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1. lékařská fakulta

Autoreferát disertační práce



UNIVERZITA KARLOVA
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**Individuální, sociální a kulturní faktory, které formují užívání
stimulačních drog v Evropě.**

(Individual, social and cultural factors shaping the use of amphetamine-
type stimulants in Europe)

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Preliminary Note

The cumulative dissertation is mainly based on the ATTUNE project (“Understanding Pathways to Stimulant Use: a mixed methods examination of the individual, social and cultural factors shaping illicit stimulant use across Europe”), supported by the European Research Area Network on Illicit Drugs (ERANID). The author of this cumulative dissertation was the main actor in setting up the research idea and its proposal, acquiring the funding, coordinating the consortium, steering the research and data collection, organizing, analysing and interpreting the data and achieving the project’s envisaged output. The dissertation is therefore cumulatively and partly based on the output and articles produced within the ATTUNE project.

1. Abstrakt v češtině

Východiska: Stimulanty amfetaminového typu (ATS) představují skupinu látek, které mají do značné míry podobné farmakologické vlastnosti a jsou pro ně charakteristické stimulační účinky. Přes tuto podobnost vykazují ATS rozmanité vzorce užívání a sociodemografické charakteristiky uživatelů. Užívání ATS je spojeno s pozitivními i negativními dopady. Biopsychosociální model užívání psychoaktivních látek poskytuje komplexní rámec pro pochopení užívání ATS.

Cíl: Primárním cílem této studie je popsat a pochopit faktory, které na individuální úrovni motivují a podmiňují iniciaci, ukončení, eskalaci a/nebo omezení užívání ATS.

Materiál a metody: V rámci mixed methods přístupu byly provedeny kvalitativní rozhovory na souboru tvořeném různými skupinami uživatelů ATS a jednou skupinou neuživatelů. Tyto kvalitativní rozhovory poskytly podklady pro realizaci druhé fáze výzkumu tvořené standardizovanými kvantitativními rozhovory za pomoci počítače (CAPI), které využily řadu (standardních) nástrojů. Studie byla provedena v pěti členských státech Evropské unie a mezi prvním užitím nebo expozicí ATS a provedeným rozhovorem muselo uplynout minimálně pět let. V kvalitativním rameni studie bylo dotazováno celkem 279 jedinců. Mezi nimi bylo 17 % identifikováno jako aktuálně závislých na ATS, 20 % bylo závislých v minulosti, 17 % bylo současnými častými uživateli, 13 % tvořili bývalí častí uživatelé, 18 % občasní uživatelé a 15 % neuživatelé ATS, kteří však byli jejich nabídce někdy v životě přímo vystaveni. Rozhovory odhalily odlišné charakteristiky typické pro každou skupinu. Ve kvantitativní větvi studie bylo zahrnuto celkem 1 656 osob. Mezi nimi bylo 21 % identifikováno jako neuživatelé ATS, kteří jejich nabídce byli vystaveni, 16 % jako příležitostní uživatelé, 17 % jako umírnění uživatelé, 18 % jako častí uživatelé a 29 % jako uživatelé s pravděpodobnou závislostí na ATS.

Výsledky: Výsledky ukázaly odlišné charakteristiky specifické pro každou uživatelskou skupinu. U významného počtu respondentů se vyvinul vzorec užívání ATS, které lze v širším smyslu označit jako neproblémové. Pozoruhodné je, že skupiny neuživatelů, příležitostných uživatelů a umírněných uživatelů vykazovaly velmi podobné výsledky, zatímco skupina s pravděpodobnou závislostí na ATS vykazovala velmi odlišné vzorce užívání. Skupina častých uživatelů zaujala pozici mezi skupinou se závislostí na ATS a ostatními třemi skupinami. Častí uživatelé a osoby pravděpodobně závislé na ATS vykazovaly výraznou tendenci užívat tyto látky jako prostředek ke zvýšení své funkční kapacity a k usnadnění provádění rutinních činností a prokázala se u nich omezená schopnost regulace užívání ATS. Celoživotní výskyt problémů s duševním zdravím a současných duševních potíží byl výrazně vyšší ve skupině závislé na ATS. Při hodnocení osobnostních rysů Velké pětky však nebyly zjištěny výrazné rozdíly mezi skupinami uživatelů. Velká

většina uživatelů ATS, bez ohledu na jejich zařazení do té či oné uživatelské skupiny, obecně vykazovala výrazné kolísání intenzity užívání ATS v čase charakterizované střídáním období eskalace a deeskalace. Mezi faktory přispívající ke snížení míry užívání patřily obavy z dopadů na zdraví, subjektivní pocit ztráty kontroly a také změny sociálního prostředí a situačních faktorů.

Závěry: Existují různé trajektorie a faktory podmiňující různé vzorce a fáze užívání ATS. To ukazuje na potřebu intervenčních strategií navržených na míru různých uživatelských skupin. Hlavní důraz ve všech skupinách by měl být kladen na snižování škod spojených s užíváním ATS.

2. Abstract in English

Background: Amphetamine-type stimulants (ATS) encompass a varied assortment of substances that possess comparable pharmacological effects and stimulant characteristics. ATS display diversity in patterns of use among different substances and users' sociodemographic characteristics. The utilization of ATS is associated with both favorable and unfavourable outcomes. The biopsychosocial model of substance use provides a comprehensive framework for understanding ATS use.

Aims: The primary objective of this study is to cultivate a thorough comprehension of the motivating factors driving individuals to initiate, cease, escalate, and/or curtail their ATS use.

Material and methods: In a mixed methods approach, qualitative interviews were conducted to explore distinct groups of ATS users and one group of non-ATS users. These qualitative interviews then informed standardized quantitative computer-assisted personal interviews that utilized a range of (standard) instruments. The interviews were carried out in five European Union member states, and a minimum of five years had to elapse between the first usage or exposure to ATS and the conducted interview. In the qualitative study arm, a total of 279 individuals were interviewed. The interviews revealed distinct characteristics unique to each group. In the quantitative study arm, a total of 1,656 individuals were included in the interviews. Among the participants, 21% were identified as non-ATS users who had been exposed to ATS, 16% as rare users, 17% as moderate users, 18% as frequent users, and 29% as users with a probable ATS dependency.

Results: Findings revealed distinct characteristics specific to each group. A considerable number of participants have developed a pattern of ATS use that can, in broad terms, be classified as non-problematic. Notably, the non-user, rare user, and moderate user groups exhibited highly similar results, while the group with likely ATS dependency displayed contrasting patterns. The frequent user group demonstrated an intermediate position, with varying proximity to both the group with ATS dependency and the other three groups. Frequent users and persons likely dependent on ATS, showed a pronounced tendency to leverage these substances as a means to enhance their functional capacity and to facilitate the

execution of routine tasks and demonstrated a reduced regulatory framework when engaging with ATS. Lifetime incidences of mental health issues and current mental distress were markedly higher in the group dependent on ATS. However, when considering the Big Five personality traits, no discernible disparities between the user groups were identified. A vast majority of ATS users, irrespective of their group designation, generally demonstrated notable temporal fluctuations in ATS use, characterized by periods of escalation and de-escalation. Factors contributing to decreased use included concerns about health effects, the subjective feeling of loss of control, as well as changes in social environment and situational determinants.

Conclusions: There are varied trajectories and driving factors associated with different patterns and stages of ATS consumption. This shows a need for tailored intervention strategies for various groups. The central emphasis at all groups should be on harm reduction in relation to ATS use.

3. Introduction

Amphetamine-type stimulants (ATS) encompass a range of naturally derived or synthetically produced substances, including amphetamines, methamphetamines, and other synthetic drugs, all of which stimulate the central nervous system. Key members of this group include amphetamine, a classic drug of abuse that heightens alertness, physical activity, and libido, while suppressing appetite and inhibitions; methamphetamine, a close relative of amphetamine with similar effects such as appetite suppression, a feeling of intense well-being, and increased energy, heart rate, and mental alertness; and methylphenidate, a medication typically prescribed for attention deficit hyperactivity disorder (ADHD) that shares similar stimulant effects with ATS. Another member of this group, 3,4-Methylenedioxyamphetamine (MDMA) or ecstasy, has both stimulant and hallucinogenic effects and is often used recreationally. The ATS classification also includes synthetic cathinones like mephedrone, derivatives of the natural stimulant cathinone found in the Khat plant and often used as cheaper alternatives to traditional ATS. All these substances share structural and functional similarities with amphetamine and their effects on the nervous system, enhancing the synaptic availability of catecholamines such as dopamine and norepinephrine, as well as serotonin, which leads to their stimulant effects.

ATS modulate monoamine neurotransmitters, especially dopamine, norepinephrine, and serotonin, increasing their release and preventing their reuptake into the pre-synaptic neuron, leading to heightened concentrations in the synapse. This amplifies their psychoactive effects, with notable impacts on cognitive functions such as attention, working memory, and decision-making, primarily through direct action in the prefrontal cortex (PFC). Neuroimaging and animal studies suggest that ATS increases PFC activity and connectivity, and

dopamine release, all of which enhance cognitive performance. ATS also modulate neurotransmitter systems and neuronal excitability in the PFC, contributing to improved information processing and cognitive function.

The positive effects of ATS include increased energy and alertness, improved concentration, and elevated mood and confidence. Some ATS, like Ritalin, are used medicinally to treat conditions like ADHD, while others are prohibited by the World Anti-Doping Agency due to their performance-enhancing effects. However, chronic ATS use can lead to addiction, dependence, mental health problems, cognitive impairments across multiple domains, and physical health issues, such as cardiovascular disease and dental problems. There are also concerns about the potential link between ATS use and the onset of Parkinson's disease due to their negative effects on dopaminergic transmission and function.

The biopsychosocial model presents a comprehensive understanding of substance use disorders (SUDs), such as amphetamine-type stimulant (ATS) use disorder, by integrating biological, psychological, and social aspects. It highlights the role of various factors, including genetic predisposition, mental health conditions, and socio-economic status, among others, in substance addiction. Models like COM-B and PRIME elaborate on this by identifying capability, opportunity, and motivation as essential components for any behaviour and integrating reflective and automatic processes, respectively. However, the specific influences on individual consumption trajectories remain somewhat unclear and call for extensive research. Various studies using the biopsychosocial model have broadened our understanding of diverse phenomena, from addiction to social networking to sexual dysfunctions and opioid misuse, among others. Such comprehensive understanding can inform more effective strategies for prevention and treatment, addressing individual, social, and environmental factors specific to ATS users.

The prevalence of amphetamine-type stimulants (ATS) usage ranks third globally after cannabis and opioids, underpinning significant public health and law enforcement issues. A marked surge in ATS seizures over the past decade underscores this reality, with methamphetamine and amphetamine seizures quintupling and quadrupling respectively, while ecstasy-related confiscations tripled. Around 34 million individuals reportedly consumed amphetamines in 2020, representing 0.7% of the world's population, with East and South-East Asia accounting for the most substantial demographic. Meanwhile, approximately 20 million people used 'ecstasy' type substances, equivalent to 0.4% of the world population. Europe, as per the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), shows that 0.7% of the population aged 15-64 used amphetamines, with a higher proportion using MDMA (0.8%), reflecting an increasing trend among adolescents and young adults. The growing impact of synthetic stimulants on Europe's overall stimulant issue raises concerns about health risks and social issues, with the prevalence of high-risk methamphetamine use varying significantly among EU countries. Women account for roughly half of

ATS users globally but receive a mere 20% of ATS-specific treatment. Patterns of ATS usage can vary widely among different substances and users, ranging from occasional or recreational use to more frequent and problematic use, and may shift over time due to changes in drug availability, law enforcement efforts, public health campaigns, and cultural influences.

The extensive use of amphetamine-type stimulants (ATS) globally necessitates effective addiction treatment and prevention strategies. The diverse ATS user demographic dispels cultural or regional stereotypes, underlining a global concern. Currently, pharmacological interventions are experimental, with no drug proving robustly effective in routine treatment, although methylphenidate, buprenorphine, modafinil, and naltrexone have shown some potential and promising clinical experience exists including in the Czech Republic. Psychosocial interventions have proven more successful, significantly reducing drug use and risky behaviors when compared to usual care, particularly when combined with contingency management strategies. However, the evidence supporting cognitive-behavioral therapy (CBT) remains inconclusive, and the impact of internet interventions on stimulant users is limited. On another note, harm-reduction policies have been effective in mitigating health risks among chronic users, emphasizing the need for further research and innovation in this area. It is also important to consider non-abstinence goals in treatment plans as they focus on minimizing the negative consequences of substance use and improving overall well-being. Finally, the phenomenon of self-change or natural recovery, though still a developing research area, suggests the importance of understanding factors that drive and maintain self-change and the role of relationships in fostering this process.

4. Hypotheses and objective of the work

This study's primary aim is to deeply comprehend the diverse motivations that lead individuals to begin, discontinue, intensify, or diminish their Amphetamine-Type Stimulants (ATS) consumption, with a particular focus on pathways leading to more regulated or less problematic consumption patterns and societal integration, independent of formal intervention methods. Guided by a biopsychosocial model, the investigation will examine individual differences, social dynamics, and environmental and cultural influences impacting these usage changes. These insights will inform the development of targeted interventions, including self-help programs, prevention strategies, and treatment approaches. The objectives encompass exploring reasons behind individuals' abstinence, minimal usage, frequent consumption, cessation after intense usage, persistent consumption, and ATS dependence. By understanding the determinants of psychoactive substance use pathways, particularly for ATS, this project aims to identify effective interventions promoting controlled consumption and facilitating the integration of those affected by Substance Use Disorders (SUDs).

5. Material and methodology

The ATTUNE study was an exploratory cross-sectional investigation employing a mixed methods approach to understand consumption trajectories among Amphetamine-Type Stimulants (ATS) users. This includes nine distinct consumption types across two modules, varying according to their ATS usage history and frequency, as well as a comparison group of individuals who had the opportunity to use ATS but abstained. Module 1 involves qualitative interviews conducted across five countries, with recruitment strategies such as purposeful sampling and snowball sampling to ensure a broad range of ATS usage patterns. Inclusion criteria were carefully designed, ensuring participants were either ATS users or had been exposed to the opportunity to use ATS, and excluding those with opioid addiction history to prevent confounding effects. Dependency was assessed using the Severity of Dependence Scale, and life course charts provided contextual data on participants' living environments, health status, social functionality, life events, and broader lifestyle patterns. Life course drug use, understanding drug use patterns across an individual's lifespan, offered a framework for categorizing drug use trajectories and identifying critical factors contributing to drug use persistence or change. Audio-recorded interviews were transcribed verbatim for data analysis, employing a code system based on the Biopsychosocial Model and consumption trajectories divided into distinct phases. The MAXQDA qualitative research software was used to effectively analyze and organize this data, leading to a comprehensive understanding of factors influencing ATS use.

Building upon Module 1's insights, Module 2's methodology encompassed the creation of a quantitative survey, which incorporated both themes derived from qualitative interviews and an array of standardized instruments. These tools aimed to grasp variables such as substance use, health determinants, psychological factors, and personality traits. The study centered on five distinct categories of amphetamine-type stimulant (ATS) users, including a non-user group, identified through an efficient online screening process, ensuring targeted selection of subjects that met specific criteria. The recruitment process mirrored that of Module 1, utilizing a multipronged outreach approach in diverse environments and online spaces.

A strict set of inclusion and exclusion criteria served as a selection guide for the participants who accurately represent each ATS user group. Factors such as ATS use frequency, duration, patterns, age range, and other demographic characteristics were taken into consideration. This screening process, coupled with the inclusion and exclusion criteria, allowed for a rigorous, systematic exploration of factors influencing ATS use and the associated outcomes.

The study groups in Module 2 were categorized based on their ATS use patterns and exposure status with clear prevalence rates, defining the frequency of ATS use within specific periods. Crucially, all participants had a minimum of five years of

ATS exposure or use, ensuring they could provide a comprehensive understanding of the long-term effects and patterns of ATS use.

Furthermore, the study assessed dependency using the Severity of Dependence Scale (SDS), a five-item questionnaire that measures the severity of amphetamine dependency. Participants scoring above four on this scale were considered indicative of significant dependence, allowing the research to delve deeper into the complexities of ATS use and its long-term impact on individuals.

This comprehensive study gathers a multitude of data, considering diverse aspects from sociodemographic factors, such as sex, age, citizenship, migration background, relationship status, to education, occupation, and social integration. It comprehensively assesses drug use, emphasizing illicit drugs, alcohol dependency, tobacco usage, and particularly amphetamine-type stimulant (ATS) use, using various reliable and valid instruments like the CAGE questionnaire, AUDIT-C, and SDS. Alongside ATS, the study investigates judicial problems to explore potential correlations between drug use and legal issues. The physical and mental health of participants are evaluated through the Brief Symptom Inventory-18, and personality traits are assessed using instruments like the Big Five Inventory-10 and Brief Sensation Seeking Scale-4. These assessments aim to shed light on potential connections between personality traits, life events, and substance use. A series of show cards were employed during interviews to ensure uniformity across countries and assist respondents. Data was collected using the CAPI method, translated into relevant languages, and managed through a central server at Hamburg University, promoting standardized data collection and security. Interviews, conducted by trained assistants face-to-face or via video-telephony, were incentivized to encourage participation. Quantitative data analysis was done using SPSS 25, and variables representing consumption patterns were generated to explore the heterogeneity of ATS use, giving a deep understanding of the participants' behaviors and the complex interplay between individual characteristics and drug use.

6. Results

6.1 Results from the qualitative study arm

The qualitative study encompassed an in-depth analysis of screening data from 279 participants, distinguished by a rich representation of gender perspectives offering varied insights into ATS usage. The research incorporated detailed face-to-face interviews, revealing a unique gender distribution across participating nations such as the Netherlands, Germany, Poland, the Czech Republic, and the United Kingdom. The observed gender distribution, which significantly impacts study findings, reflected potential gender-specific differences in ATS use prevalence within these nations. The participant's age range, generally between 30.1 years in Germany and 32.8 years in the Netherlands, varied across the six groups involved in the study, as well as the initiation age of ATS usage. Over a third of the entire

sample reported ATS dependency, with 'speed' emerging as the most commonly used ATS. However, a significant proportion of participants also reported the use of additional substances, suggesting a pattern of polydrug use. The concurrent and significant use of cannabis, cocaine, hallucinogens, and alcohol varied based on geographical location and demographics, highlighting the necessity of more context-specific and effective interventions to address the multifaceted problem of substance use and dependency.

The onset and progression of ATS (amphetamine-type stimulant) use are significantly influenced by individuals' biographical backgrounds, with three distinct developmental conditions identified: stable, conflict-ridden, and very poor. Stable conditions saw respondents growing up in caring, strongly-knit families, often with liberal views on initial drug use due to parental experiences, despite some experiencing ADHD or eating disorders. Conversely, conflict-ridden conditions resulted from difficult family relationships, often instigating stress, anxiety, or depression during adolescence. Those in very poor conditions experienced critical life events, such as domestic violence or parental alcohol dependence, with some suffering from severe mental health issues and a lack of formal education. First-time ATS use was primarily motivated by either hedonistic desires, such as heightened pleasure or curiosity about the drug's effects, or social influences, including trusted individuals recommending ATS use for coping with emotional distress or improving work or academic performance. Non-users cited the unpredictable risks and fear of losing control as reasons to avoid ATS. In all cases, peer groups played a pivotal role in the initiation of ATS use, providing necessary information, sources, and a sense of belonging. The hedonistic lifestyle, often including cannabis and alcohol use, and the immediate social environment also significantly influenced the initiation and maintenance of ATS use. Ritalin, popular among students for boosting concentration, was primarily procured from the black market, while occasional users maintained control over their consumption by only using when offered by friends.

Continued consumption of Amphetamine-Type Stimulants (ATS) was found to remain steady for many users, even those who did not markedly escalate their intake over time. This stable pattern of use was notably prominent among frequent and occasional users. Despite the continuation of ATS usage, these individuals maintained their frequency of intake, indicating a controlled or steady usage pattern. A distinct trajectory of consumption emerged wherein these individuals effectively maintained a consistent level of ATS usage without progressing towards increased frequency or intensity. Furthermore, individual circumstances dictated that ATS was often used as a means of escape from the monotony of everyday life, offering a change in perspective. Notably, the use of ATS also played a role in social situations, with many users consuming ATS as part of partying and weekend activities. However, such habitual use was not without its

side effects, including sleep disturbances, nasal problems, and even feelings of depression.

Escalation in ATS usage presented a different set of patterns, particularly in respondents who progressively shifted from frequent to problematic use, and eventually developed dependency. This gradual escalation was more pronounced among methamphetamine users, who typically increased their consumption at a quicker rate. This accelerated consumption pattern often resulted in daily use of high doses, leading to potential health and social consequences. An increase in ATS consumption among these respondents was largely driven by problematic experiences, including emotional stress, social isolation, and anxiety. Moreover, excessive use of ATS led to several health and psychological problems, with sleep disturbances, memory loss, concentration disorders, and weight loss being commonly reported. Social circumstances during this escalating phase of ATS usage were closely tied to the specific substance used and associated lifestyles. This period also witnessed an increase in negative life events among ATS-dependent groups.

The decrease or cessation of ATS use marked a significant phase in the consumption habits of users. This typically was a prolonged process, often involving multiple attempts to reduce ATS consumption before a definite shift towards controlled or sporadic use, or complete cessation was achieved. Personal circumstances such as the escalation of adverse effects and the onset of significant health issues often motivated dependent and frequent ATS users to decrease their consumption. Among the adverse effects reported were fatigue and sleep disturbances, which significantly impacted daily functioning. Additionally, respondents also reported experiencing panic attacks, memory lapses, symptoms of depression, and paranoia. Changes in personal life circumstances, such as acquiring a new job or moving to another city, also played a significant role in reducing or stopping ATS use completely. Furthermore, reorienting their lives and setting new priorities proved particularly challenging for addicts, often requiring them to pick up new hobbies or leisure activities.

6.2 Results from the quantitative study arm

The study initially screened for diverse amphetamine-type stimulant (ATS) usage patterns and further eligibility. Screening was followed by in-depth interviews for nuanced information and revealed occasional inconsistencies. To investigate amphetamine usage trajectories, participants were re-categorized according to their usage over the previous year and the mean consumption throughout their 'ATS use career', a term encompassing all instances of ATS use from initiation to present. A calculation of total ATS usage days divided by ATS career length provided an average yearly usage frequency. The Severity of Dependence Scale (SDS) identified individuals with severe usage patterns, forming an additional group regardless of their ATS career consumption patterns. This resulted in five groups:

'Never Used,' 'Rarely Used' (1-5 days per year), 'Moderately Used' (6-20 days per year), 'Frequently Used' (21-365 days per year), and 'SDS Positive' (SDS score for ATS four or more). The reclassification allowed a granular analysis of the sample, showing significant variations in ATS usage patterns based on country demographics. For instance, the UK had the lowest 'Rare Users' but the highest 'SDS Positive' participants, while the Czech Republic had the smallest 'Moderate Users' but the most 'Never Used' and 'SDS Positive' participants. In contrast, German and Dutch samples displayed a more balanced distribution.

The study sample exhibited a balanced gender distribution with slight variations across ATS usage groups; 'Frequent Users' and 'SDS Positive' groups were predominantly male, while the 'Non-Using' group had more females. The average age was 31.4 years, with 'Moderate Users' being younger and 'SDS Positive' participants older. Half of the sample was in a romantic relationship, with 'Non-Users' having the highest rate and 'SDS Positive' participants the lowest. Despite a lower proportion in relationships, the 'SDS Positive' group had the highest instances of parenthood. Most participants lived in stable accommodations, with precarious living conditions more prevalent in the 'SDS Positive' group. Self-perceived social integration and social position correlated negatively with ATS usage. Educational attainment, categorized using ISCED levels, revealed nearly half the sample in the middle category and a third with a university degree, decreasing with increased ATS usage. The 'SDS Positive' group had the highest unemployment rate and lowest income category. Life satisfaction rates were highest among non-users to moderate-users and lowest in the 'SDS Positive' group, but overall satisfaction among ATS users was high.

This study investigates also the relationship between significant biographical stressors and ATS consumption, focusing on the timing of adverse life events. The most commonly reported stressors include the death of a close acquaintance, physical assault, and separation from a long-term partner or divorce, experienced by 58.5%, 40.7%, and 35.9% of participants, respectively. On average, each participant reported approximately four such events, with frequency increasing with ATS usage. Significant differences in experience rates of events such as physical assault and unexpected job loss were observed between rare users and SDS-positive ATS users. Additionally, participants rated their childhood love and care experience on a scale of 1-10, with an average score of 7.0. This score decreased with increased ATS usage. Roughly 30% of participants reported legal offenses, with about 16% experiencing incarceration. These aspects varied across ATS usage groups, with frequent users having higher offense and incarceration rates. This pattern persisted when examining specific offenses, suggesting a correlation between increased ATS usage and legal implications.

The study explores the health-related concerns and psychological factors crucial in understanding an individual's personality, particularly in the context of ATS use. Participants self-rated their physical health at an average of 7.1 and mental health

at 6.7. The SDS-positive group reported notably poorer physical health and significantly lower mental health ratings, underlining severe ATS usage's impact on health. About 52.8% reported no diagnosed mental health problems, with depression being the most common among the rest. Higher rates of diagnosed mental health problems correlated with frequent ATS usage. Scores on the Brief Symptom Inventory, which measures psychological distress, and the Global Severity Index showed an upward trend with increased ATS usage. In terms of personality traits, the SDS-positive group scored higher on neuroticism and lower on the General Self-Efficacy and Connor-Davidson Resilience Scales. There were no significant differences across ATS-use groups for traits like extraversion, openness to experience, and agreeableness.

The study analyzed the use of various Amphetamine-Type Stimulants (ATS) in terms of lifetime use, last year's use, and last month's use, and found considerable variation across different user groups. Lifetime use was dominated by amphetamine and MDMA, acknowledged by approximately 90% of respondents, and by New Psychoactive Substances (NPS) reported by 42.2% of respondents. Non-prescribed ATS medication and methamphetamine were less common. Although the prevalence of lifetime use was consistent across most groups, rarely using ATS users reported lower prevalence. When looking at usage in the past year and last month, consumption patterns largely mirrored lifetime usage data, albeit with a reduction in consumption over time. The use of methamphetamine and non-prescribed ATS medication was more common in moderate and frequent user groups, possibly indicating riskier behavior or substance substitution. An exploration of other illicit substances and alcohol, based on ATS career group, revealed similar patterns of use. A significant number of users reported lifetime use of cannabis and cocaine, and over half reported lifetime consumption of hallucinogens. Non-prescribed tranquilizers and opioids were less frequently used but seemed significant to frequent ATS users. First instances of drug use most often involved cannabis, followed by hallucinogens, with ATS onset occurring on average around the age of 18.1. Tobacco smoking and alcohol consumption were prevalent, with half the sample acknowledging lifetime alcohol abuse. Drug treatment experiences were reported by a third of the sample, with the majority from the SDS-positive group.

This study explored the diverse dynamics of ATS (Amphetamine-Type Stimulant) use, including self-described consumption trajectories, motivations, and patterns within social networks. An overwhelming 41% of respondents characterised their ATS use as "recreational," while about one-fifth each categorised their usage as "situational" or "experimental." However, a notable 25% revealed a pattern of "compulsive" use, with 10% detailing "intensive" use. Interestingly, even within the group with frequent ATS use, more than half reported recreational and socially contextualised usage. The study also introduced graphic representations of consumption trajectories, allowing for a more comprehensive understanding of

each participant's history with ATS. The "highly variable" pattern emerged as the most frequently chosen. The motivations behind ATS use were found to be multi-faceted, with euphoria and relaxation being the primary reason for nearly 90% of users. Social dynamics were also influential, with three-fifths desiring better connections with peers or partners. The examination of motives across ATS-use career groups revealed that the SDS-positive group, representing the most frequent users, reported a wider array of motivations compared to other groups. These motivations were categorised into four categories: "hedonism", "coping", "functionality", and "external/environmental", revealing the complex influences guiding individuals' ATS consumption.

The study asked participants about their typical days and times of ATS use, such as workdays or off days, and daytime or night-time. Findings show that ATS consumption was most common during off days, with 95% of respondents reporting night-time usage and 72% reporting daytime usage. Workday consumption was less common, with only 42-49% of respondents engaging in ATS use. Frequent users and those with higher SDS scores reported more varied usage patterns, particularly on workdays. The study also explored the participants' self-imposed rules for ATS use, revealing that while 12% did not follow any consumption rules, over half of the respondents avoided ATS use when in the presence of family or children. Additional rules included limiting the quantity consumed, abstaining during work or academic commitments, ensuring basic needs were met before use, and restricting consumption to familiar social settings. Interestingly, rarer and moderate users tended to impose more consumption rules, while more intensive users reported fewer guidelines. Examination of the participants' social environment revealed that roughly a fifth had a partner who also uses ATS, with a higher prevalence among moderate to SDS-positive users. On average, participants reported having 2.2 friends who also use ATS, with a greater number reported by the moderate- and frequent-user groups.

The study explored the experiences of participants who had been exposed to ATS use but had not personally consumed it, revealing interesting patterns. A majority of these individuals had encountered ATS use repeatedly, typically in social settings such as clubs, parties, or festivals. More than half reported feeling encouraged or pressured to try ATS, and a third even reported feeling tempted on one or multiple occasions, underlining the impact of social environments on substance use dynamics. When asked about their reasons for abstaining, the most cited reason, reported by 75% of these individuals, was concern over health risks. Similar numbers had heard adverse accounts of ATS effects and hence decided against usage. Other deterrents, reported by 60-70% of respondents, included a lack of interest, disapproval of ATS-induced behavioural changes, and unfamiliarity with the substance. More than half abstained due to a broader approach against consuming any substances classified as 'chemical,' 'psychoactive,' or 'illegal.' Additional fears included the presence of dangerous adulterants (60%)

and the risk of developing dependency (53%). Personal boundaries and familial discouragement against ATS use were also influential factors, resonating with more than a fifth of the subgroup.

The study investigated the negative consequences of ATS use among all user groups in the sample. Only 6% reported experiencing no adverse effects, while the majority experienced psychosomatic issues like insomnia, fatigue, and emotional disturbances, reported by over 80% of users. A distinct set of consequences related to social and environmental factors, like disruptions in daily routines and loss of social contacts, was reported by 25-50% of the sample. About one-fifth reported instances of violence related to ATS use. An analysis of these impacts across ATS career groups revealed that psychosomatic issues were common across all, while other effects increased in frequency and intensity with ATS use. About 70% of users mitigated these effects using other substances, most commonly cannabis and alcohol, but this varied across groups. When questioned about motivations to reduce or cease ATS use, psychological and physical health concerns were the most common, followed by feelings of dependency and social pressures. Interestingly, while over half of the sample didn't increase the use of other substances after reducing ATS consumption, a significant portion reported heightened use of substances such as alcohol, cannabis, and cocaine, especially within groups characterized by frequent ATS use, indicating the complex dynamics between ATS and other substances.

7. Discussion

A significant proportion of ATS users have managed to maintain a pattern of use that doesn't disrupt their daily lives. However, individuals with more severe use patterns experienced detrimental physical and mental effects and neglect of daily responsibilities, requiring specialized preventive interventions. The initiation phase of ATS use is critical for information provision about the substance's effects, appropriate dosage, and potential risks. Trusted peer-led information distribution and drug checking services in nightlife settings can help mitigate harm. As usage increases, individuals need to adopt harm reduction measures like consumption control guidelines. For those engaging in problematic and/or dependent use, counseling and treatment services are essential. Yet, the current landscape lacks specialized treatment for ATS-dependent individuals, despite the wide range of associated physical, mental, and social adverse effects. Utilizing both qualitative and quantitative research findings allows a comprehensive understanding of the varied ATS use trajectories. The qualitative data offers an in-depth view of individuals' experiences through initiation, continuation, and reduction phases, while quantitative data provides broader trends across ATS users, informing prevention and intervention strategies. The integration of these data forms provides a multifaceted understanding of ATS use, helping devise more effective responses.

The demographic of ATS users is diverse, ranging from young adults experimenting with illicit substances and "clubbers," to unexpected groups like full-time employed middle-aged individuals and young mothers. This diversity is also reflected in a nearly gender-balanced user population, with ages from 18 to 77 years, and the majority being well-integrated socially, having stable living circumstances, and possessing high educational attainment. ATS consumption careers differ, varying from infrequent and moderate to frequent use, with some users progressing to ATS dependency. Regardless of the consumption career type, some individuals continue using ATS, while others achieve abstinence. Consumption trajectories often fluctuate over time, with some users reporting an initial surge in use followed by stabilization, and others incorporating intentional periods of abstinence. The dominant pattern of ATS use is typically recreational or experimental, with compulsive or intense use reported less frequently.

People start using ATS due to diverse motives broadly classified as "hedonistic" (such as the desire for euphoria, relaxation, or enhanced sexual pleasure), "functional" (like boosting work or academic performance), "coping" (dealing with physical and mental health issues), and "external" reasons (peer pressure or lack of law enforcement risk). Hedonistic and functional motives often dominate the early phase of ATS use, while coping-related motives emerge later. Those who abstain from ATS do so due to potential health concerns, observed negative effects on others, or a complete rejection of substances seen as chemical, psychoactive, or illegal. Preferences for ATS substances vary, with amphetamine and MDMA being popular among users who control their recreational consumption, followed by New Psychoactive Substances (NPS). Methamphetamine use is more common among groups with higher and sustained ATS use, as well as marginalized individuals using it as a coping mechanism. Non-prescribed ATS-containing drugs like methylphenidate are primarily used by individuals aiming to enhance work or academic performance. Concurrent use of other substances such as alcohol, tobacco, cannabis, cocaine, and hallucinogens is common among ATS users and even non-ATS users, the latter notably consuming alcohol and cannabis. For frequent or dependent ATS users, the use of these substances often serves to alleviate negative aftereffects of ATS use, such as insomnia or anxiety. During the early stages of amphetamine-type substance (ATS) consumption, users are often drawn to effects such as increased energy, disinhibition, and boosted self-esteem. For casual or moderate users, these effects maintain interest in ATS as a staple of social events. However, frequent users may notice these effects diminish, leading them to increase their consumption to regain the initial potency. For MDMA users, increased frequency or dosage often fails to recreate the initial effects and instead leads to escalated side effects, emphasizing the importance of regulated consumption and abstention periods for recovery. Occasional users tend to consider this when determining their consumption frequency, while some heavy

users try to sustain the effects by continually escalating MDMA doses. In contrast, methamphetamine has a higher psychological addiction potential due to its sudden onset and shorter effect duration. Upon sobriety, many users encounter significant exhaustion, which they might counteract with further substance use, perpetuating a cycle of consumption and withdrawal. About a third of the sample reported a level of ATS dependency, often driven by an inability to resist or abstain from use. These individuals and frequent users often experience critical and stressful life events, suggesting a potential correlation between the accumulation of such events and ATS use prevalence or intensity. This highlights the importance of providing support mechanisms to manage these underlying stressors. The study also revealed difficulties related to the misuse or dependency of other substances, particularly alcohol, across all identified ATS usage groups. However, opioid dependency and injection drug use were predominantly reported within frequent-use groups, indicating a higher propensity towards riskier substance use within these subsets. Users with controlled ATS usage often see no need to cease their use unless they experience negative consequences that interfere with their everyday responsibilities. These findings underscore the complexity of polysubstance use patterns and their implications, necessitating comprehensive approaches in research, prevention, and treatment efforts.

Participants in the study indicated several factors for reducing or completely ceasing amphetamine-type substance (ATS) use, with health concerns being the primary reason, followed by a perceived loss of control over their drug use. Social and situational factors such as changes in social networks, new romantic partners, and professional demands also influenced this decision. Many achieved this reduction without professional intervention, often coinciding with lifestyle changes and shifts in life priorities, a phenomenon referred to as "maturing out" of drug use. Negative consequences of ATS use, primarily physical and mental health issues, were most common among frequent users. However, reduction or cessation was not always the response to these negative outcomes; some users turned to other substances to mitigate the side effects of ATS use, including cannabis, alcohol, and non-prescribed tranquilizers. The study recognized various factors that could steer ATS consumption towards either a controlled pattern or a more problematic, possibly dependent, form. It's crucial to understand these risk and resilience factors exist in a symbiotic relationship, where the lack of a risk factor essentially functions as a resilience factor, and vice versa. The temporal sequence of these factors and the manifestation of problematic or dependent ATS consumption could involve complex interactions, and given the retrospective, cross-sectional study design, definitive conclusions regarding causality could not be drawn unequivocally.

8. Conclusions

ATS stimulants represent a diverse group of substances that share similar pharmacological effects and stimulant properties. ATS utilization patterns exhibit heterogeneity across substances and user profiles. Our research elucidates that the availability of ATS does not fully explain its consumption, and a significant cohort of ATS users demonstrates a controlled consumption pattern within recreational contexts, devoid of dependency or problematic usage manifestations. In addition, we've identified a segment of consumers who cease ATS intake following an extended usage period. Moreover, a distinct group that develops problematic usage tendencies and SUD was also discerned.

The ATTUNE study identified unique characteristics among the different ATS user groups. A significant portion displayed a broadly non-problematic ATS use pattern. Non-user, rare user, and moderate user groups showed similar trends, whereas likely ATS dependent individuals differed significantly. Frequent users had an intermediate position, showing tendencies towards both ends. Increased ATS use was noted among those needing to enhance functionality or control routine tasks, particularly in the ATS-dependent group, which also showed higher instances of mental health issues. However, no differences were identified regarding the Big Five personality traits across groups. Most ATS users experienced cyclical usage patterns, influenced by health concerns, feelings of lost control, and changes in social and situational factors.

These findings suggest that diverse stages of ATS consumption necessitate distinct intervention strategies.

Initiation of ATS use serves as a prime intervention point for imparting education about the effects, dosages, and risks associated with various amphetamine-type substances. While such information is largely available, the majority of nascent and inexperienced users tend to rely on the knowledge imparted by their peers. Peer-led interventions in nightlife settings offer an avenue for the dissemination of user-friendly, factual data, which could potentially enhance acceptance and reach. Such on-site services should further incorporate substance testing initiatives, also referred to as "drug checking", as one of the greatest harms related to ATS use derives from unknown substances, adulterants in substances and overdose. As users transition from infrequent to regular consumption—a shift that often transpires rapidly, particularly with methamphetamine—harm reduction strategies are valuable in assisting users to establish rules for governing the frequency and intensity of their use. These rules might include lowering the dosage, extending intervals between subsequent doses, and capping expenditure on drugs.

For users with problematic and dependent ATS use, counselling and therapeutic services are vital in facilitating a substantial decrease in use or complete abstinence. The current treatment landscape exhibits a paucity of therapy forms specifically designed for ATS addiction. Given the unique set of challenges associated with addiction, such as adverse physical health effects (e.g., sleep

disturbances, concentration difficulties, fatigue), psychological symptoms (e.g., paranoia, depression, anxiety), and social problems (e.g., unemployment, childcare issues), specialized therapeutic interventions are necessary. These interventions should acknowledge these specific factors and adopt a multiprofessional approach when required.

9. References

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Seznam publikací doktoranda v tomto uspořádání:

1. publikace *in extenso*, které jsou podkladem disertace
 - a) s impact factorem (uvést hodnotu IF)

Berndt, S., Rosenkranz, M., **Martens, M.-S.**, & Verthein, U. (2022). Amphetamine-Type Stimulant Dependence and Association with Concurrent Use of Cocaine, Alcohol, and Cannabis: A Cross-Sectional Study. *European Addiction Research*, 28(2), 113–121. <https://doi.org/10.1159/000519541>

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b) bez IF

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2. publikace *in extenso* bez vztahu k tématu disertace

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