

# Prevalence of Attention-Deficit Hyperactivity Disorder Symptoms in Methamphetamine Users Attending Erada Centre

Ayesha A. Ameri

# ABSTRACT

There is a prevalence of ADHD symptoms in METH users with similar outcomes in other studies. From a total of 44 participants with current or history of METH use 25% met A-ADHD criteria

Academic Supervisors: Prof. Nadia Mahmoud & Prof. Hafez Ahmed – Clinical Supervisor: Dr. AbdelAzim Ali DMCG 2019-2021 – September 20, 2021

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#### Abstract

**Background:** Attention-deficit Hyperactivity Disorder (ADHD) and methamphetamine (METH) use has been an area of interest after the rise in illicit stimulant use amongst the youth worldwide. ADHD is associated with high-risk behaviors including substance abuse with a high prevalence of ADHD in METH users (Mihan, R., et al., 2018). ADHD symptoms include forgetfulness, trouble concentrating on tasks, distractibility, difficulty sitting still, and a common urge to interrupt (Leary, A., 2019). Treatment of ADHD typically involves pharmacological interference using prescribed stimulants such as Adderall or Ritalin (Bhandari, S., 2020). Illicit stimulants, specifically METH, is considered being one of the most highly used illicit substances (Fleming, T., et al, 2020). METH, also known as crystal, is a highly addictive stimulant. Like many ADHD medication, METH increases dopamine levels in the brain, however, the rapid release of substantial levels of dopamine is what reinforces "drug-taking" behavior (NIDA, 2019). METH is a growing concern worldwide, including, the United Arab Emirates (UAE) with seized amounts tripling in 2010 (Awad, M., 2011). Aim: the aim of this study is to identify the prevalence of ADHD symptoms in male patients attending Erada Centre that used of METH at some point in their lifespan. Methodology: A quantitative cross-sectional study was conducted at Erada Centre for Treatment and Rehab. A total of 44 participants have consented to performing an Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist. Participants had to be male, Emirati, 18 and above, and more importantly with past or current METH use either alone or in combination with other substances. Data was modified and access to datasets were limited to ensure that the data extracted is in safe keeping and protected by passcodes to warrant patient confidentiality. Ethical approval has been obtained from Dubai Health Authority (DHA), and Dubai Medical College Ethical Committees, and Erada Centre Research Team. Data was analyzed through SPSS (version. 28). Results: Out of the 44 participants, 25% fit the criteria of ADHD (11/44). Participants programs status 43.2% inpatient, 54.5% initial assessment, and 2.3% reassessment. There were two common routes of administration amongst participants with 63.6% IV and 34.1% smoking. The relationship between route of administration (smoking or IV) and ADHD criteria was non-significant (p>0.05). The relationship between age of first use (child < 18 or adult => 18) and ADHD criteria was found to be non-significant (p>0.05). The most common drug combination found was METH with pregabalin and METH with opiates. The

relationship between METH with pregabalin combined and ADHD criteria was also nonsignificant (p>0.05). Furthermore, the results demonstrated that the relationship between METH with opiates combined and ADHD criteria was non-significant (p<0.05). **Conclusions:** There is a prevalence of ADHD symptoms in METH users with similar outcomes in other studies. The rate at which patients attended Erada Centre and the duration of time given for this study to be completed served as a limitation. Nonetheless, acknowledging the fact that this is only a pilot study allows future work to provide participants with an in-depth assessment and ADHD diagnosis as well as catering to a greater sample size than the restricted number showcased in this study. The study has shed light on the relationship between METH abuse and ADHD, which opens up avenues in further dealing with individuals within this specific population.

#### Keywords

Attention-deficit hyperactivity disorder, ADHD, United Arab Emirates, UAE, an Adult ADHD Self-Report Scale

#### Introduction

Attention-Deficit Hyperactivity Disorder (ADHD) is associated with many different high-risk behaviors including, substance abuse, with even further research suggesting a particularly high prevalence of ADHD in METH users. ADHD is a disorder that is characterized by "above-typical" hyperactivity and impulsivity with issues in attentivity, with more specific symptoms including, trouble concentrating in tasks, forgetfulness, distractibility, difficulty sitting still, and a common tendency to interrupt. Treatment of ADHD typically involves pharmacological interference using prescribed stimulants such as Adderall or Ritalin, which provides mental stimulation through increasing dopamine levels in the brain to reduce impulsivity and enhance concentration (Leary, A., 2019).

Methamphetamine, also known as crystal, is a highly addictive stimulant, which could be smoked, snorted, swallowed, or injected. Like many ADHD medication, METH increases dopamine levels in the brain, however, the rapid release of substantial levels of dopamine is what reinforces "drug-taking" behavior (NIDA, 2019). Short-term effects of METH include excessive activity, wakefulness, decreased appetite, irregular heartbeat, and increased blood pressure and body temperature. While, the most prominent long-term effects include, extreme weight loss, memory loss, anxiety, paranoia, and hallucinations (NIDA, 2019). METH is a growing concern worldwide, including, the United Arab Emirates (UAE) with seized amounts tripling the year prior, as reported in a 2011 article (Awad, M., 2011).

Almost 15% of adults with ADHD also fit criteria for substance use disorder (SUD) compared to adults without ADHD (SAMHSA, 2015). More specifically, a study conducted in Australia found that 45% of individuals who use METH and cocaine had ADHD symptoms (SAMHSA, 2015). In reference to recent literature, there seems to be an interesting neurobiological overlap between SUD and ADHD involving the mesolimbic and mesocortical dopamine pathways further describing the connection (Eme, R., 2017). Moreover, individuals with ADHD have been shown to have "issues regulating neurotransmitters such as dopamine and norepinephrine", which might suggest why adolescents and adults with ADHD lean towards substances and consequentially substance misuse (Leary, A., 2019). The aim of the thesis is to look at the prevalence of ADHD symptoms in METH users attending Erada Centre.

#### Rationale

The importance of conducting this study is to help better services for those in need and encourage superior clinical outcomes. Although there have been several studies linking ADHD and SUD in the Arab Region, including the study conducted in Egypt in 2015 with main findings concluding an association between

adult ADHD (A-ADHD) and earlier onset of SUD and a poorer clinical outcome, research on A-ADHD and METH use are scarce (Salama, H., et al., 2015). This information will be valuable to those working and/or interested in the field of mental health particularly in the UAE.

# **Literature Review**

In reviewing the literature, a rigorous process of categorizing the topics and filtering was put into play in order to come up with the most appropriate sequence. The sections of the literature review cover aspect such as the search strategy followed by mental disorders, SUD, mental disorders and SUD, ADHD, A-ADHD, ADHD and SUD, METH use disorder, ADHD and stimulant use, ADHD and METH use, management of ADHD and METH use, and ADHD and METH use in the Arab world. ADHD and METH use in the Arab World was subdivided into the following: ADHD in the Arab region, ADHD in the UAE, SUD in the Arab region, SUD in the Arab region, and management of SUD and ADHD in the Arab region.

# Search strategy

Search engines such as Google, Google scholar, Academia, and National Institute of Health (NIH) public access were used to find articles, abstracts, and reports in English relating to the theme of this study. The beginning date of the study was November 2020, which began with research questions formulation, proposal development, ethical approval application, literature review, data collection, data analysis, data interpretation, data discussion, reflection, and research finalization until July 2021. The keywords used for ADHD were "ADHD", "attention-deficit hyperactivity disorder", "ADD", "attention deficit disorder" and keywords used for METH were "METH", "METH use disorder",

"stimulant use disorder", "substance use disorder", "substance misuse", "SUD", and "addiction". The articles were screened by title and abstract initially and reviewed thoroughly when applicable. Furthermore, the references and citations used in each article found were screened for additional studies.

#### Mental Disorders

For many years' mental disorders were disregarded or misinterpreted as supernatural or somatogenic. Supernatural theories revolve around the possession of demonic spirits and sin, which in turn can be resolved through religious cleansing. While somatogenic theories justify these behaviors through physical disturbances such as brain damage or illness (Farreras, I, 2013). Fortunately, most parts of the world have progressed from that to full acknowledgement of the severity of mental disorders and the treatment of it accordingly. Mental disorders are "diseases that affect cognition, emotion, and behavioral control and substantially interfere both with the ability of children to learn and with the ability of adults to function in their families, at work, and in the broader society" (Hyman, S. et. al. 2006). Major categories of mental disorders include schizophrenic disorders, mood disorders, anxiety disorders, SUD, and behavioral and developmental disorders such as Attention-Deficit Hyperactivity Disorder (ADHD). The association between SUD, specifically METH use, and Attention-Deficit Hyperactivity Disorder is the main objective of this study.

# Substance Use Disorder (SUD)

Alcohol and drugs are considered to be key universal risk factors that contribute to an increase in the number of disability and death (Peacock, A., et al, 2018). In 2016, it was reported that 271 million people globally were involved in drug use. Substance abuse encompasses both genders, different age groups, all

geographical locations, socioeconomic strata, ethnicities, and religious backgrounds (Kaloiya, G. & Sonkar, M., 2018). This, in turn, leads to devastating social and economic burdens mainly revolving strains on healthcare and the legal system (Peacock, A., et al, 2018). Many people have fallen victim to alcohol abuse with a global estimation of 6.24 liters consumed by the adult population (aged  $\geq 15$ years) consumption per capita in 2015. Europe taking up higher percentages of heavy alcohol consumption of up to 50% with North Africa and the Middle East scoring the lowest percentages in heavy alcohol consumption of approximately 17.3% (Peacock, A., et al, 2018). As per the UNODC World Drug Report 2018, cannabis ranked the highest in consumption, followed by amphetamines (AMP), opiates, and finally cocaine (UNODC, 2018). SUD is considered a "chronic relapsing disease" with exceptionally high relapse rates of 56.8% - 81.8% (Lo, W., et al., 2020). According to the Diagnostic Statistical Manual-5 (DSM-5), SUD is described by four major grouping criteria including compromised control, social impairment, risky use, and pharmacological disruptions, which range in severity from "mild (two to three symptoms), to moderate (four to five symptoms), to severe (six or more symptoms)" (Bennett, S., et al., 2014). These symptoms include taking substance in large quantities and for a longer period of time than initially intended, having the urge to reduce intake or stop using but failing, spending ample time in obtaining, consuming, and recovering from substance, craving, neglecting social tasks, persisting to use in spite of issues in relationships, continuing to use despite imminent danger to self, tolerance, and experiencing withdrawal (DSM-5, 2013). Genetic and environmental vulnerabilities play a vital role in determining individuals at risk. According to Bennett and colleagues (2014), an estimate of 40% to 60% is attributed to genetic factors, however, it is important to note that genes are not considered to be constantly active but can be triggered under certain conditions. Mental illness, maltreatment, traumatic events,

neglectful or over-bearing parenting practices, and peer influences all contribute to the increase in vulnerability for developing addiction problems in the future (Thatcher, D., and Clark, D., 2008). Nevertheless, the main reason people resort back to substances is due to the neurological effects that essentially taps into and alters the reward pathway. Dopamine (DA) is one of the neurotransmitters in the brain that "regulate feelings of pleasure and reward, as well as emotion, cognition, motivation, and movement". While eating an enjoyable meal or engaging in sexual intercourse, human beings get a rush of dopamine that encourages them to participate in certain behaviors again. Inevitably, the use of alcohol or drugs floods the brain with dopamine beyond the natural release, which in turn results in substance misuse. The body, therefore, reacts by producing lower levels of dopamine making individuals who stop using feel down and thus return to using, creating a vicious cycle. Impairment in cognitive functioning, self-control, and learning and memory also takes place due to changes in the prefrontal cortex (executive functioning), amygdala (emotional processing), and hippocampus (memory formation and recall). After years of use, individuals develop what is referred to as "conditioned habits" or "learned reflex", which in essence are external or internal cues that trigger craving that can emerge after years of abstinence (Bennett, S., et al., 2014). Substance abuse prevention and treatment follow robust multifaceted processes by taking into account the biological, psychological, and social aspects of the disease simultaneously (Lo, W., et al., 2020). Treatment should be tailored to each person's needs including aspects such as psychopharmacology, social intervention, and individual and group therapy using motivational interviewing (MI), cognitive behavioral therapy (CBT), and 12step groups. Integrated treatment approaches significantly help those with SUD and co-occurring mental disorders (Bennett, S., et al., 2014). Mental disorders and SUD

Substance use disorder (SUD) is considered a mental disorder as elaborated in the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD), which are respectable international organizations for classifying disorders (First, M., 2015). Mental disorders and SUD are found separately, however, they are usually found intertwined. In the United States, approximately 1 in 16 adolescents (12-17 years old) in 2018 had comorbid SUD and mental health problems (SAMSHA, 2018). In adults who used illicit drugs in 2018, 49.4% suffered from serious mental illness (SMI) and 36.7% suffered from any mental illness (AMI) compared to the group with no mental illness (SAMSHA, 2018). A study by Swendsen et al. (2010), has demonstrated that mental illnesses are shown to be "significantly associated with the onset of nicotine dependence X2(19) = 142.7, p<.001, alcohol dependence with abuse X2 (19) = 187.3, p<.001, and illicit drug dependence with abuse X2(19) = 352.3, p<.001" globally. Further data showcased an increase in the numbers of drug onset, drug abuse, and dependence in individuals with mental disorders. A strong association was shown between bipolar disorder and SUD with exceptionally high risk of transition from onset to dependence. Individuals are also more likely to engage in illicit drugs when experiencing major depression and anxiety disorder. Attention-deficit hyperactivity disorder is also a notable contender when it comes to increased risk of SUD. In 2018, 51.4% aged 18 and above with co-occurring AMI and SUD received treatment for either mental health or substance use (SAMSHA, 2018). If patients suffering from these mental disorders undergo treatment, they are potentially preventing "34.2% of cases of initial drug use, 61.5% of cases of abuse among drug users, and 71.9% of dependence among drug abusers" (Swendsen, J. et al, 2010). Unfortunately, many individuals shy away from seeking treatment due to structural barriers such as finances, availability,

transportation or inconvenience; or attitudinal barriers such as stigma, perceived ineffectiveness, or misidentifying the severity (Andrade, L., et al, 2013).

# Attention-Deficit Hyperactivity Disorder

Attention-Deficit Hyperactivity Disorder (ADHD) is "one of the most common mental disorders affecting children" as well as many adults (Parekh, R., 2017). Population based studies have also found ADHD to be more common in males than in females (Cornforth, C., & Coghill, D., 2010). Classification of children's disorders mainly involves two aspects: externalization and internalization. Externalization is when a child portrays troublesome and aversive behavior towards others in his/her surroundings. Internalization is when a child experiences anxiety, depression, and uneasiness that is often hidden from those around them. A prominent disorder that is characterized by externalizing behavior is ADHD, which is identified by two key features: inattentiveness and hyperactivity-impulsivity. Inattentiveness is difficulty in sustaining mental focus during "work or play" and that causes forgetfulness, inability to follow instructions, difficulty listening and concentrating, distractibility, and loss of interest. Hyperactivity and impulsivity are being in "constant motion" and inability to hold back "immediate reactions". Children and some adults with ADHD often portray signs such as fidgeting, squirming, and walking aimlessly when expected to be seated (NCERT, 2019). Other symptoms include, talking consistently, interrupting others, lose items and belongings regularly, and difficulty engaging in activities quietly. Nonetheless, individuals who have these symptoms do not necessarily have ADHD. Other mental disorders such as anxiety, depression, and certain learning disabilities also portray similar symptoms (Bhandari, S., 2020). Initially, it was perceived that signs and symptoms of ADHD usually phase out after adolescents but studies following children with ADHD into adulthood have

found that the disorder can persist (SAMSHA, 2015). The prevalence of ADHD in children and teenagers are shown to be 5% and for adults is between 2%-3.5% (SAMSHA, 2015). Like all mental disorders both hereditary and environmental factor play a role in the development of ADHD. External factors such as fetus exposure to alcohol, drug use, and cigarette smoking, low birth weight, exposure to high level of lead at a young age, and brain injuries increase the risk of developing ADHD (NIMH, 2019). Proper diagnosis should be made by psychiatrist or clinical psychologist prior to initiating any form of treatment either pharmacological or psychological. ADHD does not have a cure, but symptoms can be managed through, which can in turn improve functioning. First line medication for ADHD treatments are stimulants with "clinically significant reduction of symptoms in around 70 percent of cases" (Cornforth, C., & Coghill, D., 2010). It primarily works by increasing dopamine levels in the brain and thus increasing attentiveness and focus (NIMH, 2019). Methylphenidate (MPH) and amphetamine (AMP) are the two main categories of stimulants to treat individuals with ADHD. For over 50 years, immediate release (IR) MPH was the primary medicine used, however, even though it has rapid onset of approximately 30 minutes. It also has a comparatively rapid offset of 4 hours and thus needs to be administered several times a day for "adequate symptoms cover" (Cornforth, C., & Coghill, D., 2010). Licensed AMF products include "mixed amfetamine salts (Adderall), dextromethamfetamine (Desoxyn), dextroamfetamine (Dexedrine) and a dexamfetamine pro-drug lisdexamfetamine (Vyvanse)". These medications can be administered once daily, and they work by blocking DA reuptake and stimulating DA release in the synapse similar to MPH. The AMF, however, selectively acts on brain regions involved in reward such as striatum, ventral striatum, and nucleus accumbens. Furthermore, individuals who react well to MPH do not have the same reaction to AMF and the opposite is also true (Cornforth, C., & Coghill, D., 2010). Non-stimulant

medication, on the other hand, are usually prescribed if individuals suffer from side effects from first line medication plan. Anti-depressants such as atomoxetine and gunafacine are sometimes used to treat ADHD. Other studies also support the use of tricyclics as they have similar actions to stimulants by targeting dopamine and norepinephrine neurotransmitters in the brain. These treatments are shown to be particularly effective with adults suffering from ADHD (NIMH, 2019).

Therapeutic approaches to treating individuals with ADHD is not supported by literature as much as pharmacological approaches, nevertheless, a combination of the two seem to yield optimistic results. A multidimensional treatment aids patients and families better navigate daily challenges. Furthermore, parents and teachers could also help children and teenagers with ADHD by "keeping a routine and a schedule, organizing everyday items, using homework and notebook organizers, and giving praise or rewards when rules are followed" (NIMH, 2019). In the long run, "untreated ADHD is associated with school failure, delinquency and substance abuse" (Cornforth, C., & Coghill, D., 2010).

#### Adult ADHD

Although adult ADHD (A-ADHD) presents in smaller percentages than childhood and adolescent ADHD with a mean worldwide prevalence of 2.8%. It still disrupts individuals' social lives including their careers and family lives significantly. According to Kooij and colleagues (2010), many individuals with A-ADHD are generally misdiagnosed due to lack of understanding of A-ADHD, behavior adjustments done by adults to cope with symptoms through nontraditional treatment methods disguises the truth, or because ADHD symptoms are covered by comorbid conditions. On that note, a striking result was released by the World Health Organization stating that 51.7% of adults with ADHD have comorbid mood, anxiety, substance use, or behavioral disorders. The burden of

enduring a disorder such as A-ADHD due to misdiagnosis results in extensive stressors that strains their family life, relationships, workplace progress, as well as their financial status. A formal diagnosis could only be made by a qualified medical professional through clinical assessments and medical classification. The two notable classification systems used worldwide for ADHD diagnosis are American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders – 5th Edition (DSM-5<sup>TM</sup>) and the International Classification of Mental and Behavioural Disorders-10th revision (ICD-10) (Shire, 2018).

#### ADHD and SUD

Time and time again, research has shown the likely development of SUD in adults with ADHD. One of the first studies conducted on ADHD and SUD was by Goodwin et al. in 1975, which portrayed 35-70% of their patients having comorbid ADHD and substance abuse conditions. A large epidemiological study showcased around 15% of individuals with ADHD also met the criterion for SUD compared to the 5% of adults without ADHD. Another study conducted in 2015 also looked at the prevalence of ADHD amongst patients with SUD found that 36% of patient who abuse substances were diagnosed with A-ADHD. They also found that the presence of ADHD was "associated with a more complicated course of SUD" (AbdelKarim, et al, 2015). In co-morbid ADHD and SUD conditions, age of substance initiation is usually lower, suicidal risks are higher, and transition in severity is quicker (SAMSHA, 2015). Several hypotheses have emerged explaining the relationship between ADHD and SUD, however, there is a lack of definitive evidence. A common theory is that poor executive functioning in ADHD patients adds to the difficulty in resisting temptations and restraining use of alcohol, tobacco, and drugs. Those with ADHD could also misuse alcohol and marijuana to numb certain characteristics of the disorder. Studies have shown increased use of

tobacco and marijuana amongst college students with ADHD. Additionally, individuals with ADHD react to nicotine and illicit stimulant drugs such as cocaine and AMP in a similar manner to ADHD stimulant medication (SAMSHA, 2015). Many speculations appeared concerning the prescription of stimulants to children as treatment for ADHD in fear that it might increase the risk of developing SUD later in life. Interestingly, some studies found that those who start stimulant therapy at an early stage will lower the risk of SUD as it alters brain development and provides protection from symptoms of ADHD that often push individuals to seek alternatives. A more recent meta-analytic study has shown that stimulant medication neither protects nor does it increase the risk of developing SUD in the future (SAMSHA, 2015).

#### Stimulant use

Stimulants are a variety of substances that accelerate the signals transferred between the central nervous system (CNS) and the peripheral nervous system (PNS). This acceleration results in individuals feeling alert, confident, and hyperactive. Stimulants include substances such as cocaine, amphetamine, nicotine, khat, and caffeine (ADF, 2021). Neurologically, stimulants target neurotransmitters such as dopamine, norepinephrine and serotonin and they act on the presynaptic monoamine reuptake transporters. For instance, cocaine is considered a reuptake inhibitor, which essentially allows the neurotransmitter to remain active in the synapse. While, amphetamines, they are releasers that increase the flow of neurotransmitters in the synapse. The potential of becoming dependent on or abusing stimulants is extremely high due to its fast pharmacokinetics and shorter peaks. Stimulant use acute medical complications include hallucinations, seizures, tachycardia, hypertension, vaginal bleeding, and dehydration. Chronic medical conditions of stimulant use include psychotic symptoms, cardiomyopathy,

renal failure, gastric ulceration, erectile dysfunction, and extreme weight loss (Ciccarone, D., 2011).

#### Cocaine

According to literature by Ciccarone (2011) on recent history of stimulant use, cocaine, which is a commonly used stimulant drug, has been used in indigenous communities in South America since 1859. Cocaine is derived from a plant called Erythroxylon coca and is sold in the streets as a powdered substance with a high melting point. The bioavailability of cocaine is up to 30-60% through methods such as insufflation (peak 14.6 minutes) or intravenous injection (peak 3.1 minutes). Crack cocaine is a form of cocaine that can be vaporized. Cocaine is also commonly used in combination with heroine in an act known as "speed-balling". Other drugs used in combination with cocaine are alcohol, tobacco, and marijuana. Around 50%-60% of pure cocaine is found on average on the streets of America, while the rest are diluted using fillers and simple sugars. The instant rise in its use was due to medical foundations professing its benefits, as well as, being incorporated in beverages such as Coca-Cola. However, the rise in use eventually caused a rise in social and physical complications, thus restrictions were put into place.

#### Amphetamine

Synthetic stimulants such as amphetamine, was first introduced in the 1930's as a nasal decongestant but the use eventually expanded to conditions such as ADHD, fatigue, narcolepsy, depression, and weight control. Synthetic stimulants, such as amphetamine and methylphenidate, could be found as prescription medicine in the form of tablets, capsules, liquids, and patches. In recent years, the prescription of stimulants has increased exponentially alongside the increase in ADHD diagnosis. Studies have consequently focused on the use stimulants and the

notable increase in illicit stimulants thereafter. However, although studies do confirm the high prevalence comorbid substance use and ADHD, the use of stimulant medication as a treatment regimen for ADHD is not necessarily associated with substance use problems in the future (Ciccarone, D., 2011).

# Methamphetamine (METH) use

Methamphetamine, an amphetamine-type stimulant (ATS), is considered to be the primary substance dominating the worlds synthetic drug markets. ATS are the second most commonly used drugs globally after cannabis (UNODC, 2018). METH, also known as blue, ice, and crystal, is an addictive substance derived from its parent drug, amphetamine (AMP), in the 20<sup>th</sup> century. Methamphetamine is categorized as 1-methamphetamine and d-methamphetamine. 1-methamphetamine has a peripheral alpha-adrenergic property which was formerly found in drugs to relieve nasal congestions (e.g., Vicks inhalers). D-methamphetamine is the most powerful form of stimulant with 3-5 times the CNS activity and a 10-12-hour halflife (Ciccarone, D., 2011). As shown in (Figure 1) AMP and METH are produced by a "dynamic range of precursor chemicals" including alphaphenylacetoacetonitrile (APAAN), phenylacetic acid, 1-phenyl-2-propanone (P-2-P), ephedrine/pseudoephedrine, and norephedrine (UNODC, 2018). It was originally intended for relieving nasal congestion or bronchitis, however, effects such as increased energy, talkativeness, confidence, and euphoria encouraged the addictiveness component of the substance (NIDA, 2019). It could be consumed through IV injection, sniffing, or smoking (UNODC, 2018).



Figure 1: Precursors for METH - (2018) Laboratory and Scientific Section

METH, compared to AMP, lasts for a longer period of time and is considered to be more impactful and harmful on the CNS. Reports from East and South-East Asia has shown that in the 1960's, METH tablets were consumed primarily by working class individuals to improve productivity. While in the 1990's onwards, METH was smoked by youth and students for performance enhancement. Recently, however, crystalline METH has become the preferred form of intake either through nasal insufflation, smoking, or IV (UNODC, 2018). In medical terms, METH could be used to treat those with ADHD and for weightloss as short-term medication. Prescriptions are limited to specific cases and in much smaller doses (NIDA, 2019). Prior to 2015, METH misuse was considered under the category of prescription stimulant although they are primarily produced illicitly rather than through pharmaceutical companies. Consequently, reformulation in questions in research done in the United States regarding METH use has therefore yielded different results with 1.9 million individuals (12 and older) shown to use METH illegally in the past year and 1.1 million diagnosed with METH use disorder (SAMSHA, 2018). Individuals who use METH for 12 months and meet criteria of SUD are characterized as having METH use disorder (SAMSHA, 2018). It is a global concern as the WHO Global Burden of Disease Estimate showed the highest percentage increase in mortality rates compared to all drug types between 2005-2016 attributed to both AMP and METH use disorder. Polydrug use seems to be a major concern when it comes METH related morbidity and mortality. For instance, people in Afghanistan and Iran use METH as means to overcome their opioid withdrawals, while, in Australia 90% METH-related deaths have found other drugs such as benzodiazepines and morphine in their autopsy. The lack in quantitative data on the growth of METH pauses as a barrier in providing accurate statistics, however, the increase in the number of seizures plays a partial part in implying demand (UNODC, 2018).

#### ADHD and stimulant use

ADHD and stimulant use have been an area of interest for researchers for many years. The rise in prescription of stimulant medication for those with ADHD has definitely contributed to the rise of illicit substance misuse. Luckily, individuals who were prescribed stimulant treatment when they were children showed no increase in substance use in later life, however, adolescents or adults who were put on stimulant treatment for ADHD have shown increased risk of nonmedical use of stimulants (Physician Health Services, 2018). Stimulant misuse could either be prescription stimulant misuse or illicit stimulant misuse. Controlled Substance Act (CSA) classified prescription stimulants and METH as scheduled II drugs, which indicates their heightened abuse potential. Illicit use of both prescription stimulants and METH are mainly amongst students and young adults who are likely to take part in rebellious acts. Another similarity between medical

stimulants and METH is that they both activate catecholamine and cause adverse cardiovascular effects, suggesting similar physiological processes (Chen, L. et al., 2014). Furthermore, a meta-analytic study has demonstrated a sharp increase in use of stimulant medication amongst college students for reasons such as elevated academic and cognitive performance. There was a 67% increase from 2006 to 2011 in prescription stimulant misuse in the adult population with 156% increase in emergency room visits (Weyandt, L., et al., 2017). Illicit stimulant use for those struggling with ADHD is another major concern. A study conducted in Australia found that 45% of those who use cocaine and METH had ADHD symptoms after being screened for ADHD. Another study taken place in Spain found that 20% of cocaine users seeking treatment had probable ADHD (SAMSHA, 2015).

# ADHD and METH use disorder

Studies on ADHD and METH use have yielded interesting results. Some studies state that ADHD or Adult Attention-Deficit Hyperactivity Disorder (A-ADHD), more specifically, leads to METH abuse due to consequences of the disorder including academic failure, familial stress, and delinquency. Other studies suggested that the increased risk of METH use in individuals with A-ADHD is due to having comorbid factors such as conduct disorder or bipolar disorder. A study conducted in Iran with a total of 134 patients found that the "prevalence rate of A-ADHD to be as high as 10.4% among METH users", which is "3 times higher than in Iranian general population" (Mihan, R., et al., 2018). Another study looked deeper into the symptomology of ADHD and found METH use was prevalent in those experiencing current ADHD symptoms (inattentiveness, hyperactivity, or combined) or having a lifetime diagnosis of ADHD compared to those with resolved ADHD as shown in the figure below (Figure 2), (Obermeit, L., et al., 2013). Additionally, large number of METH users have been shown to have

ADHD symptoms as children (Sim, T., et al., 2002). Data reported in 2013 suggested that ADHD related behaviors in childhood might initiate METH exposure, which in turn could induce METH-relevant psychotic symptoms due to significant cognitive vulnerability (Salo, R., et al., 2013).



\* p < .05. \*\* p < .01. Only individuals meeting criteria for lifetime ADHD could be assigned with current ADHD diagnoses, per DSM-IV criteria. Resolved subtypes: Inattentive n = 28; Hyperactive n = 33; Combined n = 44.

**Figure 2**: Prevalence and Resolution of ADHD in the METH+ and METH– Groups – Obermeit, L. et al. (2013)

# Management of ADHD and METH use disorder

In diagnosing ADHD and SUD, many similarities emerge between the two disorders including symptoms such as impulsivity, emotional dysregulations, and agitation. Thus, the combination of the two usually intensifies the person's condition, making it more complicated to treat (SAMSHA, 2015). A joint approach between medical and behavioral services are considered key with these cases. Screening for ADHD in those seeking treatment for substance use disorder using Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener or Wender Utah Rating Scale has been recommended to aid in the referral process (SAMSHA, 2015). As previously mentioned, first-line medication for ADHD are prescription stimulants, however, in treating people with co-occurring ADHD and SUD some clinicians are with prescribing stimulant medications while other advice against it (SAMSHA, 2015). These opposing views could be due to the inconclusive data in many published studies. For instance, in several studies no significant difference was found in the risk of abuse of stimulant medication between those with comorbid ADHD and SUD and those with ADHD only. Nonetheless, it was stated that this lack of difference could be due to the regular monitoring and expected visitations for participants in the study, which is highly unlikely to take place in the real world (SAMSHA, 2015). For stimulant addiction, such as METH, there is no Food and Drug Administration (FDA) approved medication for treatment. Therefore, depending on the case, treatment usually involves tapering down of substance and behavioral therapies such as Cognitive Behavioral Therapy (CBT) or contingency management (SAMSHA, 2015).

#### Pharmacological treatment of ADHD and METH use disorder

In addition to receiving care for their SUD or METH abuse, individuals also receive psychostimulants or non-stimulants to treat their ADHD symptoms. In majority of patients with co-occurring ADHD and SUD, psychostimulants are still considered first-line medication with the consideration of prescribing delayed response preparations, toxicology testing, close monitoring, minimizing diversion risks, and reassessing prescribed drug in case of relapse (Carpentier, P., & Levin, F., 2017; Mariani, j., and Levin, F., 2007). These new long-acting medications such as Lisdexamfetamine, which is composed of dexamphetamine and amino acid lysine, has shown promising results but has not yet been systematically evaluated (Carpentier, P., & Levin, F., 2017). Furthermore, clinical trials on regularly prescribed medication for ADHD such as methylphenidate and dextroamphetamine

for the treatment of co-occurring cocaine dependence and ADHD have found that "stimulant medications can be used safely in patients with SUD and have a relatively low risk of abuse under monitored conditions". Non-stimulant medication for co-occurrence of ADHD and SUD includes "tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs), bupropion, monoamine oxidase inhibitors, atypical antipsychotics, clonidine, and atomoxetine". Atomoxetine, which is an FDA approved drug for treatment of ADHD across all ages, is considered to be an attractive treatment method for clinicians treating co-morbid ADHD and SUD as it has no known abuse potential. Although psychostimulants still show greater efficacy in treating ADHD, there are situations where non-stimulants would be considered first line medication such as in patients with motor tic disorder or cardiovascular disease (Mariani, j., and Levin, F., 2007). Medications should be tried for a minimum of four weeks for stimulants and a minimum six weeks for treatments such as atomoxetine (Carpentier, P., & Levin, F., 2017). If a person is actively taking drugs while in treatment for co-occurring ADHD and SUD, successful outcomes might diminish or seize to take place for reasons such as forgetting to take medication, needing higher doses, and difficulty detecting therapeutic effects (Mariani, j., and Levin, F., 2007).

#### Psychosocial treatment of ADHD and METH use disorder

In treating co-morbid conditions each disorder should be treated separately and together. METH use disorder can be provided in both inpatient and outpatient settings with primary focus on abstinence. Although evidence-based psycho-social interventions for psychostimulant disorders are scarce, frequently used approaches include cognitive behavioral therapy (CBT), acceptance and commitment therapy (ACT), motivational interviewing (MI), contingency management (CM), and the

matrix model (MM) (Stoner, S., 2018). Studies on CBT and ACT methods found increased attendance, lower self-reported METH use, consequences, and dependency characteristics with significant improvement primarily for CBT group (Stoner, S., 2018). MI showed promising results in a study conducted on Taiwanese adolescents demonstrating increased readiness to change METH use (Stoner, S., 2018). Participants undergoing CM treatment method showcased three weeks of METH abstinence compared to those not receiving CM treatment approach (47% vs 33%, p=.036), however, it is considered to be costly and timeconsuming (Stoner, S., 2018). Finally, MM is a cognitive-behavioral, structured, non-argumentative approach that was developed after the cocaine epidemic in the 1980's to primarily serve those with stimulant use disorder. This program is certified across US and in South Africa, Nicaragua, Guam, Spain, New Zealand, Abu Dhabi, and Dubai (Stoner, S., 2018). Essentially, any psychosocial treatment in addition to treatment as usual (TAU), which includes clinical management, case management, and drug counseling, will probably reduce dropout rates, and increase abstinence period (Stoner, S., 2018). Psychosocial ADHD intervention, similar to SUD, requires psychoeducation. Psychoeducation allows patients to learn further about their disorder and its consequences and that serves as a foundation for developing a strong therapeutic alliance (Carpentier, P., & Levin, F., 2017). CBT has also shown to be effective is reducing ADHD symptoms in adults, however, evidence suggest cognitive problems associated with ADHD may hinder individuals who are receiving CBT for SUD. Thus, more individualistic treatment methods may be a better approach for co-occurring ADHD and METH use disorder patients (Carpentier, P., & Levin, F., 2017).

ADHD and METH use disorder in the Arab World

Research on ADHD and METH use are scarce in the Arab region compared to other parts of the world. Conveniently, there has been a noticeable increase in data in recent years. The following subsections reviews literatures in the Arab world including aspects such as ADHD in the Arab region and in the UAE, SUD in the Arab region and the UAE, and management of ADHD and SUD in the Arabian Peninsula.

#### ADHD in the Arab region

A systemic review on of the epidemiology of ADHD in Arab countries was conducted in 2016 created a well-rounded perspective on the data available (AlKhateeb, J. & AlHadidi, M., 2016). This study encompassed 58 articles from regions such as Jordan, Saudi Arabia, Tunisia, Bahrain, Egypt, Lebanon, Qatar, Kuwait, Iraq, Palestine, Oman, Sudan, and United Arab Emirates. In exploring the prevalence of ADHD in children between 6-12 years of age, the range was 7.8-11.1%. Studies on adult ADHD were limited. A study taken place in Lebanon yielded an estimate of 1.8% of adult ADHD and the low results were attributed to the usage of a structural interview and the under-reporting of the target population due to the taboo ideology of mental disorders in the Arab world. A subsequent study conducted in Iraq showcased a larger estimate of 16.6% that is significantly related to heavy nicotine intake (p=0.0001) (Alhraiwili, N., et al., 2015). However, it is unknown whether smoking is a risk factor or a repercussion of ADHD. Parallel to worldwide statistics, Arab countries have also shown a predominance in male to female ratio. In 2019, a review on adult ADHD in the Arab world was conducted by Hayek, G., and colleagues. Common themes extracted from the review were sleep problems, poor school performance, low socioeconomic factors, vitamin D deficiency, bottle-fed infants, family relationship, and psychiatric disorders in association with ADHD. Psychiatric disorders that were frequently found in

relation to ADHD worldwide and in Arab regions include, conduct disorder, anxiety disorder, obsessive compulsive disorder, learning disorder, autistic spectrum disorder, post-traumatic stress disorder and SUD (AlKhateeb, J. & AlHadidi, M., 2016).

#### ADHD in UAE

A study conducted in the UAE on the prevalence of ADHD among school aged children (n. 200) demonstrated that 12.5% of children have ADHD symptomatology. The study subdivided the categories into combined type (1.5%), inattentive type (7.5%), and hyperactive impulsive type (3.5%). Children with ADHD inattentive type were predominately males, which is similar to worldwide statistics. Interestingly, however, child individualities, parent's sociodemographic status, family setting and parenting styles were non-significant predictors of ADHD hyperactivity-impulsivity type (Khamis, V., 2011). An epidemiological study regarding the topic of ADHD amongst school children has been conducted in 2009 focused on children from 6-15 years of age in Dubai, Al Ain, and Ras-Al Khaima to represent the urban and rural population of the UAE. Parents and teachers were asked to perform the Conner Parent Teacher Scale, which showcased 4.1% of ADHD as reported by parents and 3.4% as reported by teachers. The study further noted that ADHD is generally found with other psychiatric conditions, which is consistent with world-wide data (Eapen, V., et al., 2009). An even earlier study, conducted in 1999, looked into hyperactivity symptomology amongst children in the UAE (n. 1110). The children were asked to perform the Conners Classroom Rating Scale to evaluate their ADHD and found an overall prevalence of 14.9% (Bu-Haroon, A., et al., 1999).

SUD in the Arab Region

There are an estimated 500,000 drug user in the Arabian Peninsula, primarily in areas such as North Africa, Egypt, Syria, and Lebanon. Despite the fact that many Muslim countries follow the Sharia law and have more conservative social and cultural expectations, drug and alcohol abuse are still a rising problem (AlMarri, T., 2009). It has been reported by Flynn, P. (2019) that AMP abuse is one of the most common form of abuse in Arab regions, in addition to, alcohol, hashish, and heroin. The World Drug Report (2013) released data after investigating the MENA region, which involved countries such as: Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, the United Arab Emirates (UAE), the West Bank & Gaza, and Yemen. The report confirmed the upraise in the use of cannabis, khat, and amphetamine-like substances (ATS). Notable suppliers of cannabis resin are found in Lebanon, while cannabis herb is primarily supplied by Egypt who are considered a primary drug trafficking country for the rest of the Middle Eastern and North African (MENA) region. Khat, on the other hand, is legally cultivated and consumed in Yemen and Djibouti as mild plantbased stimulant. Captagon, which are ATS in tablet form, are also highly produced in Lebanon. METH is usually produced in Benin and Nigeria and trafficked to countries such as Libya, Egypt, Qatar, and the UAE, in route to Thailand and Malaysia as shown in (Figure 3).



Figure 3: METH trafficking routes from Benin and Nigeria to East and South-East Asia - World Drug Report (2013)

In North Africa and the Middle East, substance use has been on the rise since 2012. Alcohol consumption, in particular, has risen in countries such as Qatar and the UAE, but have fallen in countries such as Bahrain, Djibouti, and Syria. Reports on female drug and alcohol use in these regions are extremely minute, in comparison to worldwide data, primarily due to stigma. Only one study conducted in Iran produced valuable results on female drug users showcasing that around 700,000 of the 3 million people who use drugs are women (Rezaian, J. 2014).

#### SUD in UAE

Substance use has been viewed and treated as a criminal act in the UAE until Federal Law No. 8 of 2016 was released stating all those suffering from SUD to be offered treatment. This law has been amended from 1995, which offers an obvious reduction in punishment, especially for first time offenders (STA Firm Law, 2020). Nonetheless, the first substance dependence treatment facility in the UAE has been established in Abu Dhabi (AD) 2005, known as the National Rehabilitation Centre (NRC). A study conducted in 2015 in NRC investigated the pattern of SUD amongst 250 male subjects in the UAE. Poly-substance users ranked as the highest with 84.4 % with a wide range of substance combinations amongst different age groups. The most common substances used were opioid and alcohol. Those younger than 30 were found to engage in pharmaceutical opioids such as tramadol, while those 30 and above engaged in illicit opioids such as heroine. Those results could be an indication of tolerance development, which suggests the insufficiency of the effect of the substance used initially thus resorting to more potent drugs (NIDA, 2017). The subjects were also found to engage in non-medicinal use of prescribed drugs such as Pregabalin (mean of 8.3 capsules), Procyclidin (6.1 tablets) and Carisoprodol (4.2 tablets) (AlBlooshi, H. et al., 2016). Following the decree in 2016, Erada Centre for Treatment and Rehab was established in Dubai. The pattern of use at Erada Centre portrays a variety of substances from data collected since 2017 up to May 2021. It is showcased that since 2017 AMP and METH are the most commonly abused drug amongst patients attending Erada centre, followed by opiates and pregabalin (Figure 4).



**Figure 4:** Drug use screener results in the outpatient clinic 2017-2021 - Erada Centre for Treatment and Rehab (2021)

# SUD and ADHD in the Arab Region

#### A study conducted in Egypt on the

#### prevalence and characteristics of adult attention deficit

*hyperactivity disorder among substance use inpatients* in 2013 found high rates of adult ADHD (35.3%) in substance use patients in association with a more complex case of SUD. The ADHD diagnosis of patients with SUD apparently showcased an earlier mean age of substance initiation, larger number of admissions in hospital facilities, and shorter mean period of abstinence (AbdekKarim, A., et. al., 2013). The methods used to retrieve these results included Arabic version of Wender Utah Rating Scale (WURS) for retrospective childhood symptoms of ADHD and Arabic version of Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist to screen adult ADHD.

#### Management of ADHD and SUD in the Arab Region

Treatment of any psychiatric disorder, such as ADHD and SUD in this case, is shown to be difficult when it to comes to Arab families due to the stigma that accompanies it. A study on Arab Immigrant Muslim Mothers' Perceptions of Children's Attention Deficit Hyperactivity Disorder by AlAzzam & Daack-Hirsch (2015), explored this matter further. The study yielded interesting results suggesting that mothers were able to identify the seriousness of their children's diagnosis of ADHD but were reluctant to seek professional help due to societal stigma in the Arab culture. Nonetheless, in addition to the pharmacological and psychosocial approaches mentioned previously in treating both ADHD and SUD, Muslim countries, in specific, uphold a great significance for spiritual healing. Substance use disorder treatment have constantly implemented the biopsychosocial spiritual approach to treatment, especially when involving 12-step themes as they considerably embody spirituality in their program (Heinz, A., et al., 2010). In the Islamic faith, drug and alcohol consumption is strictly forbidden and engagement in those acts are viewed as deviation from what is written in the Holy Quran (Hegarty, S., 2020). Thus, encompassing spirituality and religion in treating those with substance use provides generally great results. At Erada centre, spiritual groups and individual therapy sessions are enmeshed with world-renowned evidence based therapeutic approaches to provide a well-rounded, culturally accepted treatment program.

# Methodology

The methodological aspects of this thesis were carefully selected after thorough discussions and investigations. The sections involve the following: study design, inclusion criteria, data collection (instruments, variables, and participants), data analysis, ethical considerations, consent, data protection, and research timetable.

# Study design

This quantitative cross-sectional study was based at Erada Centre for Treatment and Rehabilitation. Erada Centre is a government organization located in Dubai, UAE. It was established to serve both male and female individuals who suffer from SUD from 18-65 years of age. Male patients coming in for initial assessment/reassessment and patients already receiving rehabilitation (inpatient or outpatient) at Erada Center with current or previous use of METH either with or without other substances have been given an information sheet and consent to take part in the study. The drugs are confirmed through verbal disclosure and drug tests performed at Erada Centre laboratory, which can be retrieved once updated on the system Medical Electronic System. Patients are further diagnosed with SUD through a rigorous assessment process involving nurse, rehab specialist, and psychiatrist using tools such as Addiction Severity Index.

Category	Criteria
Gender	Male
Age	Above 18 years
Nationality	Emirati
Status	Individuals coming if for initial
	assessment or reassessment, in addition
	to those already receiving rehabilitation
	(inpatient or outpatient)

# Inclusion criteria

Substance of abuse	Current or previous use of METH
	either with or without other substances

**Table 1:** Inclusion criteria including the following aspects: gender, age, nationality, status, and substance of abuse

Data collection

Instruments

Data was collected using Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener (Appendix 4) - Arabic Version (WHO, 2013). The self-report scale is divided into two parts: A and B. It was developed by the World Health Organization and follows the DSM diagnostic criteria for ADHD. In part A, if four or more marks appear in the darkly shaded boxes then the patient has symptoms highly consistent with ADHD in adults and additional investigations are necessary. Part B, on the other hand, provides additional insight into patient's symptoms. It is stated that the six questions in Part A are the most predictive of the disorder. The scale is a brief and easy-to-use tool and has been shown to properly identify adults who meet the ADHD diagnostic criteria in treatment settings and the general population (Shire, 2018).

# Variables

As data was collected, they were subsequently documented and updated using Microsoft Excel. Categories in the variable sheet were as follows: name, program, age (in years), age of first dose (in years), METH use only (Yes/No), METH with other substances (Yes/No), Past METH use (Yes/No), Current METH use (Yes/No), Drug test (Positive/Negative), METH and benzo (Yes/No), METH and pregablin (Yes/No), METH and opiates (Yes/No), Route of administration (smoking/IV), 18 item self-report scale (never, rarely, sometimes, often, very often), and finally if the participants meet ADHD criteria (Yes/No).

#### Participants

Forty-four (n. 44) Emirati male participants with current or past METH use receiving services at Erada centre agreed to take part in the study by reading the information sheet and signing the consent. Only males were chosen for the purpose of this study as the number of female patients attending the center on a regular basis was limited. The sample size was smaller than anticipated primarily due to time restrictions.

#### Data analysis

In order to determine the ADHD prevalence in METH users attending Erada Centre, IBM Statistical Package for the Social Sciences (SPSS, v. 28) was used to analyze the quantitative data. The different categorical variables were compared using the Chi-square test. Data collected were further developed into graphs and tables through Microsoft Excel to clearly demonstrate the results found.

### Ethical considerations

Prior to conducting the study, ethical approval has been obtained from three separate entities: Dubai scientific research ethics committee (DSREC), Dubai medical college ethical committee, and Erada Centre internal research committee (Appendix 1, 2, 3, & 3.1).

#### Consent

Participants were given the information on the study in person upon initial meeting and were asked to sign the consent form after fully understanding the information written prior to engaging in the self-report scale. The consent form
included details on the project and the researchers contact information such as name and mobile number. It also included a statement, which was obligatory to be included by the Dubai Scientific Research Ethics Committee (DSREC), to protect participant's rights. The statement acknowledges and safeguards participants by providing them direct email and phone number to be used in case of any harm during the study. It was also explained to participants that, this study presents no potential risks to them, and they will not be named in subsequent write ups and material submitted for publication.

## Data protection

Data collected were in encrypted files on a laptop protected by a complicated password. The laptop was kept in a locked office outside business hours. The backup of data was created in another computer protected by a different password. No access to the data was permitted by anyone apart from the researcher and supervisors as necessary. In addition to being protected by locks and passcodes, participant's names were modified by using initials and file numbers to ensure anonymity.

## Research Timetable

Proposal	Ethical	Data	Data	Data	Data	Reflection	Research
	Approval	Collection	Analysis	Interpretation	Discussion		finalization
				F			and
							presentation
			-	-			~ .
November	April	April-May	June	June 2021	July 2021	August	September
2020	2021	2021	2021			2021	2021

Table 2: research timetable including dates starting from November 2020 until September 2021.

## **Results**

The results discuss the important findings accumulated throughout the study. As mentioned earlier, the aim of the study is to explore the prevalence of ADHD among METH users. Initially, information of participant demographics will be shared, followed by participant program distribution, then the percentage of past versus current METH users amongst the participants. Additionally, METH users distributing categories, METH route of administration, laboratory Drug test results, and the poly-drug pattern of METH use amongst participants are also demonstrated. Furthermore, results from the 18-question self-report ADHD scale filled by participants with current or history of METH use is explored. Conclusively, data was analyzed through the SPSS using crosstabulation and Chisquared, which looked into the association of route of administration and ADHD, age of first use and ADHD, METH in combination with opiates and ADHD, and METH in combination with pregabalin and ADHD.

Participants' demographics	
Total number of participants	44
Mean age of participants	28.1
Median age of participants	27
Range age of participants	18-39
Mean age of first use	17.8
Median age of first use	17
Range age of first use	10-33
Number of participants who meet criteria of ADHD	11 (25%)
Number of participants who do not meet criteria of	33 (75%)
ADHD	

**Table 3:** participants' demographics including total number of participants, mean age of

 participants, median age of participants, range age of participants, mean age of first use, median

 age of first use, range age of first use, number of participants who meet ADHD criteria, and

 number of participants who do not meet ADHD criteria.

A total of 44 participants with the mean age of 28.1 years took part in the study. All participants were male and had an Emirati nationality. The youngest participant with either history or current use of METH was 18 years old and the oldest was 39 years old. The age of first dose of any substance amongst the participants ranged from 10-33 years. Among them, 25% met the criteria of ADHD.





Participants were contacted at Erada Centre and were primarily divided into three categories. Around 43.2% of the participants were residential patients seeking treatment in the inpatient program (n. 19). While 54.5% of participants were coming in for initial assessment to seek services for their METH or poly substance use disorder (n. 24). Furthermore, only one patient who came in for reassessment after experiencing relapse had agreed to take part in the study (2.3%). Although the number of participants for the reassessment category is minor, many patients come in for reassessment regularly due to the relapsing nature of the disorder.



**Figure 6:** Percentage of participants who currently use METH (27.3%) and the percentage of participants who used METH in the past (72.7%).

As the study is focused on the prevalence of ADHD in METH users, it is essential to have participants who currently struggle from METH use disorder or had a history of METH use. What is found is that 27.3% of participants currently use METH, while 72.7% have a past of using METH.



Figure 7: METH use categories including METH & opiates (31.8%), METH & pregabalin (31.8%), METH & benzo (13.6%), METH & other (52.3%), and METH only (2.3%).

Interestingly, majority of participants did not use METH in isolation from other substances. Participants mainly abused METH in combination with opiates (31.8%) and pregabalin (31.8%). After that comes METH in combination with benzo with 13.6%. Amongst the participants, METH is also found in combination with other substances such as Tetrahydrocannabinol (THC), Phencyclidine (PCP), and Methylenedioxymethamphetamine (MDMA).





In exploring the route of administration amongst the participants, it is apparent that 63.6% would use METH intravenously (IV). The other common method of METH use found issmoking with 34.1%. One participant has an unknown route of administration.



**Figure 9:** Laboratory drug test results of participants including total number of participants (n. 44), positive drug test (n. 39), positive METH (n. 30), positive other (n. 14), and negative (n. 5).

As mentioned earlier, participants use of substances, specifically METH, is verified through verbal confirmation and lab tests done at Erada Centre. The figure above shows that 39 participants have positive drug test indicating that they have substances in their system during the time of the ADHD screening test. Out of the 39 participants, 30 of them are positive for METH, while 14 are positive for other substances. Lastly, 5 presented with a negative drug test indicating that their bodies are clean from substances during the screening test for ADHD.



**Figure 10:** common pattern of METH use amongst participants are combinations such as METH & pregabalin (n. 14), METH & opiates (n. 14), METH & benzo (n. 6), METH & THC (n. 3), METH & PCP (n. 1), and METH & MDMA (n. 1).

As shown in the figure above, fourteen (38.8%) participants reported using METH is combination with pregabalin. The same amount of 38.8% used METH in combination with opiates. The third most common combination is METH and benzo with 13.6%. The least substances found in union with METH is THC with 6.8%, PCP with 2.3%, and MDMA with 2.3%.



Figure 11: Part A (questions 1-6) of the Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener

As mentioned earlier, the first six questions which are presented above are the most predictive of the disorder. Assessors should, however, also pay attention to the darkly shaded responses such as very often and often in all 18 questions and (sometimes) in question 1,2,3,9,12,15,18. Patients were asked to place a mark on the box options (never, rarely, sometimes, often, very often) for each question that best applies to how they felt or conducted themselves in the past 6 months. Regarding the first question, thirteen reported never and six reported rarely having trouble wrapping final details of the project once the challenging parts were done, while, nine (darkly shaded) reported sometimes, eleven reported often, and four reported very often giving a total of 24 leaning towards having difficulty in

finalizing details in projects or assignments. The second question on the difficulties of getting things in order in tasks that require organization, sixteen reported never and 9 reported rarely giving a total of 25 leaning towards not having difficulties in getting themselves organized in tasks. While twelve reported sometimes (darkly shaded), five reported often, and only two reported very often in response to question 2. Question three focuses on problems with remembering appointments and obligations and we found that fourteen reported never and four reported rarely having this problem. Whereas eleven reported sometimes (darkly shaded), eight reported often, and seven reported very often in reference to having difficulty remembering. In response to question four, which primarily focuses on procrastination, eleven stated never, seven stated rarely, and 10 stated sometimes. While ten reported often and only five reported very often when it comes to procrastinating on accomplishing tasks that require thought and effort. In question five, behaviors such as fidgeting, and squirming were addressed. Ten participants reported never, six participants reported rarely, and seven participants reported sometimes engaging in such acts when expected to be seated. However, eight reported often and thirteen reported very often having movement in their hands and feet when asked to be seated for a long time. The final question in part A, addresses the feeling of being overly active and compelled to engage in certain behaviors and it was reported that twelve reported never, eight reported rarely, and nine reported sometimes feeling this way. While only three reported often and eleven reported very often in reference to the feeling of compulsion and over activity.



Figure 12: Part B (questions 7-12) of the Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener

As shown in the figure above, question seven explores the regularity of making careless mistakes when working on a difficult or tedious task and ten participants reported never and six reported rarely, and fifteen reported sometimes. Whereas only five reported often and seven reported very often in response to this question. Question eight explores the difficulty in staying attentive when working on repetitive or boring tasks and it was shown that eleven reported never, ten reported rarely, and seven reported sometimes. While another seven participants reported often and eight reported very often. The ninth question addresses the difficulty in sustaining your concentration to what other are saying even when they are speaking directly at you. It was found that eleven reported never having difficulty, another eleven reported rarely, followed by another eleven participants reported sometimes (darkly shaded), with six reporting often, and lastly four reported very often. In reference to question ten on misplacing or having difficulty finding things, eleven reported never, nine reported rarely, and another nine reported sometimes. Whereas nine reported often and only five reported very often. The eleventh question addresses the level of distractibility by noise or activity around and five reported never, four reported rarely, seventeen reported sometimes, eight reported often, and nine reported very often. Question 12 looks into how often the participants would leave their seats when expected to remain seated and it was found that fourteen reported never and twelve reported rarely. While seven stated sometimes (darkly shaded), five stated often, and four stated very often.



# Figure 13: Part B (questions 13-18) of the Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener

In question 13, four participants reported never, and another four participants reported rarely feeling restless or fidgety, while 14 reported sometimes. As shown above, five participants reported rarely and fifteen reported very often in response to question 13. In response to question 14 on difficulty in unwinding and relaxing, 16 participants reported never, five participants reported rarely, and six participants reported sometimes. Whereas six participants reported often and ten participants reported very often. Sixteen participants reported never, and five participants reported rarely talking excessively in social situations in response to question 15. While ten reported sometimes (darkly shaded), eight reported often, and only three reported very often. Question 16 addresses the behavior of interrupting other or finishing others sentences and it is shown that thirteen reported never, eight reported rarely, ten reported sometimes, six reported often, and another six reported very often. On the matter of difficulty in waiting your turn as shown in question 17, sixteen reported never, five reported rarely, and 12 reported sometimes. Although only six reported often and four reported very often. The final question in part B, looks into the behavior of interrupting others while they are preoccupied and 15 reported never and nine reported rarely. Whereas seven reported sometimes (darkly shaded), only two reported often, and eight reported very often.

#### Chi-squared test

In the crosstabulation below, it is shown that 8 out of the 28 IV METH users meet ADHD criteria and 3 out of the 15 METH smokers meet ADHD criteria. The chi-square test was used to examine the relationship between route of

administration and ADHD criteria. Evidently, the relationship between route of administration (smoking or IV) and ADHD criteria is non-significant (p>0.05).

Route of administration (Smoking or IV) *									
ADHD criteria (Yes/No) Crosstabulation									
		Does	partic	ripant					
		meet ADHD criteria?							
		(Yes/	No)						
		Yes	No	Total					
Route of	IV	20	8	28					
administration									
(Smoking or	Smoking	12	3	15					
IV)									
Total		32	11	43					

Chi-Square Test										
	Value	df	Asymptotic	Exact	Exact					
			Significance	Sig.	Sig.					
			(2-sided)	(2-	(1-					
				sided)	sided					
Pearson	.377	1	.539							
Chi-Square										
Continuity	.061	1	.805							
Correction										
Likelihood	.387	1	.534							
Ratio										
Fisher's				.719	.410					
Exact Test										
N of Valid	43									
Cases										
a. 1 cells (25.0%) have expected count less than 5.										
The n	ninimum	expe	ected count is 3.	84.						
b. Comp	outed onl	y for	a 2x2 table							

In the second crosstabulation demonstrated below, it is shown that amongst those who started using substances at a later age (=>18), 3 out of the 19 meet ADHD criteria. While those who started using substances at a younger age (<18) 8 out of the 25 meet ADHD criteria. The chi-square test is used to examine the relationship between age of first use and ADHD criteria. Conclusively, the relationship between age of first use (child < 18 or adult => 18) and ADHD criteria is non-significant (p<0.05).

Age of first use (child < 18 or adult =>				Chi-Square Test						
18) * ADHD criteria (Yes/No)				Value	df	Asymptotic	Exact	Exact		
	Cro	sstabula	tion					Significance	Sig.	Sig.
	_	Does pa	articipan	t meet				(2-sided)	(2-	(1-
		ADHD	criteria?	•					sided)	sided
	(Yes/No)			Pearson	.140	1	.709			
		Yes	No	Total	Chi-					
Age	Child	16	3	19	Square					
of	Adult	17	8	25	Continuity	.000	1	1.000		
first					Correction					
use					Likelihood	.138	1	.711		
(child					Ratio					
< 18					Fisher's				.722	.490
or					Exact Test					
adult					N of Valid	44				
=>					Cases					
18)					a. 1 cells	s (25.0%	) have	expected coun	t less tha	n 5.
Total		33	11	43	The r	ninimun	ı expec	cted count is 3.	50.	
	b. Computed only for a 2x2 table									

The crosstabulation below shows that amongst those that use METH exclusively or with other substances (other than pregabalin), 7 out of 30 meet ADHD criteria. While those who use METH in combination with pregabalin specifically, 4 out of 14 meet ADHD criteria. The chi-square test is used to analyze the relationship between METH and pregabalin use and ADHD. The results demonstrated that the relationship between METH and pregabalin and ADHD criteria is non-significant (p>0.05).

METH w	vith Pre	egabalin	(Yes/N	0) *								
ADHD criteria (Yes/No)					Chi-Square Test							
Crosstabulation						Value	df	Asymptotic	Exact	Exact		
	Does participant					Significance	Sig. (2-	Sig.				
meet ADHD					(2-sided)	sided)	(1-					
	criteria? (Yes/No)							sided				
		Yes	No	Total	Pearson	1.513	1	.219				
METH	Yes	4	10	14	Chi-Square							
with	No	7	23	30	Continuity	.772	1	.380				
Pregabalin					Correction							
(Yes/No)					Likelihood	1.568	1	.211				
Total		11	33	44	Ratio							
Yes: METH with Pregabalin			Fisher's				.301	.191				
No: METH with other substances or				Exact Test								
METH only			N of Valid	44								
<u> </u>					Cases							
					a. 1 cells	s (25.0%)	hav	e expected coun	t less that	n 5.		

The minimum expected count is 4.75.

**b.** Computed only for a 2x2 table

The last crosstabulation as shown below, demonstrates that amongst those that use METH exclusively or with other substances (other than opiate), 5 out of 30 meet ADHD criteria. While those who use METH in combination with opiates specifically, 6 out of 14 meet ADHD criteria. The chi-square test is used to analyze the relationship between METH and opiate use and ADHD. The results demonstrate that the relationship between METH with opiates and ADHD criteria is non-significant (p>0.05).

					Chi-Square Test						
METH wit	h Opiat	/No) * A	ADHD		Value	df	Asymptotic	Exact	Exact		
criteria	(Yes/No	tabulat	ion				Significance	Sig.	Sig.		
		Does p	particip	ant				(2-sided)	(2-	(1-	
		meet ADHD							sided)	sided	
		criteria? (Yes/No)			Pearson	3.492	1	.062			
		Yes	No	Total	Chi-						
METH	Yes	6	8	14	Square						
with	No	5	25	30	Continuity	2.235	1	.135			
Pregabalin					Correction						
(Yes/No)					Likelihood	3.330	1	.068			
Total		11	33	44	Ratio						
Yes: METH	l with C	piates			Fisher's				132	070	
No: METH with other substances or				Exact Test				.152	.070		
METH only			N of Volid	44							
						44					
					Cases	( <b>a a c</b> -					
					a. 1 cell	s (25.0%	6) ha	ave expected co	ount less	than	

- 5. The minimum expected count is 3.50.
- b. Computed only for a 2x2 table

#### Discussion

The findings showcase that from a total of 44 participants 25% met ADHD (A-ADHD) criteria after completing the 18-item self-report scale. Comparatively, Mihan et al (2018) found a prevalence of A-ADHD to be 10.4% amongst 134 participants with a history of METH use. Obermiet et al (2013), found a similar result of 21% after studying 400 individuals with METH use disorder over the course of 18 months with 355 non-METH users as a comparative group. Although there were previous studies that found larger percentages of ADHD in METH users such as the Japanese study on childhood histories of ADHD in METH users (n. 54). They found that 55.6% of METH abusers ranked high on the rating scale for ADHD (2005). However, the study has been shown to have methodological downfalls. Obermiet and colleagues (2013) also found that METH users with a lifetime diagnosis of ADHD are more likely to be impacted in regard to daily activities, are less likely to be employed, and will probably have a harder time in following a substance treatment regimen. Individuals diagnosed with ADHD experience "more severe psychiatric symptomatology, stronger associations with the positive psychological effects of substances, more severe substance abuse and drug related problems, reported more drug cravings and had a harder time resisting use" when attending a drug treatment facility (Obermiet, L., et al., 2013). Although, our study did not focus on the treatment experience of METH users that fit ADHD criteria, information gathered from other studies help cater this group of individuals.

As the participants were current or past METH users either in solitary or with other substances, it was interesting to see the ADHD symptomology they scored high in (often – very often) and the symptomology they scored lower in (never – rarely). The most predictive questions of the disorder are questions 1-6

(Part A), as mentioned earlier. Almost half the participants reported that they very often or often fidget or squirm with their hands and feet when asked to sit for a long time (n. 21). While the majority of participants reported never or rarely having trouble getting things organized (n. 25). Moreover, 19 participants never or rarely have difficulty wrapping up final details of a project or task. Additionally, 18 participants reported never or rarely having difficulty remembering appointments. Another 18 participants reported that they never or rarely avoid or delay getting started on tasks. Another common symptomology amongst this population is feeling overly distracted by noise around them. In addition to that, many participants reported feeling restless. As the first six questions are the most indicative of the disorder, these results suggest that the majority of the 44 METH participants do not have ADHD symptomology as the majority of responses being never and rarely. However, the symptoms that many of them reported having such as feeling fidgety, restless, and overly distracted coincides with withdrawal symptoms of METH use. As people who withdraw from METH feel extremely restless, distracted, and fidgety due to going on days on end without sleep (NIDA, 2019).

In the study, many aspects were further explored in association with criteria of ADHD. One of these aspects is route of administration and it was found that the most common methods of METH intake was either IV or smoking. Route of administration and ADHD criteria have showcased a non-significant association. Age of first use was also further investigated in association with ADHD criteria. The mean age in years of first use of any substance was 17.8, which is interesting as the mean age in years of first use of METH in the study by Mihan et al. (2018) was also 17, however, the mean age in years of first use of any substance was 12. The age of first use for any substance and the age of first use of METH was not

segregated in our study. Furthermore, there were no significant association between age of first use and ADHD criteria. Other studies, however, did find an association between co-morbid ADHD and SUD and lower age of initiation (SAMSHA, 2015 and AbdekKarim, A., et. al., 2013). The commonest used substances in combination with METH from most used to least used were: pregabalin (14), opiates (14), benzo (3), THC (3), PCP (1), and MDMA (1). METH and opiates are often used in combination, which increases the likelihood of fatal outcomes (Sheehy, C., 2021). The highest ranking was pregabalin and opiates, thus they were further explored in association with ADHD criteria. Again, no significant association was found.

### **Limitations**

Methodological limitations of the study need to be acknowledged as part of the reason for the results of the study. The study had a small sample size of 44 participants due to primarily time restrictions. Comparatively, other studies had similar sample sizes, or more but none had less. In exploring the topic at hand, results were scarce worldwide but it was interesting to find one middle eastern study in particular investigating ADHD in METH users, which was by Mihan et al. (2018). Numerous studies investigated ADHD and SUD, which included a wide variety of substances such as alcohol, opiates, stimulants, and more but focus on METH or stimulants in general in relation to ADHD was harder to find. In this study in particular, only one participant used METH exclusively. The fact that the participants were polysubstance users may have altered the results by either masking or exaggerating ADHD symptoms. Furthermore, studies reflected primarily on childhood ADHD as A-ADHD is usually a neglected or rare topic to be studied or even diagnosed. For that reason, several studies fell into what is known as recall bias as they followed a retrospective approach of data collection

(Bonvicini, C., et al., 2016). Nonetheless, the prospective nature of this study yielded different results as current ADHD symptomology was investigated. Another limitation to consider is that the cross-sectional study design produced findings on association and not causation. Additionally, the participants were gathered from one rehabilitation service in the UAE, which might prevent the generalization of results. This study also only used one instrument to identify A-ADHD symptomology, while other studies might have used several. On that note, the self-report dynamic of the screener may impact the results due to unconscious or conscious bias. Fortunately, however, the participants all shared the same gender and ethnicity thus making the study more focused.

#### **Implication**

The study is the first of its kind in the UAE and in producing such a study, the primary goal was to use the findings to better serve the people. It looks at the prevalence of A-ADHD amongst current or past METH users. As the participants were primarily polysubstance users, it is recommended for future work to focus exclusively on participants whom only use METH. Nonetheless, it was important to explore the association and check for significance to protect those with childhood ADHD through early intervention to prevent future consequences such as SUD and METH use disorder. Studies have found that treatment for ADHD in childhood shields them future SUD and other risky behaviors (SAMSHA, 2015). In the Arab culture, regrettably, a large portion of people divert away from seeking treatment from mental disorders for reasons such as stigma or misinterpretation of the situation. Many families would view these illnesses as supernatural, which will lead them to treat it through religious scholars instead of conventional medicine (Dardas, L. & Simmons, L., 2015). Regular screening for ADHD in SUD treatment facilities and routine screening of SUD for individuals with A-ADHD diagnosis is

essential for proper referral to the devoted facility. The 18-question self-report questionnaire is reliable to identify specific ADHD symptomology amongst individuals, however, if individuals do fit the criteria, then a follow up assessment by a specialist should take place for proper diagnosis. Although, treating SUD and ADHD together could serve as a challenge, the UAE has come a long way in acknowledging SUD as a disorder and in treating any consequences that could accompany the disorder. Future research is also required with a larger sample size, proper ADHD diagnosis through specialist assessments on individuals and their parents, and a greater time frame to be able to carry the study out.

### **Conclusion**

This study supports the notion that individuals with A-ADHD have a twenty-five percent chance of engagement in METH use at some point in their lives. Specific ADHD symptomology were at peak amongst these group of people including fidgeting and squirming, feeling distracted by activity or noise around them, and feeling restless. It was also interesting to see the lack of significant association between route of administration and ADHD, age of first substance use and ADHD, pregabalin and METH combination and ADHD, and lastly opiates and METH combination and ADHD. Although many challenges occurred during the course of the study with regard to participants' inclusion criteria, the results provided are still crucial to the community. Early ADHD screening and treatment can significantly shield them from resorting to methods of self-medication by using illicit stimulants such as METH. Future endeavors in this field will be carried out in hopes to create a fuller and clearer picture for those struggling and those willing to help.

#### **Reflection**

As the dissertation for my MSc in Addiction Science has come to an end, it is important to look back and reflect on the unique experiences witnessed firsthand through the journey of thesis completion. Throughout the course of the study there were definite positive aspects, especially revolving personal growth but there were also some challenging situations that were hindering the study progress. I can start by shining light on the numerous positive attributes that emerged from developing the study. One of the most prominent aspects is confidence. Confidence in conducting research, in management of time, in performing statistical analysis, and in presenting the findings. The study also required a great deal of teamwork and communication between the supervisors and myself to ensure the best of my capabilities are put on paper. The challenging attributes, on the other hand, involve primarily the process of application for ethical approval and time constraints. These experiences have catapulted me significantly as a researcher and a clinician.

## Experience

In September 2019, my journey in the MSc program started. We met with the Dean and the professors for orientation, and we were asked about our ideas for our Masters' dissertation. Since that day, a flood of ideas emerged and after careful consideration and discussions with my clinical and academic supervisors, the topic of prevalence of ADHD in METH users attending Erada Centre came to life. In November 2020, I began to assemble the research proposal, which involved many revisions of previous papers by many different authors. After producing the proposal, the next step involved obtaining an ethical approval from the following entities: Dubai Medical College ethical committee, Erada Centre research committee (study site), and Dubai Health Authority (DHA). The DHA ethical

approval requirement was introduced later down the line and it was curveball as initially we were not expected to receive an ethical approval from an external entity. As a result, the study was placed on hold for months until DHA approval was obtained, which delayed the study progress significantly. The process of obtaining ethical approval was tedious and time-consuming but it opened my eyes to the unpredictable nature of conducting research. Thankfully, the college decided to extend the deadline from mid-July to end of September. Following the ethical approval debacle, it was time for data collection and data analysis. Data collection started of smoothly, however, after deciding to increase the sample size midway, the inclusion criteria had to be reviewed. Originally, the participants had to be attending Erada Centre for the first time for initial assessment, however, that was changed and patients from different treatment programs were asked to take part in the study. Furthermore, data analysis required regular meetings with the head of the head of Research Committee at DMCG, Prof. Hafez, to decide on the best approach to analyze and showcase the findings. Finally, the writing up of the study, in addition to, producing a poster and presentation was completed with the aid of my academic supervisor, Prof. Nadia, through continuous visitations and feedback either via email or face to face.

## Feelings

There was a rollercoaster of emotions throughout the process of conducting the study. The initial anxiety was triggered when I first embarked in the MSc program after learning I was pregnant with my first child. Having an infant to care for, work obligations, and deadlines, a person is bound to feel frustrated and overwhelmed. The road bumps and unpredictability that accompanied the research added to the feelings of anxiety. There were many times where I felt like I cannot

manage to balance work, education, and a family life. After pushing through and making it to the end, I feel a sense of empowerment I have never felt before in my life. This feeling makes everything I felt throughout the course of writing up my dissertation worth it.

#### Evaluation

#### **Positive Aspects**

The personal positive attributes that helped me during MSc dissertation, includes time-management skills, determination, and enthusiasm. My timemanagement skills have always been an assist, which was particularly enhanced in university when I was obtaining my bachelor degree in psychology and human services. Procrastination is never an option considered, especially with the timeframe for this specific project. Determination was key in this experience, as mentioned earlier, the thought of giving up crossed my mind numerous times but the thought of perseverance was always stronger. The topic of prevalence of ADHD in METH users lights up a fire in me and enthusiasts me, as these study findings with additional future research could protect many children with ADHD from future substance abuse and more METH use disorder. In addition to personal attributes, family support has played a significant part in project completion.

#### Negative Aspects

The lack of experience with being a novice researcher has portrayed challenges as more extreme than they originally are. The strict timelines and rigidity in the schedule have served as a stressor. This has caused a disruption in my performance due personal mental and physical deterioration as it resulted in sleep disturbances and decreased appetite. After acknowledging the importance of flexibility and that life is naturally unpredictable, I became psychological more stable, physically stronger, and my performance was evidently enhanced.

# Concluding thoughts

After careful reflection of my time and efforts towards accomplishing a publishable MSc dissertation, there were many lessons learned from the MSc program and will last for many years to come. Time-management, flexibility, patience, and determination are all key ingredients in writing up a 15,000-word dissertation. The personal and professional growth will definitely make me a better mother, wife, daughter, sister, and employee. The program has given me the opportunity to expand my career and help individuals who are suffering from SUD better.

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## Appendix

#### Appendix 1

December 22nd, 2020

Ayesha A. Ameri,

MSc Addiction Sciences Batch 1 Candidate,

Dubai Medical College,

Dear Ayesha Ameri

(Notes)

Re: Prevalence of Attention-Deficit Hyperactivity Disorder Symptoms in Methamphetamine Users.
Attending Erada Centre.

I am writing this letter to confirm that the Ethics Committee at Dubni Medical College has approved your submitted proposal entitled above, having accommodated the feed-back given in the previous response, including the re-phrasing of the general aims and specific objectives, and providing other requested details. We take this opportunity to wish you all the best for the future. Please inform the Ethics Committee at DMC of publications or oral presentations that might be achieved as a result of this research project. Let us know of any intended changes to the submitted protocol before implementation.

Sincerely,

togener

Dr. Hafez Ahmed,

PhD, MSc, MB BCh, Dip-RCPath (London, Chemical Pathology).

HEA Member (UK), PG-Cert (HED., Kingston University, UK).

Professor of Biochemistry,

Director of Research Ethics Committee,

DMC, Dubai, UAE.



#### DUBAI SCIENTIFIC RESEARCH ETHICS COMMITTEE APPROVAL LETTER



From :	Dubai Scientific Research Ethics Committee (DSREC) Dubai Health Authority	Date :	29 Apr 2021
To:	Ms. Ayesha Ameri, MSc student in the field of Addiction Science, Dubai Medical College for Girls	Ref:	DSREC-SR-04/2021 09
Study Site	ERADA Center, Dubai		20120 011 0172021_07

#### Subject: Approval for the research proposal, "Prevalence of Attention-Deficit Hyperactivity Disorder Symptoms in Methamphetamine Users Attending Erada Centre"

Dear Student Researcher,

Thank you for submitting the above mentioned research proposal to Dubai Scientific Research Ethics Committee, DHA. The Dubai Scientific Research Ethics Committee has been organized and operates in accordance with the ICH/GCP and the committee is registered with the Office for Human Research Protection (OHRP).

Your request was discussed with Dubai Scientific Research Ethics Committee. We are pleased to advice you that the committee has granted ethical approval for the above-mentioned study to be conducted at above mentioned site. However, please approach the Medical Director of the Hospitals to secure permission to review any hospital records and to carry out your study in the hospital.

Please note that it is DSREC's policy that the principal investigator should report to the committee of the following:

- Anything which might warrant review of ethical approval of the project in the specified format, including:
  - any serious or unexpected adverse events and
  - unforeseen events that might affect continued ethical acceptability of the project
- 2. Any proposed changes to the research protocol or study team or to the conduct of research
- 3. Any new information that may affect adversely the safety of the subjects
- 4. If the project is discontinued before the expected date of completion (reason to be specified)
- 5. Annual report to DSREC about the progress of the study
- 6. A final report of the finding on completion of the study

The DSREC approval validity for the study expires on 29 APR 2022 and continuing approval of the research will be subject to the principal investigator submitting an annual report. If you wish to continue, please submit an application for renewal together with the Annual Study site progress report <u>no later than 30 days</u> prior to the expiry date.





DUBAI SCIENTIFIC RESEARCH ETHICS COMMITTEE APPROVAL LETTER



The DSREC wishes you every success in your research.

Yours faithfully,

Dr. Suhail Abdulla Mohd Alrukn Chairman Dubai Scientific Research Ethics Committee Dubai Health Authority

Dubai Scientific Research Ethics Committee Dubai Health Authority Dubai, UAE.




Ayesha Ameri ≺a.ameri@erada.ae>

# **RE:** Letter of approval

To: Ayesha Ameri <a.ameri@erada.ae> Cc: Wael Foad <w.foad@erada.ae>, Hamdy Moselhy <H.moselhy@erada.ae> Raghda Raad <r.raad@erada.ae>

Tue, Nov 24, 2020 at 10:01 AM

Dear Mrs. Aeysha,

Attending Erada Centre. I am writing to you to inform you that the Medical Research committee met yesterday the 23rd of November 2020 and approved your research proposal on the Prevalence of ADHD Symptoms in Methamphetamine Users

FYI, the approval letter is to be signed by the head of the Committee, Prof. Hamdy Moselhy.

Wishing you the best of luck.

Appendix 3

### Appendix 3.1

Dear Dr. Mohammad Fayek - Chief Executive Officer of Erada

I. Ayesha Ameri, would like to request approval for patient participation at ERADA Centre for Treatment & Rehabilitation as part of the Masters of Addiction Science Research Study. The study <u>Prevalence of ADHD Symptoms in</u> <u>Methamphetamine Users Attending Erada Centre</u> aims to understand the correlation between individuals with Attention-Deficit Hyperactivity Disorder (ADHD) symptoms and the use of methamphetamine as a primary substance. Patients will be asked to perform an Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) – Arabic Version. Results from this study will hopefully contribute to Erada Centre's research department and the field of addiction aciences. The following is necessary for research completion:

- Access to new patients attending ERADA Centre
- Access to AURA w/ patient MRN for background & drug test confirmation

Participation in this research study is entirely voluntary and participants are able to withdraw at any moment. Confidentiality of patients involved will be taken with the utmost professionalism and caution.

The research proposal is attached, for your reference. If approved, kindly sign below. In advance, sincere gratitude for your cooperation.

Name: Dr. Haundy Moselhy Date: 24 - 11 - 2020 Signature: H MOSELHY Consultant Psychiatry BRIEMITE - 201

Ereda C

Appendix 4

قم يتقدير وجود هذه الأعراض أو أعراض شبيهه في مرحلة الطقولة. الراشدين الذين لديهم اعراض لمرض قرط الحركة وقلة الانتياء ليسوا يحاجة لأن يكون قد تم تشخيصهم رسميا في مرحلة الطفولة. عند تقييم تاريخ المريض انظر للدلائل على الظهور المبكر و المشاكل طويلة الامد مع الانتياء أو ضبط النفس. يحض الأعراض ذات الدلائة يجب أن تكون موجودة خلال فترة الطفولة. لكن ليس هناك حاجة الى وجود كل الأعراض.

قائمة الأعراض لمقياس التقرير الذاتي لمرض فرط الحركة وقلة الانتباه للراشدين (النسخة الأولى)

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					لسنة شهور السابقة. الرجاء اعطي هذا الاختبار	تتصرف خلال
					عاية الصحية ليشرحه لك خلال اللقاء اليومي.	لمتخصص الرء
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					التقاصيل التهانية لمشروع بمجرد قيامك	
					بالأجزاء الصعية منه ؟	
					الى أي مدى تجد صعوية في تربّيب الاشياء	2
					عندما يكون عليك القيام بسهمة تحتاج الى	
					التتطيح؟	
					الى اي مدى يكون لديك مشاكل في تذكر	3
					المواعيد و الالتزامات؟	
					عندما يكون لديك مهمة تحتاج الكثير من التفكير	4
					الى أي مدى تتجنب أي تتأخر عن يدء العمل؟	
					الى أي مدى تتململ أو تلوي يديك أو قدميك	5
					عندماً يكون عليك أن تجلسٌ لقترة طويلة؟	
					الى اي مدى تشعر باتك تشط بشكل مقرط ان اتك	6
					مدفوع لفعل الأشياء وكأتك تقاد يواسطة	
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الاسم:..... تاريخ اليوم.....

التاريخ:

2

	الجزء (ا)
الى اي مدى ترتكب فيها اخطاء يسبب الاهمال عندما يكون عليك العمل في مشروع ممل أو. صعب؟	7
الى اي مدى تجد فيها صعوية في الحقاظ على انتياهك عند القيام بعمل ممل أو. متكرر؟	8
الى اي مدى تجد صحوية في التركيز قيما يقوله إليك الآخرين حتى عندما يتحدثون اليك مباشرة؟	9
الى أي مدى تضع الأشياء في غير مكانها أو. تجد صعوية في العثور على الأشياء في الييت أو العمل؟	10
الى أي مدى تصاب قيها بالتشتت بسبب الازعاج أن التشاطات حولك؟	11
الى أي مدى تترك قيها مكاتك او مقحك في المقايلات أو المواقف الأخرى عندما يكون متوقعا أن نظل جالسا؟	12
الى أي مدى تشعر قيها أنك متوتر أن متململ؟	13
الى أي مدى تجد صعوية في أن تسترخي أو أن تحصول على الراحة عندما يكون لديك وقت لنفسك؟	14
الى أي مدى تجد نفسك تتحدث يشكل مقرط عندما تكون في مناسبات اجتماعية؟	15
عندما تكون في محادثة , الى أي مدى تجد نفسك تنهي جمل الأشخاص المتحدثين إليك قبل أن يتمكنوا من إنهائها بأنفسهم؟	16
الى أي مدى تجد صحوبة في انتظار دورك في المواقف عندما يكون مطلوبا أن تناخذ دورك؟	17

		الى اي مدى تقاطع فيها الآخرين عندما يكونوا مشغولين؟	18
			الجزء (ب)

قيمة القحص والبحث عن الراشدين الذين بعاتون من مرض قرط الحركة وقلة التتباه

البحث يشير إلى أن أعراض مرض فرط الحركة وقلة النتياه يمكن أن تستمر عند الراشدين, ولمها تأثير ذو. دلالة على العلاقات والعمل وحتى على السلامة الشخصية للمرضى الذين قد يعانوا من المرض.

بسبب هذا الاضطراب الذي غلبا ما يقهم خطأ الحيد من الناس الذين يعانون لا يحصلون على علاج مناسب وتكون النتيجة أنهم لا يصلون الى كامل امكانياتهم. جزء من المشكلة ان هناك صعوبية للوصول للتشخيص وبالذات قيما يخص الراشدين.

قائمة الأعراض الخاصة بمقيلس التقرير الذاتي لمرض فرط الحركة والقلة الانتباء للراشدين (النسخة الأولى) تم وضعه بمشاركة منظمة الصحة العالمية ومجموعة عمل في مرض فرط الحركة وقلة الانتباء عند البالغين يتكون من الفريق التالي من الاطباء التفسيين والباحثين:

دكتور /ليتارد أدئر

أستاذ مساعد الطب النفسي والامراض العصبية

كلية الطب - جامعة نيويورك

دکتور / روتاند کیزئر

أستلا بقسم سياسة الرعاية الصنحية

كلية الطب – جامعة هارفارد

دکتور / توماس سیینسر

أستاذ مساعد بقسم الطب النفسي

كلية الطب – جامعة هارفارد

كمهني في الرعاية الصحية يمكنك استخدام هذا المقيلس كأداة لتساعد في الفحص والبحث عن مرضى فرط الحركة و قلة الانتباء عند المرضى الراشدين. من خلال البصيرة التي وصلنا اليها أثناء عمليات الفحص تشير إلى الحاجة إلى مقابلة اكلينيكية أكثر عمقا.

4

Appendix 5

### **RESEARCH CONSENT FORM**

Prevalence of Attention-Deficit Hyperactivity Disorder Symptoms in Methamphetamine Users Attending Erada Center: A Quantitative Cross-Sectional Survey Study

Please read and complete this form carefully. If you are willing to participate in this study, ring the appropriate responses and sign and date the declaration at the end. If you do not understand anything and would like more information, please ask.

I have had the research satisfactorily explained to me in written form by the researcher.

## YES / NO

I understand that the research will involve:

• Completion of Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1)

## YES / NO

I understand that I may withdraw from this study at any time without having to give an explanation.

### YES / NO

I understand that all information about me will be treated in strict confidence and that I will not be named in any written work arising from this study

### YES / NO

I understand that any data collected will be used solely for research purposes and will be erased on completion of the research

### YES / NO

I understand that the data will only be discussed within the research team

## YES / NO

I understand that study participants will not be named in subsequent write ups and material submitted for publication.

### YES / NO

If you are harmed due to someone's negligence, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, you can

# contact Dubai Scientific Research Ethics Committee, DHA on +971 4219 1961/1965 or email on <u>DSREC@dha.gov.ae</u>

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Signature: ..... Name (capital letters).....

Date: .....

Contact	details:	(include	address,	email	and	telephone	number)
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•••••	•••••	•••••	••••••	•••••	•••••	•••••	

Appendix 5.1

Prevalence of ADHD Symptoms in Methamphetamine Users Attending Erada Center: A Quantitative Cross-Sectional Survey Study أعراض اضطراب فـرط الـحركـة ونقص الانـتباه لـدى مـتعـاطه, الـمـثـامـين

أو افق على المشاركة في هذه الدراسة التي وصفت لي وأحطت علما بكافة المعلومات المتعلقة بها وأعلم أن مشاركتي في هذه الدراسة هي إختيارية. كما أنني أحطت علما بأن المعلومات التي سندلي بها في هذه الدراسة ستستخدم لأغراض البحث العلمي ومن خلال هذا الإقرار فأنا أحطت علما أنه يحق لي الانسحاب من الدراسة في أي وقت دون أن يؤثر ذلك على العناية الطبية المقدمة لي وأن كافة المعلومات ستحاط بسرية تامة.

> ولمزيد من المعلومات يمكنك الاتصال ب عائشة آميري – طالبة ماجيستير – كلية دبي الطبية تلفون 3711411 -056

إذا تعرضت للأذى بسبب إهمال شخص أو كان لديك أي مخاوف بشأن أي جانب من جوانب التواصل أو التعامل معك أثناء هذه الدراسة ، يمكنك الاتصال بلجنة أخلاقيات البحث العلمي بدبي ، هيئة الصحة بدبي على DSREC@dha.gov.ae أو بريد إلكتروني على DSREC@dha.gov.ae

وشكرا لكم على مشاركتكم معنا.

التوقيع:	التاريخ:	اسم المريض:
التوقيع:	الناريخ:	إسم الباحث :
التوقيع:	التاريخ:	إسم الشاهد :

# Appendix 6



RESEARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N)

1	Student name: Ayesha Ameri		(weat)
2	Supervisor(s) present Dr. Abdel gim		
3	Date of meeting:		
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	b. On the part of the supervisor(s) 		****
6.	List milestones approaching - with timescales - - Filmical Approval (January) - Data collection (FED)	-9roposal appr	and Occas
7.	Any other activities: Statistical curcilysis		
			*******
8,	Date/time/venue of next meeting: Erector Ere/0.2021		
Candi	date name and signature:		*******
Super	visor name and signature: DALABDELAZIM ALL	ANG	
	Date: 30/8/2021		*****
Studer Profes	nts should send electronic copies of the agreed versions sor Hafez Ahmed, Prof.hafez@dmcg.edu and Dr. Wael P	of these records to: load, w.foad@erada.ae	

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RESE	ARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N)
1.	Student name:
2.	Supervisor(s) present:
3.	Date of meeting
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	b. On the part of the supervisor(s)
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	- Data collection for a period of 600 months Tele 1, 2021 - March 31, 2021
7.	Any other activities: - structured statistical docum entertion - statistical analysis - written proper
.0.	Date/lime/venue of next meeting:
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Superv	DN ABDECARIA ALL A
	Date 30/8/2021
Studeni Profess	s should send electronic copies of the agreed versions of these records to: or Hafez Ahmed, Prof.hafez@dmog.edu and Dr. Wael Foad, w.foad@erada.ae



RESEARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N)

1. Student name: Ayesha Ameri 2. Supervisor(s) present Prof. Nadia Prof. Hafez 4. Topics/work discussed: (Indicative Content) - Data callection Visit state 10.1 Actions agreed – with time scales/deadlines: on the part of the student - Continuation of data collection of Frada - Decomentation of variables Feb + March 2021 (2 molt On the part of the supervison(s) - Follow up of progress 6. List milestones approaching - with timescales -- Data collection for a penod of 2 months reb 1, 2021 - Murch 31, 2021 7. Any other activities: - Structured statistical documentation - NOHAD PROPER 8. Date/time/venue of next meeting: March 2, 2051 Candidate name and signature: Ayesha Ameri -Supervisor name and signature: prof. Madia Mahmand Date: 

Students should send electronic copies of the agreed versions of these records to: Professor Hafez Ahmed, Prof.hafez@dmcg.edu and Dr. Wael Foad, w.foad@erada.ae



RESEARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N) Student name: PMESH A - AMERI 1. 2. 3. Date of meeting . JP / S/202. 4. Topics/work discussed: (Indicative Content) - Vanable: - Dada, analysis Actions agreed – with time scales/deadlines. a. on the part of the student - Produce relevant graphs and Royatt - Die SPSS NO & Chi-square west ice date and the b. On the part of the supervisor(s). T. TERME MR. MERSING 6. List milestones approaching - with timescales -- Graphs + Monrey (2 weeks) Contraction of the second s - Ok - SAMANS JOST (DWERKS) 7. Any other activities: - Completion of matricet, wissingthe new consider and literature X EAGLERAS. Date/time/venue of next meeting: to Queeks - DACCO Candidate name and signature: AMASING PODER Supervisor name and signature: VODD 92 A. Date:.... Students should send electronic copies of the agreed versions of these records to: Professor Hafez Ahmed, Prof hafez@dmog.edu and Dr. Wael Foad, w.foad@erada.ae

RESE	ARCH STUDENT SUPERVISION MEETING RECORD FORM-ADD16 and 918(N)
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Superv	pref Maden Pahmand
	Date:
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REat	ARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N)
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2.	Supervisor(s) present:
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RESEARCH STUDENT SUPERVISION MEETING RECORD FORM-AD916 and 916(N)

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Professor Hafez Ahmed, Prof.hafez@dmog.edu and Dr. Wael Foad, w.foad@erada.ae