

This chapter addresses substance misuse prevention through amelioration of anhedonia.

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Substance misuse prevention: Addressing anhedonia

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ANHEDONIA REFERS TO the inability of experiencing pleasure in positive life events. It has been conceptualized as a stable yet malleable characteristic, and is associated with hypoactivity in the mesolimbic and mesocortical dopaminergic systems. Very recently, it has been posited as an etiologic factor associated with drug addiction onset, escalation, and relapse. Prevention programming could be developed to counteract the harmful impact of anhedonia, so as to minimize its impact on drug misuse. Remedial efforts are those that either: (1) permit the individual to tolerate low levels of pleasure without resorting to drug misuse or other maladaptive behaviors that may unhealthily besot pleasure (for example, through normalization, structuring time, or meditation); or (2) counteract anhedonia by enhancing ones capability to experience pleasure (for example, behavioral activation, positive psychology, pharmacotherapy, or pursuit of positive addictions). School-based activities could be developed that can be completed by individuals, small workgroups, or the whole classroom. We describe the concept of anhedonia, and

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speculate on possible prevention strategies that might be utilized in schools as well as other contexts.

Many people report experiencing positive emotions when watching the sun set or rise in the sky, expecting the birth of a child, mastering a new skill, viewing a novel entertainment program, or spending a day at the park. However, some people report being unable to experience the joy in these events. The term “anhedonia” has been applied to these people (that is, in those who experience diminished interest or pleasure in rewarding activities). This construct is grossly understudied as a cause of psychopathology.¹ Anhedonia lies on a continuum and varies widely in population samples of adolescents.² One’s degree of anhedonia tends to be relatively stable over time.³ While this construct is rarely demonstrated in the absence of depressive mood among adolescents with Major Depressive Disorder (only 2.3 percent of cases), it can increase following stress or within the context of an acute major depressive episode and can decrease following behavioral or pharmacologic intervention. Anhedonia is associated with hypoactivity in the mesolimbic and mesocortical dopaminergic circuits and may reflect both tonic and phasic diminished activation.⁴

Recently, anhedonia has been posited as a potential cause of addictive disorders, with evidence that anhedonia increases risk of substance use onset and escalation.⁵ For example, using the National Epidemiologic Survey on Alcohol and Related Conditions, Leventhal and colleagues found that lifetime anhedonia was positively associated with lifetime stimulant use and transition to dependence among those who reported lifetime stimulant use even after accounting for the effect of co-occurring depressed mood.⁶ A study of adolescents in China found a cross-sectional relation of the CESD-anhedonia scale to retrospective reports of smoking initiation.⁷ Similarly, Audrain-McGovern et al., in a community-based sample of 1,106 adolescents participating in an 18-month prospective longitudinal survey study of adolescent health behaviors, found that teens with higher anhedonia were more likely to initiate and escalate levels of smoking.⁸ A case-control study found

that inpatient adolescents with cannabis abuse ($n = 32$) scored higher than controls ($n = 30$) on anhedonia.⁹

Adolescents tend to be more sensitive than adults to positive rewarding properties of drugs and other risk-taking-related stimuli, while less sensitive to the aversive aspects of drugs and these other stimuli.¹⁰ Anhedonic adolescents may seek out hedonically valenced behaviors that are of higher intensity to attempt to experience pleasure if common moderate-intensity positive events are ineffective means of impacting pleasure. They may rely on relatively intense interactions with peers (which could be interpreted as being of low social self-control).¹¹ They may seek out even more intense risk-taking activities than other adolescents, such as extreme sports (for example, skydiving).¹² For similar reasons, anhedonic teens may seek out drugs and experience more rewarding effects from alcohol or other drug intake than nonanhedonic adolescents. In particular, these exogenous substances may directly probe mesocorticolimbic dopamine circuitry and pharmacologically activate the reward pathway which may remain dormant in anhedonic teens due to hyporesponsiveness to nonpharmacological low-intensity pleasant events. To the extent that anhedonia is associated with poor interpersonal skills and is a chronic condition, its alleviation may necessitate extensive entrenchment in intellectual, physical and social activities that provide pleasure experiences while instructing better social behavior.¹³

Addressing anhedonia in prevention research

There are two therapeutic stances one may make regarding the amelioration of anhedonia. One may learn to accept a sense of anhedonia and live a comfortable life anyway. Alternatively, one may attempt to decrease this mood state.

Accepting anhedonia

One may accept that it is a stable feature of one's neurobiological make-up. As such, strategies could attempt to normalize the

“anhedonic experience.” By doing so, there would be less desire to alter one’s emotional terrain by resorting to drug use. There are several strategies one may employ here. First, one may simply obtain an awareness and acceptance of one’s status as an anhedonic person. As such, one’s expected perception of a sunset may be restructured from “I should experience a sense of awe” to “I find this interesting.” One may accept that it is not imperative that one becomes particularly excited or joyful about anything. One may “know” that a situation is joyful, and simply interpret oneself as being understated, or “Spock” like (a la Star Trek).

Second, alternatively, one may accept being relatively anhedonic at the present time; but also realize that there are fluctuations in mood in one’s own affect topography and that “joy” is not the goal *per se*, but rather recognizing one’s own mood fluctuations and when one is in a comparatively “good” mood relative to one’s own typical experience (not others). One may further accept that he or she is “right where you should be right now” and that one is simply on a continuum of fluctuating affect.

Third, one may also engage in as much prosocial structured time as possible.¹⁴ In this way, one is less likely to reflect on one’s anhedonia or feel imprisoned by it. Through regimenting one’s life, a sense of being productive may be a means to bypass having to feel a sense of pleasure *per se*.

Fourth, mindfulness meditation may be used to strip away at illusions of how experiences come to be associated with pleasure; that one may see things as they really are.¹⁵ (Sometimes, as a side effect, a sense of pleasure also may be achieved.)

Changing anhedonia

There are also several means to attempt to change anhedonia. Pharmacologic adjuncts have been proposed as one such means (for example, atypical antidepressants, fluoxetine and maprotiline; bupropion or acetyl-L-carnitine have been suggested more recently).¹⁶ However, these are methods that rely on careful input of a physician outside of a school or other nonmedical environments.

Second, one can be introduced to new environments. Novel high-intensity environments that are healthy may be potent enough to surpass the affect-enhancing thresholds in anhedonic individuals and ultimately create a pleasurable experience for them. This could be accomplished through visiting theme parks, participation in high-activity sports, going to museums, viewing novel videos, playing highly stimulating electronic games, engaging in high-intensity social networking, or looking “meditatively” at things as if for the first time. Also, virtual reality approaches may be used to create new environments. All of these approaches may be addressed as examples of an “environmental enrichment” approach, which may increase dopaminergic output even among those with hypoactive mesocorticolimbic dopaminergic circuitry.¹⁷

Third, exercise might be used to create pleasurable experience and has been used to assist in the treatment of depression and addiction for some time.¹⁸ Of course, no study has investigated physical activity impact on anhedonia, the results of studies on the impact of exercise on depression are mixed, and the results of studies on the impact of exercise on drug addiction is promising but still sparse.¹⁹

Fourth, positive psychology principles may and have been used.²⁰ These include recognizing and harnessing personal strengths, listing positive daily events, writing a gratitude list, writing a gratitude letter to someone who has been helpful, savoring pleasant moments in the day, listening to others’ good news, or doing and savoring one’s own an act of kindness to another. This approach is promising as a means of psychotherapy and for smoking cessation among adults, and might be utilized as a drug misuse prevention approach among teens.²¹

Fifth, behavioral activation (BA) helps people identify whether they are engaging in rewarding or nonrewarding activities and make behavioral choices that are likely to increase exposure to positively rewarding experiences.²² Perhaps some anhedonic individuals are in a “rut” and simply need to re-establish connections with pleasant activities which may have been lost for any number of reasons.

Sixth, and not necessarily exclusive of other approaches, one may engage in so-called positive addictions that are likely to “jump start” experience of pleasure on a somewhat regular basis. While also having negative effects, these alternative addictions may involve fewer costs than drug abuse.²³ Such addictions may include those to exercise, work, a hobby, reading, gaming, or movies. Seventh, one may engage in elaborative processing of memory associations such that one may tie currently engaged in prosocial activities to memories of pleasurable past experiences.²⁴ Thus, for example, one may imagine going to the gym as being like skiing downhill and by pairing experiences may come to experience pleasure going to the gym. All of these eleven theoretical models/approaches (four targeting acceptance, seven targeting change) might be considered when constructing a school-based drug abuse prevention program.

Anhedonia as a target in school-based drug misuse prevention

There are many benefits and some drawbacks of providing school-based drug misuse prevention programming. School-based prevention is a unique context of programming because youth spend much of their waking hours in the school environment, in the classroom youth are a captive audience for material provision, and material may be provided to the whole class, to groups created within the class, and to individual students.²⁵ Further, school-based programs involve provision of material to heterogeneous groups of teens and thus allow for positive-contagion effects whereby at-risk teens may observe and learn adaptive strategies from low-risk teens.²⁶ On the other hand, school contexts tend to be highly structured, there are many demands on a classroom teacher’s time, and provision of programming takes some training.²⁷

Of course there are some current drug misuse prevention strategies that may directly or indirectly impact on anhedonia. In Project Towards No Tobacco Use, for example, there exists a self-esteem

enhancement session.²⁸ Within this session, the student notes their personal assets and passes a compliment to other students, as two of the activities in that session. These activities may be potent enough social rewards to enhance pleasure in anhedonic teens.

Future program development work

Near-future program development efforts might consider making use of the six-step “chain model” to develop a prevention curriculum targeting anhedonia.²⁹ According to this model, a theory of program mediation should be developed to address anhedonia. Program activities that plausibly address anhedonia should come to mind. A certain activity should alter in some way the functioning of anhedonic motivations on later drug use behavior. In the earlier sections of this chapter, we suggested underlying mechanisms of addressing anhedonia. Cognitive restructuring on nonacceptance of one’s unique mood profile or environmental enrichment to modify one’s mood were examples of such mechanisms.

Second, there is a need to systematically pool and warehouse promising activities for new uses. The theory of program mediation developed in the prior step leads one to search for promising activities to test. One should be able to go through a library of activities and pull out useful information. For example, as mentioned above, the Project TNT self-esteem session might be adapted here. As another example, there is a yoga activity from Project EX (a teen tobacco use prevention/cessation program) that also may be utilized as a meditation/exercise means of altering anhedonia.³⁰

Third, there is a need to systematize a set of perceived efficacy (“theme”) studies that can screen among promising activity ideas gathered in the last step for additional program development work. Numerous ideas gathered during the previous step can be contrasted using methods that are relatively time- and cost-effective. This could be viewed as a program activity screening step. There are numerous activities one may screen from. These activities might be adapted from previous programs or may be

novel, and may target individuals (for example, through use of DVD or CDs, or SMART phones, or one-on-one class-pull-out counseling), classroom groups (for example, multiple group discussions within the class that can increase youth interaction), or the whole classroom (for example, classroom discussion, the TNT self-esteem activity, or the EX yoga activity).

Fourth, there is a need to systematize a set of immediate impact studies that can provide a means of determining workability of individual program components. Possibly, the top half of the most favorably rated activities from the previous “theme study” step would be retained for this one.³¹ Fifth, there is a need to systematize program construction and pilot testing of a complete program. Around 50 percent of activities from the previous step are retained for this step. Rules of construction, including a consideration of program content and process sequencing, along with a consideration of pragmatics of testing a complete program should be addressed. For example, instruction in the topography of anhedonia and self-ratings of anhedonia would be completed prior to anhedonia altering activities. Finally, there is a need to refine a set of immediate posttest/posttreatment activity set measures that predict longer-term outcomes from short-term measures. Such measures should not be too long and difficult to implement.³² Pilot testing outcome measures should be able to predict not only target population receptivity, but also longer-term behavior.

Limitations and conclusions

One limitation regarding modifying anhedonia pertains to the extent to which this construct is trait-like, subjectively experienced as unmodifiably uncomfortable, which can't be varied for more than brief chunks of time. Such a perspective would lead one to suggest that only radical environmental changes, or medication, could alter the anhedonic experience of the world. It is too premature to discount or support wholeheartedly this perspective. A second limitation of addressing anhedonia among teens in general pertains

to the need to engage in much more study of the concept. It is not clear to what extent anhedonia is composed of facets, which are separable among teens, and possibly too little work has been completed on relating anhedonia to the addictions.³³ However, the theoretical plausibility for anhedonia underlying drug abuse and, hence, being an important focus of drug abuse prevention efforts, can't be understated.

In conclusion, while the research is in a nascent stage, the theoretical plausibility is very high based on other work that indicates that anhedonia is a cause of drug onset and increases among teens. Current evidence-based prevention programming may operate in part through impacting anhedonia. Adding measures of anhedonia to questionnaires may help determine whether or not this construct does operate as a mediator of prevention effects.³⁴ (It is also possible that it may act as a moderator variable, which also should be assessed). Also, future programming might focus specifically on modifying anhedonia. Program development work is needed either to encourage acceptance of or change in one's mood topography.

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