvement,

inadequate emotional support behaviours, cognitive dysfunction in parents, psychological disorders and direct modelling of drinking and substance misuse.

Effective parenting is inversely associated with adolescent SUD. Parental knowledge is an important construct that reflects reasonable parent-child communication and relations leading to parental awareness of their adolescents, friends' activities and whereabouts. Studies have reported that parental knowledge is a protective factor against adolescent use of cigarettes, alcohol and marijuana. Girls and younger adolescents experience a higher level of parental knowledge which may in turn protect them from SUD and delinquency overall.<sup>27</sup> Infrequent communication and less time spent together between parent and child has shown to be associated with higher rates of alcohol and tobacco use.<sup>28</sup> Overall the demographics, parenting variables and their interactions explained 12% of variance in smoking scores, 8% of alcohol consumption scores, 10% of aggression scores and 17% of the delinquency scores.<sup>27</sup>

In a survey of school aged children from 11 to 16 years in the USA on data obtained from  $n=8,795$  Wang 2009<sup>21</sup> reported that peer influence had a direct influence on adolescent substance use. Peer influence has consistently shown that it is amongst the strongest predictor of adolescent SUD. Adolescents who associate with substance using peers are more likely to use illicit substances.<sup>29</sup> Therefore, when focusing on developing preventative measures for SUD, one needs not only to address the adolescent but also provide parenting training, since minor changes such as more communication, time spent together and knowledge of who their friends are may drastically diminish the negative influence adolescents suffer in peer pressure.

#### ***Attitude ambivalence and friend norms to SUD***

Of the potential risk factors mentioned on attitude to substance use behaviour, ambivalence is the one which has most evidence. Ambivalence is characterised as a person holding a positive and negative attitude towards an object simultaneously. Priester 2002<sup>30</sup> reported that adolescents who were ambivalent about alcohol consumption and safe sex practices had less attitude-behaviour congruence than participants of low ambivalence. Hohman 2014<sup>31</sup> reported that the higher perceived

behavioural control to resist marijuana use was negatively related to intentions to use marijuana ( $p<0.001$ ). Furthermore, the more friends approved the use of marijuana the stronger was the intention to use substances ( $p<0.001$ ). The more adolescents felt they could refuse marijuana the less likely they were to intend to use the drug in the future. The younger the adolescent the higher was the prevalence who hold negative attitudes to marijuana use, as time passes this change.<sup>32</sup>

Findings from published research suggests two potentially preventable possibilities. The first prevention model suggests that professionals should make use of hard scientific knowledge to facilitate adolescents adopting correct attitudes to SUDs and consequently inform their behaviours. This model reduces ambivalence in adolescents and provides a strong knowledge base for anti-drug attitudes and behaviours. Information that is truthful, credible and not exaggerated or falsified would be more persuasive.<sup>33</sup> The second suggestion is that prevention messages should be designed to attenuate ambivalence, thereby reducing the susceptibility to their peers' influence.<sup>34</sup> Given that published studies report that one of the strongest risk factors to developing SUDs is peer influence, psychoeducation from professionals sharing the honest truth about the pros and cons of substance use, could help reduce the ambivalence adolescents have and reduce the false belief which they may hold that is 'all my peers hold a positive regard to substance use'.

#### ***Effectiveness of treatments for adolescents with SUDs***

Adolescents are more susceptible to peer influence and focused more on immediate concerns. The effectiveness of available treatments for adolescents with SUDs is currently a reason for concern due to the high rates of treatment drop-out and post treatment relapse. Behavioural interventions are considered 'first line' treatment however, medications are often used adjectively to reduce drug cravings, symptoms of withdrawal and to treat co-occurring psychiatric conditions. Lipsey et al conducted a meta-analysis on a variety of treatment modalities that were tested against a control or alternative treatment sample and a consistent pattern emerged that showed an overall positive effect for all treatment modules when compared to controls however, family therapy, CBT

and motivational enhancement therapy/CBT tended to show the best outcomes.<sup>35</sup> Overall CBT and family interventions have been consistently shown to have moderate effects sizes. Moreover, CBT in adolescents ( $d=0.45$ )<sup>36</sup> have consistently shown greater sustained or post-treatment effect size compared to family-based interventions.

For every Euro invested in addiction treatment it is estimated that it yields cost savings of between 3 to 5 euros in reductions in drug related crime, theft and criminal justice costs. These costs are greater when health and societal savings are considered.<sup>37</sup>

### Recovery

Nearly all adolescent treatment approaches are based on the abstinence model, unfortunately a return to drug use occurs in one third to one half within 12 months following treatment.<sup>38</sup> Preventive measures should focus on specific treatment variables include; the adolescents treatment experience, counsellor rapport and aftercare attendance.<sup>39</sup> Individual variables include psychiatric comorbidity, lack of family involvement, continuing influence with drug using peers and poor coping skills.<sup>40</sup> All these variables are known to have strong evidence to support one's decision on whether the adolescence would choose to continue or not to continue attending and engaging therapy.

### Conclusion

The results from a cluster analysis report<sup>41</sup> highlight that the highest risk groups include; those having two parents with a SUD, early use of one or more substances and the highest level of psychological dysregulation. This group is associated with significantly earlier use of tobacco, alcohol, marijuana and cocaine. The first steps of interventions are treatment programs but focusing on abstinence alone is insufficient. Rather, multimodal programs addressing various aspects as psychological dysregulation such as in the case of multi systemic therapy, a process which includes the young person, their family and their environment are optimal.<sup>42</sup>

The suggested core elements for adolescent treatment programs in Malta should include; screening and comprehensive assessments to ensure understanding of the full range of issues of the adolescent and family, comprehensive services to address the substance use problem. Given the

limited funds available for prevention programs in Malta, research has demonstrated that there are three main groups to target. These include: children with ADHD, ODD and conduct disorders should be provided with a primary care provider for parental education and a child psychiatrist. Briones 2006 reported that frequent screening in schools for problematic alcohol and substance use during late childhood and early adolescence, to identify, then offer education should, whilst treatment to be offered to parents with SUDs is an effective preventative method to reduce the onset go SUDs. Encouraging adolescents in Malta to engage in positive social activities such as organised sport, voluntary activities and regions activities as these are less likely to develop SUDs ablate other negative behaviours.<sup>43</sup>

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