The relationship between Cannabis and Psychosis in Greek and Dutch population

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Abstract

Objective

This research paper analyzes the complex relationship between cannabis use and the development of psychosis while also considering the cultural and legal contexts of two different populations: the Dutch and the Greek. It considers the cultural and legal factors influecing this relationship and addresses the growing prevalence of cannabis consumption, emphasizing the need for a better understanding of its potential implications for mental health.

Methods

The study involved 111 participants and were examined through two self-repot questionnaire enabling the investigation of differences in cannabis use prevalence and the presence of psychotic symptoms. Also, the study wanted to assess the vulnerability of Greek cannabis users to positive symptoms such as persecutory thinking, in comparison to their Dutch counterparts.

Results

The findings indicate a statistically significant association between cannabis use and the presence of psychotic symptoms within the general population. Additionally, the study reveals that Greek users exhibit higher levels of consumption, although not statstically significance, and a potential increased suspectibility to positive when compared to Dutch counterparts. These differences may be influenced by economic disparities, cultural attitudes, and legal frameworks.

Conclusion

This study findings underscores the need for additional research to explore the interplay between socio- economic and cultural factors concerning cannabis use and its implication for mental health. Caution is warranted due to the limited sample size.

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Introduction

Theoretical Background

Cannabis stands as one of the most widely utilized illicit substances globally, encompassing a diverse spectrum of over 200 million users. With the escalating prevalence of cannabis consumption, the scientific community is increasingly compelled to accumulate evidence concerning the associated health risks. Notably, there exists a well-documented linkage between cannabis consumption and the development of psychiatric conditions, as indicated by previous studies (Hasin *et al.*, 2015). This connection is particularly concerning, given the potential implications for public health and well-being.

Of significant concern are the associations between cannabis use and the onset of psychosis, which have been identified through case reports and cohort studies (Semple *et al.*, 2005). While some researchers argue that socioeconomic and demographic factors shared between substance use and psychosis may contribute to this association, others propose a shared etiology involving genetic factors and neural circuitry dysregulation related to drug reward and reinforcement. Moreover, substantial evidence supports the notion that cannabis intoxication can precipitate brief psychotic episodes or recurrent psychotic symptoms, particularly in individuals with a history of psychosis (Semple *et al.*, 2005).

Despite the extensive body of research on this subject, the establishment of a definitive correlation between cannabis and psychosis remains challenging due to various confounding factors, including genetic predisposition, socioeconomic disparities, cultural influences, and other unidentified causes. Numerous empirical investigations have underscored the substantial risk of psychosis development associated with cannabis use, with factors such as age, first-time use, genetic susceptibility, cannabis quality, and usage frequency playing pivotal roles (Murray & Forti, 2016).

Furthermore, the recent trend toward cannabis legalization has introduced a novel dimension to this issue. The impact of legalization on individuals' behaviors and personalities is a matter of great significance, as exemplified by the differing approaches taken by countries like the Netherlands and Greece in formulating cannabis-specific legislative frameworks (Elser *et al.*, 2023).

Consequently, an exploration of the nexus between cannabis use and psychosis is essential not only for scientific understanding but also for informing public policy and health interventions, given the potential consequences for individuals and societies at large. Thus, further research in this domain is imperative to elucidate the multifaceted interplay between cannabis consumption and psychosis, facilitating evidence-based decision-making and promoting public well-being.

Thesis Objectives and Hypotheses

The interplay between cannabis and psychosis is intricate and still lacks complete understanding. Despite significant research into cannabis and psychosis, it remains inconclusive whether cannabis definitively triggers psychosis in susceptible individuals. The development of psychosis appears to be influenced by a combination of internal and external factors. While it is clear that high doses of cannabis can produce psychotic symptoms, it is unclear whether cannabis consumption per se can influence the development of psychotic symptoms.

The primary objective of the present study is to scrutinize the potential impact of cannabis use on the emergence of psychotic symptoms within a non-clinical sample of individuals among Greek and Dutch populations, encompassing a range of ages from 18 to 50 years old. It is a correlational study that aims to highlight possible similarities and differences between the two populations regarding the topic. Therefore, the first hypothesis H1 of the thesis is the following:

Hypothesis 1: Greek population exhibits higher levels of cannabis consumption and 'experiences with cannabis intoxication' (CEQ) compared to the Dutch population.

Previous research has revealed that various factors, including differentiating legal and cultural approaches, cannabis potency and strains , as well as patterns and amounts of cannabis use, can significantly impact consumption patterns. Specifically, higher levels of THC content have been linked to an increased risk of developing psychosis due to heightened intoxication levels. For example, The Netherlands has embraced a decriminalization strategy, permitting individuals to possess limited amounts of cannabis without facing criminal penalties, thus reducing stigma associated with legal consequences. This approach promotes a transparent, well-regulated cannabis market, with cannabis accessibility facilitated through licensed coffee shops that enforce quality control and potency regulation. This potentially leads to less frequent

use and lower THC content. Conversely, Greece maintains a strict prohibition policy, resulting in an underground market characterized by secrecy and lack of regulation. Cannabis primarily circulates through an illegal market with significant variability in product potency and purity, elevating the risk of adverse mental health outcomes like psychosis. The Netherlands also emphasizes education and harm reduction initiatives in the context of cannabis use, fostering a more open and accepting cultural outlook. Conversely, in Greece, there is a notable absence of educational support due to the illegality of cannabis. The government does not focus on educating people but rather enforces a prohibition. This can contribute to higher usage rates, as individuals may be more inclined to try cannabis when they lack information about its associated risks.

Therefore, another objective of the study is to explore whether cultural and legal influences play a role in cannabis consumption patterns between these two countries. This aim was examined under two hypotheses, H2a and H2b:

Hypothesis 2a: 'Experiences with cannabis intoxication' (CEQ) is positively related to the presence of psychotic symptoms.

Hypothesis 2b: The relation between 'experiences related to cannabis intoxication' (CEQ) and the differences within the Dutch and Greek populations.

Moreover, prior research has highlighted the role of cultural norms, social attitudes, and the societal acceptance of cannabis in shaping individual's perceptions and responses to its use. The Netherlands has a tradition of tolerance and liberalism, particularly when it comes to cannabis use. Dutch society upholds relatively liberal drug policies, especially concerning cannabis. Additionally, the Dutch have a long history of promoting individual freedoms encompassing expression, religion, and lifestyle choices.

In contrast, Greek society's stance against cannabis use, resulting in legal consequences such as arrest or prosecution, potentially contributing to the emergence of persecutory thoughts among users. This is exacerbated by a lack of cultural acceptance due to conservatism and environmental stressors in Greece. Lack of cultural acceptance of certain behaviors, including cannabis use, can contribute to stigmatization and social isolation. If individuals are stigmatized or ostracized by their society or social circles for their cannabis use, they may develop a heightened sense of vulnerability and persecutory thoughts. By examining the divergent approaches of the Netherlands and Greece, the third objective of this study seeks to

shed light on the potential implications of cultural attitudes on cannabis use and the association with the persecutory thinking. Thus, the third hypothesis H3 came as follows:

Hypothesis H3: Greek cannabis users report a higher incidence of 'psychotic symptoms' (CAPE), specifically persecutory thinking than Dutch users.

In the forthcoming literature review, the thesis embarks on an exploration of the current state of knowledge pertaining to the thesis topics. To underpin the analysis, the study employs a rigorous methodology, including a review of existing literature, statistical analysis to discern patterns and correlations, and, finally, a conclusion that synthesizes the findings and offers insights into the complex relationship between cannabis use and psychosis.

Literature Review

The subsequent sections investigate the current state of knowledge pertaining to the topics addressed in the thesis. First, shedding light on the complex interplay between cannabis, psychosis, and social context. By synthesizing existing research and critically analyzing available evidence from across the globe. Second, the thesis provides an analysis of prevalent rates of cannabis consumption per country, examining the global landscape of cannabis use and highlighting the differences in usage patterns along with trends across different populations and regions. Lastly, the differences in legality and cultural perceptions of cannabis use in various countries are examined. This section briefly explores the diverse legal frameworks surrounding cannabis, ranging from complete prohibition to varying degrees of decriminalization and legalization, and discusses the cultural factors that influence perceptions and attitudes towards cannabis in different societies.

Cannabis Effects and its Connection with Psychosis

Various empirical studies on the use of cannabis showed a high potential for developing psychosis. A number of factors play a crucial role in the development of psychosis, such as age, first-time use, genetic predisposition, cannabis quality,the consumption frequency, and the potency of THC within the cannabis (Murray & Forti, 2016). While cannabis consumption often results in a gentle feeling of euphoria and relaxation, commonly known as being 'high', users may also encounter adverse effects, including anxiety, panic, and paranoia, which in rare instances can escalate to acute psychosis characterized by delusions and hallucinations (Baker *et al*., 2003).

Cannabis consumption has long been linked to changes in behavior, including episodes of psychosis. In the 19th century, Moreau (de Tours) identified hallucinations, paranoia, thought disorganization, and memory issues similar to symptoms of schizophrenia during acute cannabis intoxication. The impacts described have been documented in case reports, affecting around 20–50% of cannabis users. It's worth noting that similar acute psychotogenic effects are observed not only with cannabis but also with medicinal cannabinoids like dronabinol and nabilone, as well as newer synthetic cannabinoids (Bora *et al*., 2010). Scientific studies using cannabis, THC, and synthetic cannabinoids have provided strong evidence of these acute

psychotomimetic effects. These substances can induce a range of symptoms in healthy volunteers including positive symptoms such as suspiciousness, delusions, fragmented thinking, as well as negative symptoms like emotional withdrawal, psychomotor retardations, along with cognitive impairments such as memory deficits, impaired decision-making) all resembling symptoms seen in schizophrenia. While conventional wisdom would suggest that cannabis use might exacerbate cognitive impairments, particularly in areas as mentioned above, some studies have suprisingly reported similar or even improved cognitive functioning in cannabis- using schizophrenia patients when compared to non-users (Shrivastana *et al*.,2011).

Notably, THC can worsen psychotic symptoms in individuals with chronic schizophrenia, even when they are receiving stable antipsychotic medication (Burns, 2013). Furthermore, multiple lines of converging evidence suggest a link between exposure to cannabis and a heightened risk of developing disorders, although the precise role of cannabis as a contributing factor to psychosis remains somewhat unclear. Schizophrenia seems to be significantly associated with the abuse of cannabis, with a significant number of people presenting positive psychotic symptoms (such as delusions). A recent study revealed that the early onset of cannabis use was linked to an earlier onset of psychosis only when cannabis consumption commenced by the age of 14. In a comprehensive meta-analysis encompassing 83 studies, it was established that the age of psychosis onset among cannabis users was approximately 2.7 years earlier compared to non-users (Radhakrishnan *et al*., 2014).

Additionally, two separate meta-analyses discovered that patients with schizophrenia and long-term cannabis users showed superior neurocognitive functioning compared to patients with schizophrenia without a history of cannabis use. Unexpectedly, cannabis users with chronic schizophrenia (CANN+) performed better on neurocognitive tasks when compared to their non- cannabis using counterparts (CANN-). The evidence appeared to relate particularly to executive functioning, working memory, and visual functioning (Burns, 2013). In a separate study that compared individuals with a lifetime history of cannabis use to those who had never used cannabis, it observed that CANN+ individuals exhibited lower performance in several cognitive areas (e.g., premorbid IQ, verbal working memory, motor inhibition) in contrast to CANN-. However, CANN+ individuals displayed better performance than CANN- individuals in tests specifically related to conceptual set-shifting (Figueiredo *et al*., 2020).

As mentioned earlier, cannabis intoxication often triggers acute psychosis and can temporarily exacerbate pre existing psychotic conditions. Additionally, cannabis use can lead to depersonalization, irrational panic, fear of dying, and paranoid thoughts, which tend to

coincide with intoxication and fade rapidly. Studies showed that about 15% of cannabis users experience psychotic-like symptoms, including auditory hallucinations, feeling of intimidation or persecution, and paranoid thoughts (Miller *et al*., 2020). Hall and colleagues (1994) suggested some fundamental rules of cannabis use underlying psychosis: (a) large doses may induce a toxic or organic psychosis; (b) cannabis may lead to an acute schizophreniform state or (c) chronic psychosis; (d) long-term cannabis use plays a significant role in decreased motivation and effort; and lastly, (e) cannabis use could be associated with serious illnesses, such as schizophrenia (also see Johns, 2001). There are high rates of drug abuse associated with mental illness. Indeed, patients with psychosis who are cannabis users have distinctly worse long-term outcomes compared to those who are not habitual cannabis users in terms of general functioning, re-hospitalization, and the development of severe psychotic symptoms (Penzel *et al*., 2022). These complex dynamics underscore the multifaceted relationship between cannabis use and psychiatric well- being, emphasizing the importance of continued research in this field.

This risk is particularly pronounced in initial psychosis cases and among clinically high-risk patients, with this vulnerability persisting even after attenuated psychotic symptoms. Despite global increases in cannabis use disorder prevalence, there remains a need to understand the factors associated with continued cannabis use. Additionally, proactive identification of individuals susceptible to ongoing cannabis use is of paramount importance. Various sociodemographic factors such as age, gender, low income, and substance use patterns, have been found to predict relapses in cannabis use. The transition from sporadic to disordered cannabis use is driven by substance patterns, mental health issues, trauma history, personality traits, and urban living. It is noteworthy that the primary predictor of cannabis use relapse is the presence of psychotic symptoms. Interestingly, motivations for cannabis consumption vary among patient groups, with mood enhancement and social reasons prevailing. Moreover, the intricate link between cognitive deficits and cannabis use demonstrates variability, with environmental risk factors and cognitive deficits correlating with heightened psychosis risk (Penzel *et al*., 2022).

Moreover, a systematic review showed an association between the use of cannabis and three different classifications of the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders): cannabis intoxication, cannabis-induced psychotic disorder (CIPD), and schizophrenia (Pearson & Berry, 2019). Specifically, cannabis-induced psychotic disorder (CIPD) is placed under the Schizophrenic Spectrum Disorders. This is determined when, after

cannabis intoxication, the user experiences symptoms such as hallucinations, delusion with clinical distress, and impairment in social functioning (Pearson & Berry, 2019). Another criterion that should be considered is that cannabis use can trigger a functional disturbance that is not cannabis-induced, such as a pre-existing disorder (schizophrenia) (American Psychiatric Association, 2013). Importantly, it is expected that CIPD persists for several weeks following cannabis exposure, distinguishing it from the typically shorter duration of cannabis intoxication, which typically ranges from a few hours to a single day. CIPD serves as a conceptual boundary that delineates the spectrum of cannabis- related psychosis, extending from acute intoxication to long-term psychotic effects.

Lastly, it's important to emphasize the chronic and severe nature of psychotic disorders associated with cannabis use, a topic that has received limited research attention and remains the subject of vigorous debate (Pearson & Berry, 2019). Understanding the nuances of this relationship is essential for providing effective interventions and support for individuals at risk of cannabis- induced psychosis and related mental health challenges.

Examining the Prevalence of Cannabis Use

Concerning the connection between cannabis consumption and psychosis, it is unclear whether the influence of cannabis on later psychosis, if any, is more pronounced in individuals who are already susceptible to psychosis. Several studies involving individuals diagnosed with psychosis during their hospitalization have revealed that those who use cannabis tend to have a worse prognosis compared to non-users (Os *et al*., 2002). The occurrence of substance use is more prevalent among individuals with psychosis compared to the general population. For instance, research indicates that nearly 50.7% of 419 individuals diagnosed with psychotic symptoms have experienced cannabis dependence at some point in their lives (Smith *et al*., 2009).

The perception of marijuana has shifted over time, with the old belief that it was non-addictive due to the absence of withdrawal syndrome. However, with the increased potency of THC, a definite withdrawal syndrome has been recognized, leading to symptoms like anger, irritability, depression, restlessness, insomnia, and strong cravings for marijuana. Studies indicate varying addiction rates, with 9% of experimental users, 17% of teenage initiates, and 25–50% of daily users becoming addicted. Notably, high-potency cannabis has been linked to more severe dependence, especially in young individuals (Stuyt, 2018).

An illuminating study conducted by Clark (2019) examined the association between cannabis use and the risk of developing psychosis. This extensive research spanned eleven locations across Europe and highlighted the strong link between daily cannabis use, particularly high-potency cannabis, and incidences of psychosis. Specifically, to estimate the prevalence of psychosis, the researchers identified individuals with first-episode psychosis who sought mental health services between 2010 and 2015. They compared 901 patients with first-episode psychosis to 1,237 healthy controls to determine the risk factors associated with psychosis. Astonishingly, the study estimated that approximately 20.4% of new cases of psychosis across the eleven sites could be attributed to daily cannabis use, and 12.2% could be linked to the use of high-potency cannabis. Particularly noteworthy were findings in Amsterdam and London, they found high-potency cannabis use to be a significant predictor of psychotic disorders. In Amsterdam, 4/10 (43.8%) new cases of psychosis were estimated to be linked to daily cannabis use, and 5/10 (50.3%) new cases were linked to high-potency use (Clark, 2019).

Another article examined the relationship between early initiation of cannabis use and other high-risk behaviors, as well as psychosocial and health-related factors, among 15-year-old adolescents in six European countries and showed that the prevalence of lifetime and last-year cannabis use varied across the countries. The highest rates were found in the Czech Republic, with 30.7% reporting lifetime use and 27.5% reporting use in the past year. In contrast, Greece had the lowest rates, with 5.4% reporting lifetime use and 4.1% reporting use in the past year (Kokkevi *et al*., 2006).

On the American front, a recent study corroborated earlier reports ,which suggested an increase in psychosis cases that coincided with shifts in cannabis consumption trends (Hjorthøj *et al*., 2021). A separate study from Denmark also observed an increase in schizophrenia spectrum disorder cases between 2000 and 2012, particularly among younger age groups. However,it is crucial to note that this study did not explicitly attribute this rise to the growing use or potency of cannabis. Intriguingly, Hjorthøj *et al*. (2021) demonstrated that the population-attributable risk fraction (PARF) for cannabis use disorder in schizophrenia increased fourfold, from around 2% before 1995 to approximately 8% after 2010 in Denmark. This increase corresponds to the rising incidence of cannabis use disorder and the THC content of cannabis during the same period (Ganesh & Souza, 2022), emphasizing the intricate between these factors. It is clear that further research on the complex intersection of cannabis and psychosis is needed to fully grasp the complexities of this relationship.

The Role of Culture and Legislation of Cannabis Use

Another factor that plays a significant role in the association between cannabis and psychosis is the legality of the drug. The admissibility of cannabis can contribute highly differently to individuals' behavior and personalities (Elser *et al.*, 2023).Notably, different countries have adopted varying approaches to cannabis regulation, and these policies can have diverse impacts on cannabis use patterns and associated outcomes.

The Netherlands was among the first countries to decriminalize marijuana. For instance, in 1972, with the exception of possession of 30 or more grams, which was designated a misdemeanor, the Dutch government eased the regulations and classified cannabis as less harmful (soft drugs). Cannabis is technically illegal in the Netherlands, but the country has a policy of tolerance, where the possession and sale of small quantities of cannabis for personal use in licensed coffee shops are not actively persecuted. This approach falls within a gray area between full legalization and strict prohibition. Nowadays, citizens of the Netherlands can possess 5 grams or 5 plants of cannabis without legal consequences (Korf, 2019). On the other hand, Greece adopts distinct legal procedures concerning cannabis. Like the Netherlands, it deems cannabis illegal, but with stricter regulations that may lead to imprisonment. The law stipulates that the possession or supply of drugs in quantities deemed for personal use or the cultivation of cannabis plants in quantities intended solely for personal use can result in imprisonment for up to five months. Considering the similarity or differentiation of cannabis in comparison with other substances, as well as the internationally relevant suggestions for the classification of drugs, with article 1 of Law 4523/2018, an exception is introduced from par. 2 of article 2 of Law 4139/2013 "on addictive substances and other provisions". This exception specifically applies to Cannabis Sativa L with a tetrahydrocannabinol (THC) content of less than 0.2% (Koliadou, 2020).

The use of cannabis has become increasingly ambiguous, with advocates arguing that legalization can reduce crime, raise tax revenue, lower criminal justice expenditures, improve public health, increase traffic safety, and stimulate the economy. These arguments draw support from a study conducted in the U.S. on legalizing recreational cannabis, which showed a significant decrease in the retail price of cannabis, the availability of a regular supply without the risk of criminal penalties, and a wider range of cannabis products for sale. This increased availability and visibility of cannabis use may make it more socially acceptable and enable adults to use cannabis for longer periods than during prohibition (Halle & Lynskey, 2020). However, it is important to note that there is a counter argument as well. Several researchers

have demonstrated that legalization can lead to increased cannabis use, as well as heightened use of other drugs or alcohol, elevated crime rates, decreased educational achievement among teenagers, and adverse public health effects (Dills *et al*., 2021).

When cannabis is illegal in a country, it creates a unique and complex environment that can significantly impact individuals who choose to use the substance. Firstly, in places where cannabis is illegal, it can become more alluring to some individuals due to its forbidden nature. People are often drawn to activities or substances that are seen as rebellious or illicit. The idea of breaking the law can have a certain appeal for some, leading them to use cannabis despite its legal status (Center for Innovation in Campus Mental Health, 2018).

Additionally, in countries where cannabis is illegal, it creates an overwhelming environment in which individuals who choose to use cannabis may experience heightened feelings of fear, guilt, and stress. This seemingly counterintuitive relationship between stringent drug regulations and increased drug use can be better understood by examining the psychological and social factors at play. Research by Freeman *et al*. (2015) has shown that individuals who use cannabis in environments where it is illegal often grapple with intense feelings of anxiety and paranoia. These emotions can lead to experiences characterized by heightened suspicion of others, especially during cannabis consumption. The connection between cannabis use and anxiety is well-documented, with cannabis users frequently reporting feelings of unease and restlessness.

Within the context of cannabis use, particularly in situations where the drug is prohibited, the anxious thoughts can be escalated because of the fear of legal consequences, creating a very real and immediate source of anxiety which can manifest persecutory delusions. Persecutory delusions are a form of intense paranoia where individuals firmly believe that others are actively conspiring against them or attempting to inflict harm because of their cannabis use. (Wilkinson *et al*., 2015).

Methodology

The methodology chapter serves as a structured framework detailing the research methods and procedures employed to address the research objectives and hypotheses. It provides a systematic account of the data collection, analysis, and interpretation techniques utilized, ensuring the rigor and reliability of the research findings.

Research Design

An extensive search strategy was meticulously employed to identify relevant studies for this research. Systematic searches of electronic databases, including PubMed, Google Scholar, Research Gate, Medical Sciences (RuG), and the National Institute on Drug Abuse (NIH), were conducted. For the primary hypothesis, which posits that Greek population exhibits higher levels of cannabis consumption 'experiences with cannabis intoxication' (CEQ) compared to the Dutch population, the English search incorporated keywords such as cannabis, marijuana, THC, cannabinoids, tetrahydrocannabinol, consumption, and potency of THC in cannabis.The Greek search for this hypothesis encompassed terms such as κάνναβης, τετραϋδροκανναβινόλη, κατανάλωση κάνναβης and χρήση κάνναβης. In addressing the second hypothesis, which suggests 'experiences with cannabis intoxication' CEQ is positively related to the presence of psychotic symptoms and the differences between these two populations, the search incorporated keywords like, marijuana intoxication, symptoms including psychosis, schizophrenia, anxiety, depression, delusions, and hallucinations. The Greek search terms for this hypothesis were κατάχρηση κάνναβης, χρήση κάνναβης, νευρικότητα, στρες, ψυχώσεις, σχιζοφρένεια, ψευδαισθήσεις. Lastly, for the hypothesis proposing Greek cannabis users report a higher incidence of psychotic symptoms, particularly positive symptoms (CAPE) than Dutch users. The search terms included cannabis, marijuana, laws and regulations for cannabis, paranoia, persecutory thinking, and social stigma. In the Greek search, terms such as κάνναβης, νομοθεσία κάνναβης στην Ελλάδα, παράνοια, ψυχώσεις, νόμοι για την χρήση κάνναβης, παράνοια, διωκτικές ιδέες, and κοινωνικό στίγμα were utilized.

Participants

The study was a master's thesis for the track in clinical neuropsychology at the Behavioral and Social Sciences department of the University of Groningen. All participants were volunteers who agreed to participate after being informed about the research ethics and research design. Participants must possess the following characteristics: a) Dutch or Greek nationality; and b) have been either current or past users or non-users of cannabis.

A stratified sampling technique was employed to explicitly define the differences between these two populations. Participants were recruited through a scannable barcode by way of social media platforms such as Facebook, Instagram, WhatsApp, and Messenger.

Research Instrument

In this study, two self-reported questionnaires were administered: the Community Assessment of Psychic Experience (CAPE) and the Cannabis Experience Questionnaire (CEQ) (see Appendices B and C for full questionnaires). To measure psychosis proneness, the Community Assessment of Psychic Experience (CAPE) was used, which is a measurement tool used in clinical and research settings with 42 questions and sub-questions that utilize similar language to the Likert scale (never, sometimes, often, always) (Verdoux, 2000). The Cannabis Experience Questionnaire (CEQ), consisting of 70 items, was used to measure participants' subjective experiences of cannabis use before and after intoxication (Barkus *et al*., 2006; Stirling *et al*., 2008). The purpose of using these questionnaires was to test variables related to the amount and timing of cannabis use as well as to observe any behavioral changes that could potentially lead to the development of disorders such as psychosis. Persecutory thinking was assessed by the positive scale from the CAPE-42 questionnaire, measuring positive symptoms such as paranoia, persecutory thinking, or conspiracy ideation.

Cannabis use was measured using a validated self-completion questionnaire, the Cannabis Experience Questionnaire (CEQ), which includes 70 questions and measures the subjective experience of cannabis during and after intoxication (see Appendix C). Participant experiences of psychotic-like symptoms were measured using the Community Assessment of Psychic Experience (CAPE), a reliable self-completion questionnaire with 42 questions (see Appendix B).

The two questionnaires were translated into Greek language in order to be administered to the Greek participants. However, it is important to note that the percentage of Dutch people who are proficient in English is notably higher than that of Greeks. This language proficiency among the Dutch population contributed to the decision to utilize the English version for them, as it was expected to be well understood.

Community Assessment of Psychic Experience (CAPE)

The first questionnaire that was provided attempted to measure psychosis proneness in clinical and research settings. CAPE is a Likert-scale questionnaire with 42 questions about psychotic experiences and 42 sub-questions that measure levels of distress associated with these experiences (see Appendix B). The Likert point scale ranges from 1 (never) to 4 (nearly always), with higher scores indicating greater symptoms of psychosis, and from 1 (not distressed) to 4 (very distressed), with higher scores indicating greater distress. If participants choose "sometimes", "often ", or "nearly always," they must also answer sub-questions that define the distress associated with these experiences. In the event that the participants chose "never", the sub-questions were not included in the questionnaire (Verdoux 2000).

The CAPE includes three symptom dimensions with 20 positive questions, sub-classified as 8 depressive symptoms and 14 negative symptoms. To measure the third hypothesis the presence of positive symptoms such as persecutory thinking, the positive question frequency score is used, which consists of the following questions in column A:

a2,a5,a6,a7,a10,a11,a13,a15,a17,a20,a22,a24,a26,a28,a30,a31,a33,a34,a41,a42.The positive dimension distress score consists of the accompanying questions in column B:

b2,b5,b6,b7,b10,b11,b13,b15,b17,b20,b22,b24,b26,b28,b30,b31,b33,b34,b41,b42. (Verdoux *et al*., 2003). The total score ranges from 42 to 168 on both dimensions, with the positive sub-scale consisting of 20 items (range 20–80), the negative sub-scale consisting of 14 items (range 14–56 on both dimensions), and the depressive sub-scale consisting of 8 items (range 8–32 on both dimensions). Additionally, the CAPE can be used as a screening tool to detect individuals at increased risk for developing psychosis (Verdoux *et al*., 2000).

Cannabis Experience Questionnaire (CEQ)

The second questionnaire was conducted and designed to measure the subjective experience of cannabis use before and after intoxication (Barkus *et al*., 2006; Stirling *et al*., 2008). In addition, the questionnaire can estimate intoxication effects across a 70-item scale that measures the likelihood of consumption patterns that can lead to addictive behavior or psychotic development (Birnbaum *et al*., 2019). Specifically, participants were asked to answer questions on a Likert scale from 1 (never) to 5 (always) (Brinbaum *et al*., 2019).

The CEQ has the potential to aid in the identification of cannabis users. This questionnaire was administered after the CAPE questionnaire.The goal was to measure if the population suffers in general from psychosis and then establish correlations with cannabis use covering domains of psychotic-dysphoric feelings, intoxicating feelings, and expansive feelings. (Stoner, 2016).

Data Collection

The study's methodology was designed to ensure that participants were well informed and fully understood the objectives and requirements of the research. To achieve this, participants were presented with written explanations at the very outset of the questionnaires, outlining the study's aims and prerequisites. Importantly, participants were assured of the strict confidentiality measures that were implemented throughout the investigation. Following this detailed overview, participants were equipped with informed consent forms. These documents, bearing detailed information, were provided to participants to ensure a clear understanding of the research purpose, benefits, and potential risks associated with their participation. By signing these forms, participants indicated their informed agreement and their voluntary willingness to actively participate.

The study was conducted online, and self-reported questionnaires were administered via the 'Qualtrics' software; a link was shared through media with the population. The entire protocol took an average of 45–60 minutes to complete. After handing out the questionnaires, all participants underwent the same conditions and research procedures. Participants who enrolled in the survey received an email with information about the protocol they were required to follow and links to the questionnaires they needed to complete.

The data for this study was collected from April 1 to May 1, 2023. The study contained a total of 121 participants, including 42 Dutch and 79 Greek individuals, consisting of 61 males,

21 Dutch, and 40 Greek, and 60 female participants, 21 Dutch, and 39 Greek. The participants' ages ranged from 19 to 42 with a mean of 30.17 and 5.156 SD, and all were considered to be part of the general population.

Data Processing and Analysis

In this study, we conducted an analysis to explore the relationship between cannabis consumption and intoxication, as measured by the CEQ questions, and the presence of psychotic symptoms, as measured by the CAPE questionnaire. To investigate this relationship, we created three new variables: 'cannabis consumption intoxication' as the independent variable (denoted as X) derived from the CEQ questions, and 'presence of psychotic symptoms' as the dependent variable (denoted as Y) based on the CAPE questionnaire, as well as 'positive symptoms,' specifically to test persecutory thinking, also as a dependent variable (denoted as Y) using specific items of CAPE questions. This involves aggregating data as follows :

CEQ_total : Sum of responses to CEQ questions,

CAPE_ total : Sum of responses from CAPE questionnaire

CAPE_pos : Sum of responses related to positive symptoms (persecutory thinking) from the CAPE questionnaire.

Following the above syntax:

CEQ_total=SUM(A3.1_1,A3.1_2,A3.1_3,A3.1_4,A3.1_5,A3.1_6,A3.1_7,A3.1_8,A3.1_9,A3.1_10,A3.1_11,A3.1_12,A3.1_13,A3.1_14,A3.1_15,A3.1_16,A3.1_17,A3.1_18,A3.1_19,A3.1_20,A3.2_1,A3.2_2,A3.2_3,A3.2_4,A3.2_5,A3.2_6,A3.2_7,A3.2_8,A3.2_9,A3.2_10,A3.2_11,A3.2_12,A3.2_13,A3.2_14,A3.2_15,A3.2_16,A3.2_17,A3.2_18,A3.2_19,A3.2_20,A3.2_21,A3.2_22,A3.2_23,A1_1,A1_2,A1_3,A1_4,A1_5,A1_6,A1_7,A1_8,A1_9,A1_10,A1_11,A1_12)

CAPE_total=SUM(A1,A1a,A2,A2a,A3,A3a,A4,A4a,A5,A5a,A6,A6a,A7,A7a,A8,A8a,A9,A9a,A10,A10a,A11,A11a,A12,A12a,A13,A13a,A14,A14a,A15,A15a,A16,A16a,A17,A17a,A18,A18a,A19,A19a,A20,A20a,A21,A21a,A22,A22a,A23,A23a,A24,A24a,A25,A25a,A26,A26a,A27,A27a,A28,A28a,A29,A29a,A30,A30a,A31,A31a,A32,A32a,A33,A33a,A34,A34a,A35,A35a,A36,A36a,A37,A37a,A38,A38a,A39,A39a,A40,A40a,A41,A41a,A42,A42a).

CAPE_pos=SUM(A2,A2a,A5,A5a,A6,A6a,A7,A7a,A10,A10a,A11,A11a,A13,A13a, A15,A15a,A17,A17a,A20,A20a,A22,A22a,A24,A24a,A26,A28,A28a,A30,A30a,A31,A31a, A33,A33a,A34,A34a,A41,A41a,A42,A42a).

Afterwards, a comprehensive analysis was conducted to gain insights into various aspects of cannabis use and its implications. Firstly, essential descriptive statistics were calculated, such as the median, mean, and standard deviation of cannabis use within the entire population. This enabled us to understand the central tendency and variability of cannabis consumption. Moreover, the way in which cannabis use is distributed within the Dutch and Greek populations was examined. By doing so, valuable insights were gained into usage patterns and potential disparities between these two groups. Additionally, this analysis delved into the financial dimensions of cannabis consumption. The mean expenditure of cannabis use and the frequency of its usage within the Dutch and Greek populations were evaluated so that the monetary implications of cannabis use could be evaluated and the financial aspects of usage practices could be quantified.

In order to test the three hypotheses, a linear regression was employed to investigate the connections between cannabis use and various dependent variables, such as the development of psychotic symptoms for the first hypothesis. Hypothesis 1 posited that the Greek population exhibits higher levels of cannabis consumption and 'experiences with cannabis intoxication' (CEQ) compared to the Dutch population. To test this hypothesis, analyses were conducted as follows: For all participants, crosstabs of frequencies and chi-square tests were used to examine the lifetime use of cannabis. For all lifetime users, crosstabs of frequencies and chi-square tests were applied to assess current cannabis use. For all lifetime or current users, a t-test was performed on the CEQ total score with the grouping variable distinguishing the Greek and Dutch populations.

For the second hypothesis, Hypothesis 2a, which proposed a positive relationship between 'Experiences with cannabis intoxication' (CEQ) and the 'presence of psychotic symptoms', linear regression was conducted for all lifetime or current users with CEQ predicting psychotic symptoms (CAPE). Furthermore, Hypothesis 2b suggested that this relationship might differ between the Dutch and Greek populations. To investigate this, linear regression analyses were applied separately for the Dutch and Greek populations, examining the relationship between CEQ and psychotic symptoms.

Regarding the third hypothesis, Hypothesis 3a, it posited that Greek cannabis users would report more psychotic symptoms, particularly 'positive symptoms' (CAPE), than Dutch users. To test this hypothesis, a t-test was performed to compare the CAPE total and CAPE positive scores between the two groups, Dutch and Greek.

Prior to conducting the linear regression analysis, the assumptions were checked, including the normal distribution, and it was assured that the residuals were consistent across different levels of the independent variable with homoscedasticity, independence, and linearity. By checking these assumptions, it is ensured that the linear regression model produced accurate and reliable results. To assess the goodness of fit of the model, the R-squared value was calculated, which indicates the proportion of variance in the dependent variable ('psychotic symptoms') that is explained by the independent variable ('experiences with cannabis intoxication').

Ethical Considerations

The study and all its implications for the participants were approved by the Ethical Committee (PSY-2021-S-0515). The participant's confidentiality and privacy were ensured by using anonymous codes for data analysis, and all data was stored on a password-protected computer. No identifiable information, such as names, addresses, or phone numbers, was collected during the study.

The findings of the present research are discussed in the following chapter.

Analysis Results

The analysis results chapter presents a detailed examination of the data collected during the research study, revealing key findings, patterns, and relationships. It provides an analysis of the data, addressing the research objectives and hypotheses while providing valuable insights into the study's implications and significance.

Descriptive Statistics

Sample frequencies were computed to analyze the demographic attributes of the 121 participants, and the results are summarized in Table 1 below. The cumulative percent column accounts for the entire dataset, summing up to 100%. Additionally, there were 22 cases with missing data, constituting 15.4% of the total sample size. The table provides an overview of the nationality distribution within the sample, demonstrating that 34.7% of participants were Dutch, while 65.3% were Greek. The Dutch and Greek populations in the sample differ by approximately 30.58%.

Table 1. *Nationality of Participants*

	Frequency	Percent	Valid Percent	Cumulative Percent
Dutch	42	29.4	34.7	34.7
Greek	79	55.2	65.3	100.0
Total	121	84.6	100.0	
Missing	22	15.4		
Total	143	100.0		

The sample consisted of 61 male and 60 female participants, with a minimum age of 19 to 42 maximum and a mean age of 30.17 years (CI 95% [29.24; 31.09]). Figure 1, below, depicts a histogram of the age distribution of the sample. It is observed that most participants were between 27 and 33 years old.

Cannabis & Psychosis in Dutch and Greek population

Figure 1. *Age profile of the Sample*
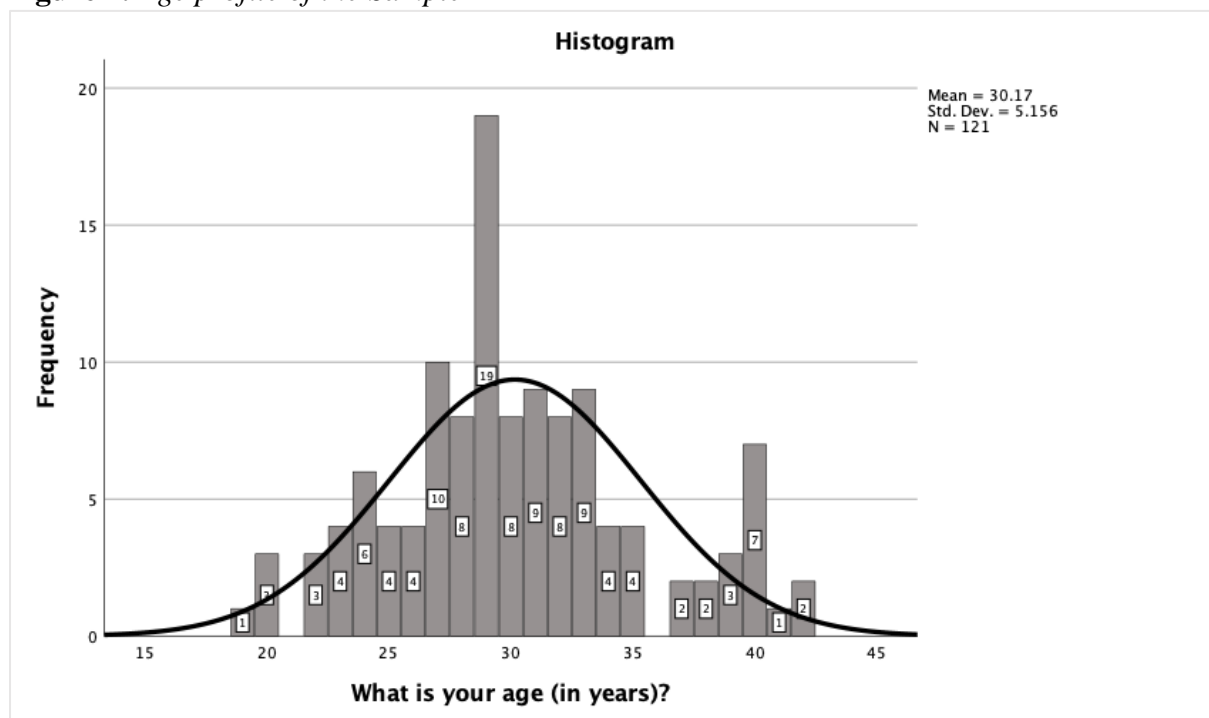
Table 2 shows the frequency of cannabis use among both the Dutch and Greek populations surveyed. The Dutch population had 39 respondents. 30 individuals (76.9%) reported that they have smoked or used cannabis before, with 9 individuals (23.1%) indicating that they have not smoked or used cannabis. The Greek population had 72 respondents: 58 individuals (80.6%) reported that they have smoked or used cannabis previously, and 14 individuals (19.4%) stated that they have not smoked or used cannabis. Consequently, the cumulative prevalence rates for cannabis use across both populations were approximately 79.28. Notably, the prevalence rate within the Dutch population specifically was recorded at 76.9%, and within the Greek population, it reached 80.6%.

Table 2. *Proportions of Lifetime Users and Non-Users*

			Frequency	Percent	Valid Percent	Cumulative
Dutch	Valid	Yes	30	71.4	76.9	76.9
		No	9	21.4	23.1	100.0
		Total	39	92.9	100.0	
	Missing		3	7.1		
	Total		42	100.0		
Greek	Valid	Yes	58	73.4	80.6	80.6
		No	14	17.7	19.4	100.0
		Total	72	91.1	100.0	
	Missing		7	8.9		
	Total		79	100.0		

As it is observed from Table 2, 10 additional missing values were excluded from the research study, reducing to a total sample of 111 cases. Thus, among the 111 participants from whom data on cannabis use were available, 61.5% (88) had reported smoking weed at least once in their lifetime, with a mean of 1.83 and SD of 0.343. Conversely, 16.1% (23) of participants had never used cannabis, with a mean score of 1.63 and a standard deviation of 0.377 (see Figure 2).

Figure 2. *Cannabis Use among Participants: Proportions of Lifetime Users and Non-Users*
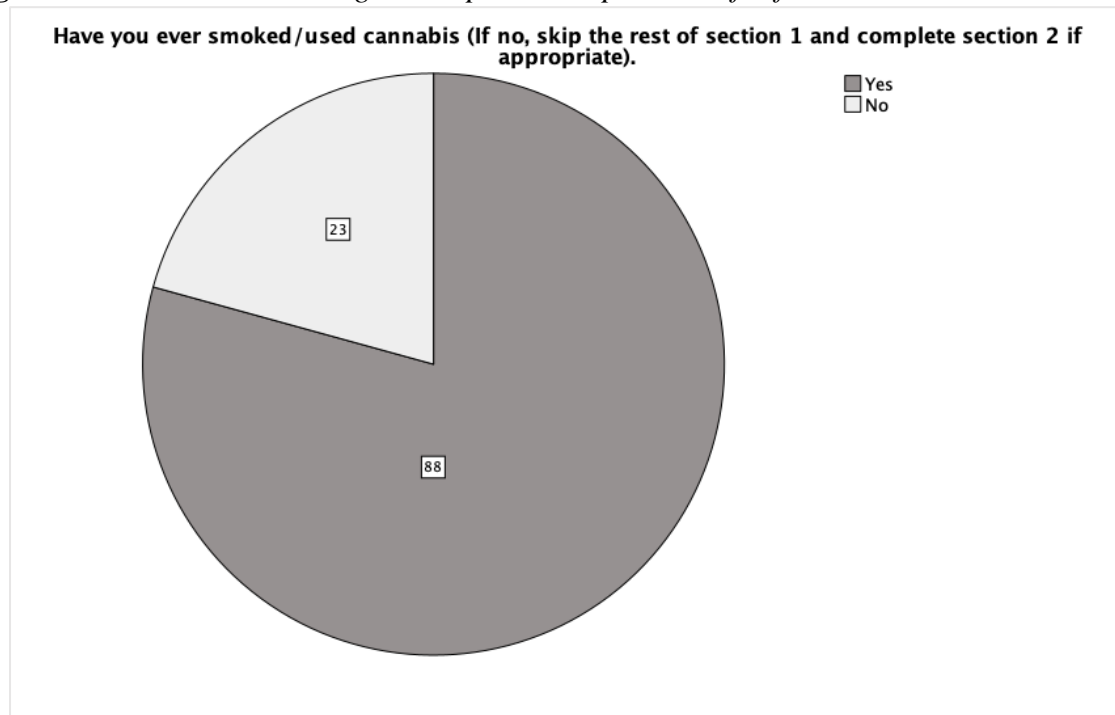
In terms of frequency of cannabis use, Greek participants reported using cannabis more frequently than Dutch participants (M = 25.00 vs. 83.0 times; p = .202), whereas Dutch participants reported spending slightly more money per week on cannabis than Greek users (M = 3.07 vs. 2.45 euros; p = .097). Of the 88 cannabis users, 47 (53.41%) reported current use, while 41 (46.59%) reported past use (See Appendix A, for supporting table for frequency and cost of cannabis use).

By conducting an analysis using Excel, it was possible to determine the prevalence rates of cannabis use within the study's population. Notably, the prevalence rate across the entire sample was found to be approximately 79.28%. Upon examining the breakdown by nationality, it was observed that among the Dutch participants, the prevalence of cannabis use stood at 76.9%, while among the Greek participants, it was notably higher, at 80.6%.

Hypothesis Testing

Hypothesis 1: Greek population exhibits higher levels of cannabis consumption and 'experiences with cannabis intoxication' (CEQ) compared to the Dutch population.

To examine cannabis use within the two populations, we first assessed whether individuals had ever smoked or used cannabis. The results are summarized in Table 3. Among the Dutch population, 30 respondents reported cannabis use, with 14 reporting no use. This initial analysis indicates a greater prevalence of cannabis use among the Greek population. Next, we explored whether participants in both populations were current or past cannabis users (Table 4). We observed that 19 Dutch respondents and 28 Greek respondents identified as current users, while 11 Dutch and 30 Greek respondents reported past use. This information provides valuable insights into the patterns of cannabis use in each group, highlighting the Greek population's notably higher prevalence of current use.

Table 3. *'Experiences with cannabis intoxication' for the Two Populations*

		What is your nationality?		Total
		Dutch	Greek	
Have you ever smoked/used cannabis (If no, skip the rest of section 1 and complete section 2 if appropriate).	Yes	30	58	88
	No	9	14	23
Total		39	72	111

Table 4. *Current and Past Cannabis Users – Populations Comparison*

		What is your nationality?		Total
		Dutch	Greek	
Are you current or past cannabis user?	Current	19	28	47
	Past	11	30	41
Total		30	58	88

In order to thoroughly examine our hypothesis, we conducted a t-test on the 'Experiences with cannabis intoxication' (CEQ) scores. This analysis aimed to identify statistically significant differences between the Dutch and Greek populations regarding their 'experiences with cannabis intoxication'(Table 5). However, the differences between these means are not statistically significant, as indicated by a t-test statistic of -0.322 and a p-value one sided of 0.374 and two sided of .748 (Table 6). The negative t-value indicates that the

Dutch population has a slightly lower mean CEQ score than the Greek population.Therefore our hypothesis is not confirmed as we don't observe the stasticial difference between these two populations.

Table 5. *Comparison of Levels of 'Experiences with cannabis intoxication'*

	What is your nationality?	N	Mean	Std. Deviation	Std. Error Mean
CEQ_total	Dutch	30	112,9000	32,72492	5,97473
	Greek	57	115,1404	29,75521	3,94117

Table 6. *Comparing 'Experiences with Cannabis Intoxication' (CEQ) Scores between Dutch and Greek Populations*

Independent Samples Test

Model		Levene's Test for Equality of Variances				Significance One-Sided
		F	Sig.	t	df	(P)
CEQ_total	Equal variances assumed	.908	.343	-.322	85	.374
	Equal variances not assumed			-.313	54.395	.378

Hypothesis 2a: 'Experiences with cannabis intoxication' (CEQ) is positively related to the presence of 'psychotic symptoms'.

In this analysis, a simple linear regression was calculated to predict the second hypothesis and showed statistically significant results. The dependent variable CAPE_total was regressed on the predicting variable CEQ_total (F $(1,85)$ = 17.773; p <.001) within R2 of .173, suggests that around 17.3 % of the variability in the presence of 'psychotic symptoms' (CAPE_total) can be attributed to the participants 'experiences with cannabis intoxication' (CEQ_total). Participants predicted an increase in risk of psychotic symptoms of .443 for each time they use cannabis (Table 7). Therefore, hypothesis 2a is confirmed.

Table 7. *Association between 'experiences to cannabis intoxication' and Risk of Developing Psychotic Symptoms*

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	71.172	12.423		5.729	<.001
	CEQ_total	.443	.105	.416	4.216	<.001

a. Dependent Variable: CAPE_total

Hypothesis 2b: The relation between 'experiences related to cannabis intoxication' (CEQ) and the differences between Dutch and Greek population.

To test this hypothesis, a linear regression was conducted with cannabis experiences (CEQ) predicting 'psychotic symptoms' (CAPE) separated per group (Dutch versus Greek). As shown in the following figures (Figures 5, 6 and 7) both groups show a similar relationship on cannabis intoxication questionnaire' (CEQ) with the Greek group to have more data points that are significantly different from the rest, indicating more extreme cases. This analysis suggests that cannabis experiences are positively related to the presence of 'psychotic symptoms' with no substantial group- specific differences in this relationship. However, the results were only significant for the Greek population ($p < .001$) and not for the Dutch population ($p = 0.09$). Thus, Hypothesis 2b is partially confirmed, indicating a positive relationship between 'cannabis experiences intoxication'(CEQ) and 'psychotic symptoms'(CAPE_total), with more extreme cases in the Greek population. The results of this regression model are presented in Table 8.

Table 8. *Association between experiences to cannabis intoxication and Risk of Developing Psychotic Symptoms*

Coefficients for Greek and Dutch nationality

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Dutch	(Constant)	90.702	18.951		4.786	<.001
	CEQ_total	.283	.161	.315	1.754	<.090
Greek	(Constant)	58.630	16.340		3.588	<.001
	CEQ_total	.544	.137	.471	3.960	<.001

a. Dependent Variable: CAPE_total

Regarding Figure 3, in the regression analysis, the assumption of homoscedasticity (homogeneity of variance) refers to the condition where the variability of the dependent variable (CAPE) is consistent or constant across all levels of the independent variables (CEQ). In simpler terms, it means that the spread of data points around the regression line remains approximately the same throughout the range of values of the independent variable. When the assumption of homoscedasticity is met, as in this case, the residuals (the differences between the observed values and the predicted values) exhibit a relatively consistent pattern of dispersion along the independent variable. This implies that the model's errors have a consistent level of variability, which is essential for making valid statistical inferences and accurate predictions.

Figure 3. *Linear Regression with Cannabis Experiences intoxication (CEQ) Predicting Psychotic Symptoms (CAPE) Separated per Group (Dutch versus Greek)*
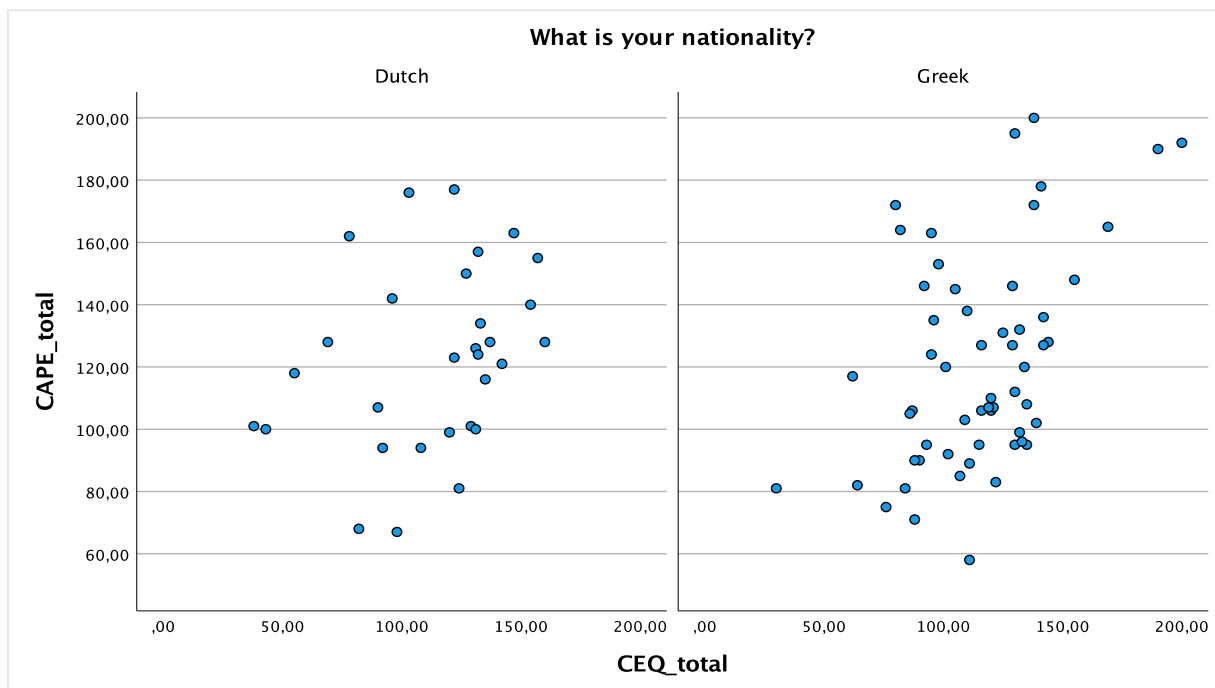
The boxplot analysis, illustrated in Figures 4 and 5, was conducted to examine the relationship between 'Cannabis Experiences Intoxication' (CEQ) and 'Psychotic Symptoms' (CAPE) when stratified by nationality (Dutch versus Greek). Within the Dutch group, no upper or lower outliers were observed in the CEQ variable, and only a few lower outliers were noted in the CAPE variable, suggesting a relatively uniform distribution of data points. In contrast, in the Greek group, a few upper and lower outliers were identified in the CEQ variable, along

with some lower outliers in the CAPE variable. These findings imply that certain Greek participants exhibited notably higher or lower levels of psychotic symptoms relative to their cannabis experiences compared to the majority of their peers. Therefore, hypothesis 2b its partially confirmed only for the Greek population.

Figure 4. *Cannabis Experiences intoxication (CEQ) Predicting 'Psychotic Symptoms' (CAPE) Separated per Group (Dutch versus Greek)*
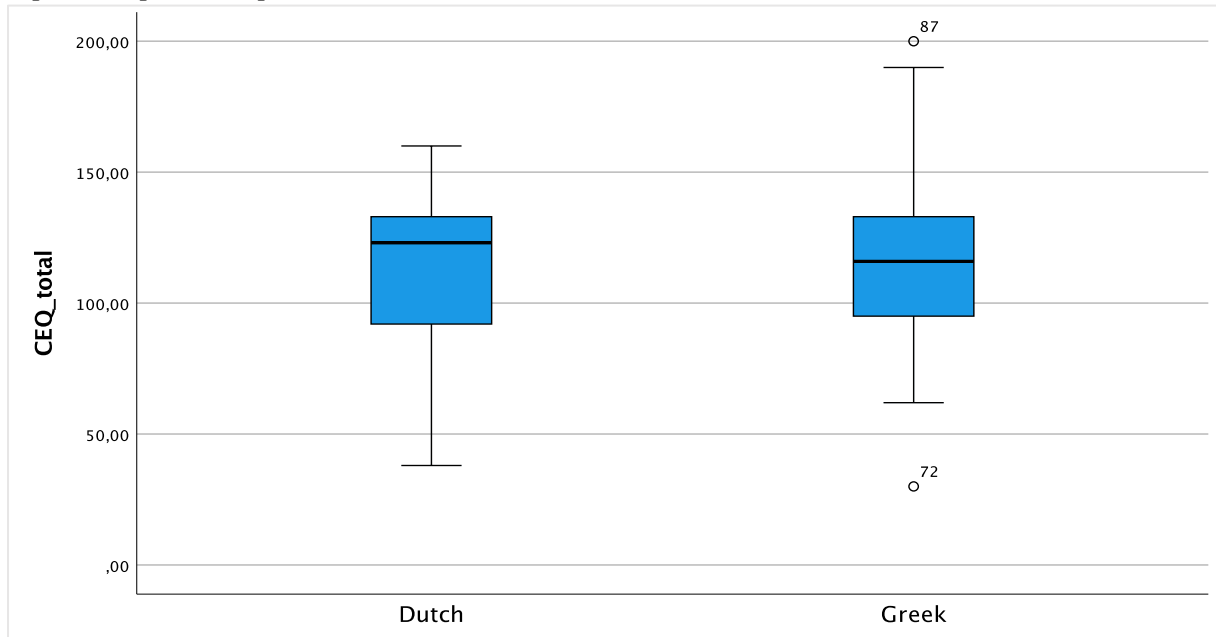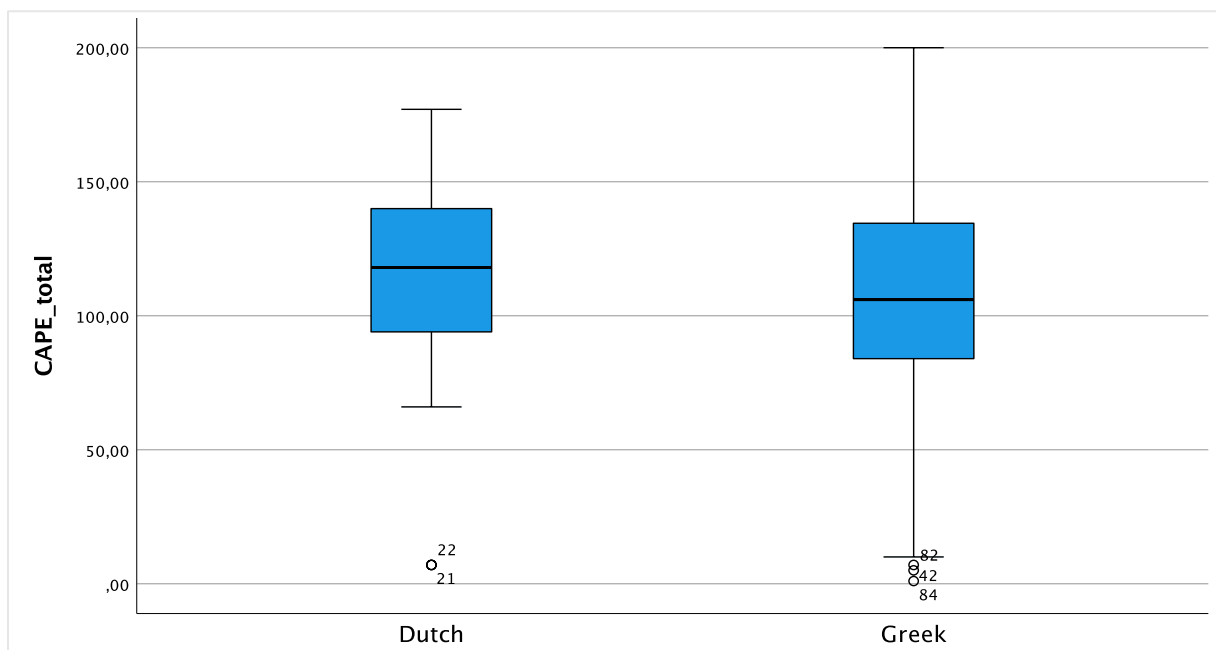

Figure 5. *Cannabis Experiences (CEQ) Predicting 'Psychotic Symptoms' (CAPE) Separated per Group (Dutch versus Greek)*

Hypothesis H3: Greek cannabis users report a higher incidence of 'positive symptoms' (CAPE), specifically persecutory thinking in comparison to the Dutch users.

To test the third hypothesis, a t-test was conducted for CAPE total and CAPE positive comparing the two groups. Results are shown in Table 9, and Figure 8. In the t-test that was conducted, it was shown that the two populations exhibit slightly equal levels of 'positive psychotic symptoms' ($p = .834$).

Table 9. *Comparison of positive psychotic symptoms*

	What is your nationality?	N	Mean	Std. Deviation	Std. Error Mean
CAPE_pos	Dutch	41	42.0244	14.96744	2.33752
	Greek	77	41.3766	16.37556	1.86617

To further investigate the results of the hypothesis testing, a boxplot analysis was conducted to visually depict the distribution of CAPE positive scores among the two groups (Dutch and Greek). The boxplots, shown in Figure 6, provide a graphical representation of the central tendency, spread, and potential outliers in these variables for each population.

The boxplot for the Dutch population illustrates a relatively symmetrical distribution with a median line in the center of the box. The box represents the interquartile range (IQR), which encapsulates the middle 50% of the data. The whiskers extend to the minimum and maximum values within a certain range, excluding two lower outliers. In the boxplot representing the Greek population, a similar distribution pattern is observed, with a median line positioned within the box. The interquartile range (IQR) is encapsulated by the box, while the whiskers extend to encompass the majority of the data, excluding some lower and higher outliers. These outliers, indicated by individual data points beyond the whiskers, signal that among the Greek participants, displayed significantly higher levels of positive symptoms compared to the Dutch population. This discrepancy highlights a noteworthy disparity in psychotic symptoms, with the Dutch population primarily exhibiting extremely only low levels in contrast. Therefore, the third hypothesis is not confirmed as the comparison reveals no statistically significant differences between Dutch and Greek.

Figure 6. *T-test for CAPE total and CAPE Positive comparing the two groups*
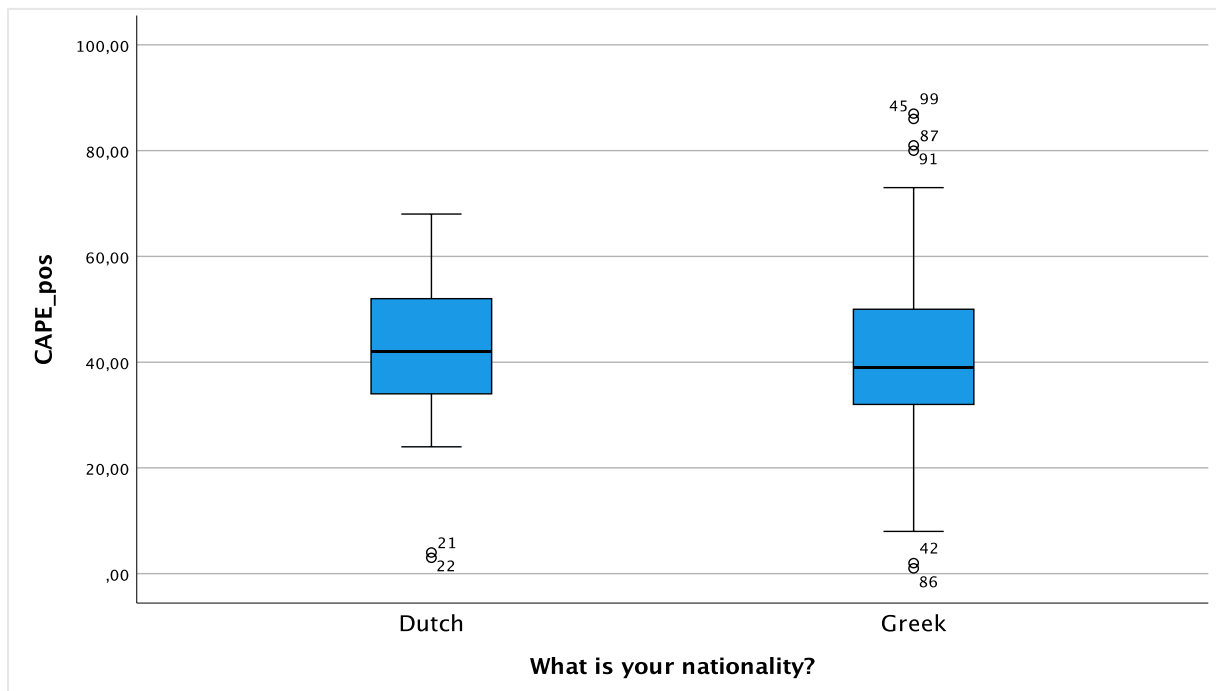
Discussion

In this cross-sectional study, we investigated the relationship between cannabis use and the development of psychosis in Dutch and Greek populations. Our primary hypothesis found no significant differences in cannabis use between the Dutch and Greek population. The secondary hypothesis revealed a significant correlation between cannabis use and the development of psychosis in the general population, with a stronger cannabis-psychosis link in Greeks. The third hypothesis showed no differences in the development of specific positive symptoms between the Dutch and Greek populations.

The sample consisted of 121 (42 Dutch, 79 Greek), with balanced gender representation. Among them, 88 reported having used cannabis at least once in their lifetime, resulting in a high overall prevalence rate of approximately 79.28 %. Interestingly, Dutch participants exhibited a slightly lower prevalence rate at 76.9 % compared to the Greek participants at 80.6 %.

Although the data did not facilitate a direct comparison of users and non- users of cannabis with respect to psychotic measures, the study uncovered interesting distinctions. Notably, Greek participants reported more frequent cannabis use than their Dutch counterparts, while Dutch participants expanded slightly more financial resources per week on cannabis. These financial variations observed between the Greek and Dutch participants in terms of cannabis use can be attributed to a combination of economic conditions, pricing factors, and consumption patterns. In Greece, where cannabis is more accessible and affordable, participants may use it more due to factors like lower incomes and lower cannabis prices. In contrast, in the Netherlands, slightly higher weekly spending my reflect to costlier, regulated market, potentially indicating better quality or controlled products.

The study begins with the primary research question and hypothesis 1a, suggesting higher Greek cannabis use than Dutch participants. While Greek use appears higher, it lacks statistical significance. These differences might be attributed to random variation or,in part,to the relatively modest sample size.

To explore the complex relationship between cannabis use and psychotic symptoms, let us first examine the influence of cannabis prevalence. Notably, we observed that Greece exhibits a slightly higher prevalence of cannabis use compared to Netherlands. Specifically, in Greece, the 11% of the general population aged 18-64 reported using cannabis. Among these individuals, 1/3 reported using cannabis within the last year. Furthermore, annual statistics

released by approved drug addiction organizations in Greece indicate a significant rise in the number of individuals seeking addiction treatment specifically for cannabis use from 45,000 in 2006 to 69,000 in 2014 new cases(Vagia, 2020).Although research conducted by Espad in 2015 showed lower cannabis use among 15 and 16 year old school students in Greece compared to the European average, long-term trends indicated a rising pattern of cannabis use among Greek students since 2007 (EKTEPN, 2017). This involving trend among the younger population sets the stage for our investigation, hinting that such changes might extend to the broader adult population.

In addition, recent public health monitoring data reveals higher rates of cannabis use in Western European nations. Between 2013 to 2019, past month use ranged from 1% in countries such as Malta, Hungary and Turkey,with a rate as high as 6 % in the Netherlands and 9.1 % in Spain. Over the past decade, cannabis consumption increased in 24 out of 26 countries, with notable increases in cannabis use particularly in middle- aged adults in countries like The Netherlands and Spain. Interestingly, in countries like the Netherlands and Spain, where cannabis use is common, the percentage of users meeting Cannabis Use Disorder (CUD) is comparatively lower, while the UK stands out with higher rates of cannabis use and CUD. (Manthey *et al.*,2021). These results suggest that the level of prevalence in cannabis use has been on the rise in recent decades in countries like the Netherlands and Greece, potentially increasing the likelihood of individuals exhibiting psychotic symptoms, which could explain the trend between higher consumption levels of cannabis use in the Greek population.

Another compelling avenue for understanding the development of psychotic symptoms is the variation in cannabis potency between the two countries. This explanation aligns with findings from meta-analyses, which have demonstrated a dose-response relationship between the level of cannabis use and the risk of psychosis. Heavy cannabis use is associated with a fourfold increase in psychosis risk and has links to conditions like depression, anxiety, and cannabis use disorder (Marconi *et al.*, 2016). Moreover, previous epidemiological and experimental evidence suggests that high concentrations of THC can have detrimental effects on mental health. A UK study discovered that high- potency THC(>15 %) was associated with a threefold increased risk of psychosis, and daily use resulted in a fivefold risk, while lower-potency hash (<5 % THC) did not show such symptoms (Stuyt, 2018).The disparities in potency may result to different levels of psychoactive effects experienced by the users of Greece and Netherlands, potentially influencing patterns of use and the likelihood of developing psychotic symptoms in the Greek population.

An additional consideration when it comes to understanding the difference between Greek and Dutch population in the evolution of psychotic symptoms, it's the cannabis quality and regulation. For instance, in the Netherlands, relevant offices and authorities monitor and test cannabis products, ensuring higher standards (Hamilton & Monaghan, 2019). Conversely, in Greece, the illegal status of cannabis results in a lack of regulation and quality control. This difference in cannabis quality standards suggests that the impacts of consumption might extend beyond consumption rates alone (Stergiatou, 2019). The findings corroborate earlier research indicating that government regulated quality control of cannabis products can ensure that consumers receive products accurately labeled for their THC and CBD. This regulation contributes to promoting safer use, reducing health risks, advocating harm reduction ,and ensuring consumer safety to prevent accidents or misuse (Murray & Hall, 2020). While no substantial differences exist between the two populations, the Greek population demonstrated a higher prevalence of use, potentially implying an increased susceptibility to the development of psychosis among the Greek population. These observations emphasize the importance of considering not only the prevalence of cannabis but also aspects like potency and regulation when investigating the relationship between cannabis use the development of psychotic symptoms.

Regarding the second research question and the hypothesis (H2a), which examined 'Experiences with cannabis intoxication' (CEQ) the presence of psychotic symptoms. The findings for the 2a hypothesis can indicate that cannabis use may have an impact on the development of psychotic symptoms. This aligns with the proposal by Medina *et al.* 2018 that there is a connection between cannabis use and the risk of developing psychosis in individuals. Furthermore, the study suggested the role of gene- environment interactions in shaping the link between cannabis use and the presence of psychosis (Medina *et al.*, 2018). Moreover, this data supports the conclusions of a prior study conducted by EU-GEI that highlighted the association between cannabis use and psychotic disorders in multiple European countries which reported significantly higher odds of psychotic disorder among daily cannabis consumers compared to non-users (Forti *et al.*, 2019). Similarly, a study conducted by Ksir and Hart (2016) support these thesis findings, suggesting a link between cannabis use and psychosis without implying that cannabis use directly causes psychosis in all individuals.

As for hypothesis 2b, which examined the differences in the relationship between 'experiences with cannabis intoxication' and 'psychotic symptoms' between the Dutch and

Greek populations, the analysis showed a similar relationship in both groups. While the relationship was significant for Greeks and not for the Dutch, it suggests that the association may be more pronounced in Greece. The elevated vulnerability to psychosis among the Greek population may be attributed to a range of complex factors, as explored in our first hypothesis concerning cannabis potency, regulation, and quality. These findings support the idea that cannabis use could indeed play a role in the development of psychosis ,yet it seems to be a consequence of various factors rather than being solely population-dependent.

Regarding the third research question and hypothesis, which suggested that Greek cannabis users report more 'positive symptoms'(CAPE), particularly persecutory thinking, than Dutch users. Surprisingly, both groups exhibited relatively equal levels of positive symptoms with no substantial differences in the development of persecutory thinking.This indicates that while cannabis use may be associated with the presence of positive symptoms such as persecutory thinking, there were no substantial variations between the two populations. However, it's worth noting that we observed higher outliers within the Greek population compared to the Dutch population. These outliers imply that a portion of Greek participants faced more severe or pronounced symptoms, potentially signifying a subgroup with elevated vulnerability or different contributing factors related to mental health.

Another possible interpretation concerning the Greek population being more vulnerable to develop positive symptoms such as persecutory thinking, is rooted in the role of cultural norms, social attitudes, and the societal acceptance of cannabis in shaping individual's preceptions and responses to its use. The Netherlands has a rich history of championing individual freedoms, including freedom of expression, religion, and lifestyle choices. In contrast,Greek society's strict stance against cannabis use, accompanied by legal repercussions such as arrest and prosecution, may foster the development of persecutory thoughts among cannabis users. This situation is exacerbated by a lack of cultural acceptance in Greece due to conservatism and environmental stressors. When certain behaviors, like cannabis use, are not culturally accepted, it can lead to stigmatization and social isolation. Individuals who face stigma or exclusion from their society or social circles due to their cannabis use may develop an increased sense of vulnerability and persecutory thoughts (Christodoulou, 2018). These results align with a study indicating cannabis use is related to stigma, with countries having stricter cannabis policies, such as Greece, reporting higher levels of stigma, while countries with more lenient policies,like the Netherlands, had lower stigma levels (Skiliamis *et al.*, 2022). While there subtle differences between the two populations, with the Greek population showing

greater vulnerability by exhibiting outlier levels of positive psychotic symptoms, it is crucial to consider a broader spectrum of factors when understanding the intricate relationship between these two variables, emphasizing the need for a comprehensive and multifaceted approach to study this phenomenon.

Strengths, Limitations, and Recommendations for Future Studies

The present study on the relationship between cannabis use and psychosis in Dutch and Greek populations demonstrates both strengths and limitations that warrant acknowledgment. First, this study stands as a pioneering effort in its unique endeavor to establish connections and elucidate disparities between these two distinct populations. By adopting a comparative framework, which allows for an examination of the differences in cannabis use and its potential impact on mental health within the specifically selected demographic cohorts. Notably, this comparative lens allows for the identification of nuanced distinctions, which contribute to a better understanding of the interplay between cannabis consumption and mental health outcomes. This study explores the unique differences between Dutch and Greek people when it comes to using cannabis and its effects. Second, the study collected valuable substance use data, including prevalence rates and associated risk factors, shedding light on the prevalence and impact of cannabis use on mental health outcomes (Faber & Fonseca, 2014). Last, the study explored the association between cannabis use and positive symptoms such as persecutory thinking. The insight gained from these investigations has the potential to enhance our understanding of the relationship between cannabis consumption and the development of specific psychotic symptoms. The study enriches the existing body of literature in examining the interplay between cannabis use and psychosis. By focusing on specific symptoms, it contributes valuable data and insights that may serve as building blocks for future research.

Nevertheless, it is essential to acknowledge the presence of certain limitations within the study. First, the study employs a cross-sectional design, which has the inherent limitation of providing a snapshot of associations at a specific point in time. This design is not suited for tracing changes or prevalence rates over time. Future research employing longitudinal designs address this limitation. Second, this study does not facilitate a direct comparison between cannabis users and non-users regarding psychotic measures. This limitation is crucial because we cannot make direct comparisons between individuals who use cannabis and those who do not. Such comparisons could offer insights into whether cannabis users experience a significant

increase in psychotic symptoms compared to non- users, which would further support the associations identified. Another limitation of the present study is the relatively small sample size, consisting of 42 Dutch and 79 Greek participants. This sample size restriction has implications for the statistical power and generalizability of the findings. Such modest numbers mean that the study's conclusions can be applied primarily to populations of similar characteristics and may not be readily extrapolated to larger or more diverse populations. Another notable limitation is the potential bias for self-diagnosis among participants. The study relied on self-reported psychosis symptoms, addictive behaviors, and mental health conditions, which can be influenced by participants' subjective interpretation and reporting (APA, 2010). Such subjectivity may inadvertently lead to an overestimation of symptoms and a misattribution of cannabis use. For instance, participants' subjective responses about their experiences might be influenced by their understanding of various symptoms outlined in the Cannabis Experience Questionnaire, such as enhanced perceptual awareness, paranoid feelings, anxiety for no reason, delusions, and auditory hallucinations. Specifically, items such as *'Feeling anxious for no reason'*, '*Losing your sense of reality'*, '*Feeling depersonalized'*, explicitly showcase participants' introspective awareness. This awareness, while integral to capturing individual experiences, also underscores the challenge of relying solely on self-reported data. To address this ethical concern, clear instructions and support were provided to participants, allowing them to seek clarification and maintain open communication with the researcher

A notable challenge arises from the translation process of the CAPE questionnaire into Greek. This translation bias introduces a potential obstacle, as the absence of an officially Greek version raises concerns about the precise representation of nuances and psychological implications (APA, 2010). For instance, items such as those in the CAPE questionnaire, such as '*Do you ever feel that you are not a very animated person'*, '*feeling all-powerful*,' or in the CEQ questionnaire, '*Things not feeling 'right' on your skin* or *in your body'*, raise valid concerns about the questionnaire's precision in capturing the psychological implications specific to the Greek population. To mitigate this limitation, this study took meticulous steps in the translation process, including including bilingual experts and conducting interviews with Greek participants to assess their understanding of the translated items.

To enhance our understanding of the complex relationship between cannabis use, psychosis, and paranoia, future studies should adopt a multinational perspective. These studies should encompass a larger scale, involving multiple countries with diverse cannabis regulations

and cultural attitudes towards its use. By comparing data from various regions, researchers can better identify patterns and factors that transcend specific populations. This broader perspective can contribute to a more comprehensive understanding of how these variables interact on a global scale. Furthermore,it is vital to conduct longitudinal studies that follow participants over an extended period to assess the effects of long-term cannabis use on the development and progression of psychotic symptoms and paranoia. Longitudinal studies tracking participants over an extended period are essential for gaining insights into the long- term effects of cannabis consumption. For instance, future researchers should explore deeper into the concept of Cannabis Use Disorder (CUD) and examine how different levels of cannabis dependence are correlated with the potential for psychosis.

In addition, future studies could investigate the underlying mechanisms that contribute to the association between cannabis use and psychosis, such as the neurobiological, genetic, and environmental factors that mediate this relationship. By identifying these mechanisms, researchers can gain valuable insights into the pathways through which cannabis may impact mental health. This understanding can contribute to more targeted interventions and prevention strategies. Interventions studies should aim at reducing the potential harms associated with cannabis use, particularly in populations with a predisposition or higher risk for psychosis and paranoia.Such interventions can be psychoeducation, or support programs in reducing the negative impact of cannabis use on mental health, or harm reduction strategies.

Last, It is essential to recognize the potential psychological impact of cannabis use, on vulnerable populations, underscores the importance of involving policymakers. Future research should not only inform but actively engage in the development of cannabis related regulations and interventions. Policymakers should consider cultural and legal factors when formulating these measures. By integrating scientific findings into policy decisions, we can proactively address potential mental health issues associated with cannabis use and develop more comprehensive and targeted approaches to prevention and support.

Conclusion

In conclusion, this study has provided valuable insights into the relationship between cannabis use and psychosis, shedding light on the nuances and disparities within the Dutch and Greek populations. The study commenced with the hypothesis that cannabis use is associated with a higher risk of developing psychotic symptoms, and the findings yielded tentative support for this assertion. Concurrently, the study investigated the variation in cannabis consumption between the Greek and Dutch populations. Remarkably, these findings indicate that Greek cannabis users have higher levels of consumption than their Dutch counterparts and display a slight susceptibility to persecutory thinking. This underscores the interconnectedness of cultural contexts, cannabis utilization, and mental health outcomes, expanding our understanding of the role played by cultural and legal factors in shaping individuals' experiences and vulnerabilities.

Moving forward, there are several avenues for further exploration. Future research should delve deeper into this influence of cannabis use on psychosis, as the existing literature is still insufficient.Specifically, investigating neurobiological, genetic, and environmental factors would deepen the current understanding of this complex interplay. Importantly, it is crucial to acknowledge that the association between cannabis and psychosis is not a linear one. Just as a key does not guarantee an opened door, an association does not automatically imply causation.

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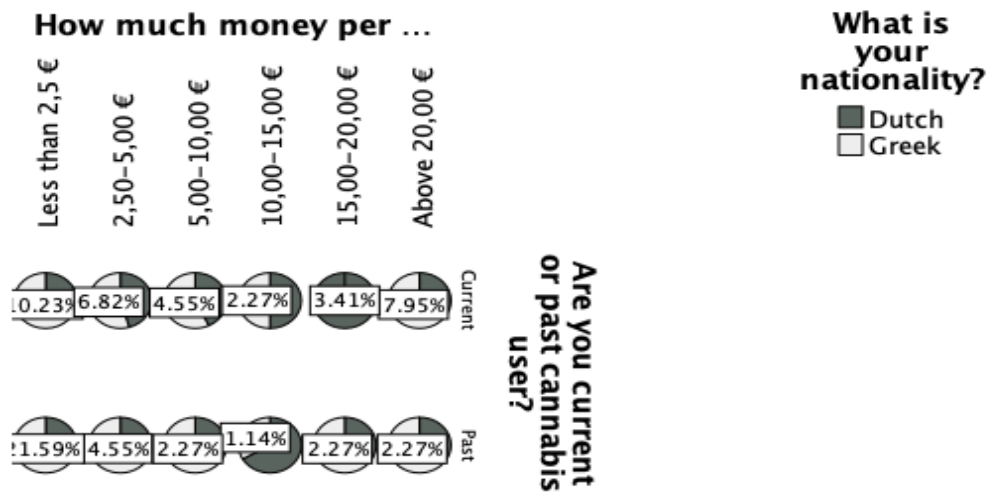
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Appendix A. Supplementary Information on Participant Cannabis Use

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How much money per ...

Less than 2,5 €
2,50–5,00 €
5,00–10,00 €
10,00–15,00 €
15,00–20,00 €
Above 20,00 €

Current
10.23% 6.82% 4.55% 2.27% 3.41% 7.95%

Past
21.59% 4.55% 2.27% 1.14% 2.27% 2.27%

Are you current or past cannabis user?

What is your nationality?
■ Dutch
□ Greek

Appendix B. Comprehensive Assessment of Psychotic Experiences (CAPE) Questionnaire

1. Do you ever feel sad? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 2

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

2. Do you ever feel as if people seem to drop hints about you or say things with a double meaning? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 3

If you ticked "sometimes" , "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

3. Do you ever feel that you are not a very animated person? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 4

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

4. Do you ever feel that you are not much of a talker when you are conversing with other people? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 5

If you ticked "sometimes" , "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

5. Do you ever feel as if things in magazines or on TV were written especially for you? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 6

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

6. Do you ever feel as if some people are not what they seem to be? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 7

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

7. Do you ever feel as if you are being persecuted in some way? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 8

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

8. Do you ever feel that you experience few or no emotions at important events? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 9

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

9. Do you ever feel pessimistic about everything? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 10

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

10. Do you ever feel as if there is a conspiracy against you? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 11

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

11. Do you ever feel as if you are destined to be someone very important? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 12

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

12. Do you ever feel as if there is no future for you? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 13

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

13. Do you ever feel that you are a very special or unusual person? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 14

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

14. Do you ever feel as if you do not want to live anymore? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 15

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

15. Do you ever think that people can communicate telepathically? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 16

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

16. Do you ever feel that you have no interest to be with other people? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 17

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

17. Do you ever feel as if electrical devices such as computers can influence the way you think? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 18

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

18. Do you ever feel that you are lacking in motivation to do things? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 19

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

19. Do you ever cry about nothing? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 20

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

20. Do you believe in the power of witchcraft, voodoo or the occult? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 21

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

21. Do you ever feel that you are lacking in energy? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 22

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

22. Do you ever feel that people look at you oddly because of your appearance? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 23

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

23. Do you ever feel that your mind is empty? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 24

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

24. Do you ever feel as if the thoughts in your head are being taken away from you? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 25

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

25. Do you ever feel that you are spending all your days doing nothing? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 26

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

26. Do you ever feel as if the thoughts in your head are not your own? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 27

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

27. Do you ever feel that your feelings are lacking in intensity? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 28

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

28. Have your thoughts ever been so vivid that you were worried other people would hear them? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 29

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

29. Do you ever feel that you are lacking in spontaneity? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 30

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

30. Do you ever hear your own thoughts being echoed back to you? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 31

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

31. Do you ever feel as if you are under the control of some force or power other than yourself? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 32

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

32. Do you ever feel that your emotions are blunted? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 33

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

33. Do you ever hear voices when you are alone? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 34

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

34. Do you ever hear voices talking to each other when you are alone? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 35

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

35. Do you ever feel that you are neglecting your appearance or personal hygiene? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 36

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

36. Do you ever feel that you can never get things done? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 37

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

37. Do you ever feel that you have only few hobbies or interests? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 38

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

38. Do you ever feel guilty? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 39

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

39. Do you ever feel like a failure? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", please go to question 40

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

40. Do you ever feel tense? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", you are now ready

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

41. Do you ever feel as if a double has taken the place of a family member, friend or acquaintance? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", you are now ready

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

42. Do you ever see objects, people or animals that other people cannot see? (please tick)

Never Sometimes Often Nearly always

If you ticked "never", you are now ready

If you ticked "sometimes", "often" or "nearly always" please indicate how distressed you are by this experience: (please tick)

Not distressed A bit distressed Quite distressed Very distressed

Appendix C. Comprehensive Assessment of Cannabis Experience Questionnaire (CEQ)

Section 1.

a) Have you ever smoked/used cannabis?   YES / NO

(circle as appropriate)If NO, skip the rest of section 1 and complete

section 2 if appropriate.

b) Are you a current* past* cannabis user? (*circle as appropriate)

c) How old were you when you first tried cannabis?_____(give approx age in years)

d) If you are a current user, indicate how often you use cannabis. If you are a past user indicate your usage patternwhen you were using cannabis (Circle as appropriate.)
Everyday
More than once a weekAbout once a week

About once/twice a month A few times each year About once a year

Only once or twice

e) Do you/did you mostly
          smoke/use cannabis;
          Socially (with
          friends)
          On your own
          Other (please state)

f) How much money per week do you/did you usually spend on cannabis? (if this figure varies, indicate average expenditure).

| Less than £2.50 | £2.50- £5 | £5-£10 | £10-£15 | £15-£20 | Above £20 |

g) When do/did you
          mostly smoke
          cannabis:During
          the day
          During the evening
          Frequently during the day and evening

h) What type of cannabis do you/did you usually buy? (if this varies, indicate the most frequent) Hash (cannabis resin/solid)

Home-grown skunkWhite widow

Super skunk

Other (please state)

j) Approximately how many times have you smoked/used cannabis in your life? _____ (a guesstimate will do)

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Section 2.

Please indicate in the table below any <u>other drug(s)</u> **including alcohol and nicotine** which you use/have used recreationally, the frequency with which you use/have used this drug, your age when you first tried the drug(s) and whether you are a past or current user. Use a new box for each additional drug: Circle your response(s) as appropriate.

Drug	Frequency	Age	Use	When
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night

Cannabis & Psychosis in Dutch and Greek population

Drug	Frequency	Age	Use	When
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night
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	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night
	Everyday More than once a week A few times each month A few times each year Only once or twice		Current Past	Day Night Both dayand night

Cannabis & Psychosis in Dutch and Greek population

Section 3.

How often do you have/have you had these experiences while **smoking** cannabis?(please be sure to tick your answer for each item)

	Rarely or never	From time to time	Sometimes Yes & sometimes No	More oftenthan not	Almost alwaysor always
Feeling Happy					
Feeling fearful					
Enhanced perceptual awareness					
Paranoid					
Uncomfortably sleepy					
Anxious for no reason					
Like there was something which you had to do no matter what (compulsive)					
Feeling all-powerful (like you could do anything)					
Deluded (believed in something which afterwards you knew not tobe true)					
Looking for excitement					
Feeling threatened by an unknown force					
Lethargic					
Sentimental					
Energized					
Nervy					
Speech becomes slurred					
Slowing of time					
Hearing things other people couldn't hear (auditory hallucinations)					
Powerful (strong)					
Able to understand the world better					
Losing your sense of reality					
Having visions (like visual hallucinations)					
Fearful that you are going crazy/mad					
Depressed					

Cannabis & Psychosis in Dutch and Greek population

	Rarely or never	From time to time	Sometimes Yes & sometimes No	More often than not	Almost always or always
Increased appetite					
Obsessive (or fixated on something)					
Being relaxed					
Sleepy					
Disturbed in your thinking					
Feeling like you no longer know yourself					
Laid back					
Sad					
Excited					
Religious					
Full of plans					
Ecstatic					
Feeling more creative					
Things not feeling 'right' on your skin or in your body					
Angry					
Rapid flow of thoughts					
Having out of body experiences					
Feeling full of ideas					
Reduced level of consciousness					

Section 4.

How often have you had/did you have these experiences **AFTER** the initial effects of cannabis have worn off (ie;experiences which you feel are directly related to using cannabis)? (Please answer each item)

	Rarely or never	**From timeto time**	**Sometimes Yes & sometimes No**	**More oftenthan not**	**Almost alwaysor always**
Dis-inhibited					
Not wanting to do anything					
Feeling generally sloweddown (physically)					
Feeling a lack of motivation					
Feeling that your thinking has been slowed down					
Being unable to concentrate					
Having a sense of slowingof time					
Paranoid without reason					
Suspicious of people, events or things without reason					
Feeling depersonalised					
Being unable to remember things					
Having reduced attention					