



## ORIGINAL RESEARCH

## Child and Adolescent Violent Behavior and Psychotropic Medications: Behavioral Health and Epidemiological Research Issues for a Post SARS-CoV-2 Environment

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### Abstract

There is substantial evidence linking the consumption of psychotropic medications with leading to mania, hostility, violence, and even homicidal ideation yet little is still known regarding the link between psychiatric drugs and acts of senseless violence. These drugs, whether administered to treat depression, mania, or anxiety, have neurological side effects that frequently enhance the probability of additional comorbid mental health outcomes. A special class of psychotropic medications, called selective serotonin reuptake inhibitors (SSRIs) are consistently involved in producing a varied range of maladaptive mental and behavioral conditions. The purpose of this paper is to examine in detail the neurological processes that may be involved in these negative outcomes and present a prospective for future research in neurosciences to develop a 'risk-benefit' profile for treating children and adolescents.

### Keywords

Psychotropic medications, Violence, Serotonin reuptake inhibitors (SSRIs), Suicidal Ideation, Homicidal Ideation, SARS-CoV-2

### Introduction

Recent studies have shown that the prescription of psychotropic drugs to adults, adolescents and young children has dramatically increased over the past several decades [1-6]. Glasser reported that as of 1994, psychotropic medications represented nearly 9% of all prescriptions on the drug market [5]. Minde reported that between 1993 and 1997 methylphenidate (Brand Names: Concerta, Ritalin, Daytrana, Aptensio XR, Metadate CD, Methylin, Quillivant XR) prescriptions

in Canada increased three times and that prescription of selective serotonin reuptake inhibitors (SSRIs) - Citalopram (Celexa), Escitalopram (Lexapro), Fluoxetine (Prozac), Paroxetine (Paxil, Pexeva), Sertraline (Zoloft) Vilazodone (Viibryd) in the United States for children five-years-old and younger had increased ten times [6]. This is problematic because there is a substantial corpus of evidence connecting the intake of psychotropic medications with resulting to manic behavior, hostility, violence, and even suicidal and homicidal ideation [7,8].

Although these observations have been considered indicative of other social issues in the United States (U.S.), the emergence of the SARS-CoV-2 pandemic appeared to contribute to the prevalence of negative mental health outcomes among children and adolescents across the globe [9-12]. Ma and associates conducted a meta-analysis examining the prevalence of mental health issues among children and adolescents during the COVID-19 pandemic and found that depression and anxiety disorders were the most prevalent based on an examination of 57,927 children and adolescents from China and Turkey [13]. It has also been suggested that lockdown may be another burden that could result in increased rates of psychiatric disorders including but not limited to Depression, Post-Traumatic Stress, and Anxiety Disorders [14-16].

Given that the treatment of mental health disorders among children and adolescents varies across the United States and the world [17], it would be efficacious

to examine factors that may result in negative outcomes tentatively associated with psychotropic prescription drug use for the treatment of mental health disorders, in particular suicide and homicide ideation.

By conducting further review and exploration of individual treatment outcomes that may come as a byproduct of taking psychotropic drugs, one may be in a position to shed light on the considerable variations in problem behaviors observed for children and adolescents with emerging mental illness specifically associated with an antisocial behavioral pattern such as suicidal and homicidal ideation. With this in mind and to remedy these limitations, the current study examined probable outcomes regarding suicidal and homicidal ideation among children and adolescents who have consumed psychotropic drugs for the treatment of mental health disorders. Moreover, we will examine this concerning the modern environment consequential of the SARS-CoV-2 pandemic to inform future behavioral health and epidemiological research initiatives in the future.

## Background

Before the SARS-CoV-2 pandemic, there was a call to reevaluate the extent to which psychotropic medications are proscribed for children and adolescents has been strongly proposed since their introduction and increased saturation in the prescription drug market over the last several decades [18-20]. When the first SSRIs such as Prozac began to be used more and prescribed to children in the United States, cases of internal and external acts of directed violence started to surface. By 2004 in the United States, the U.S. Food and Drug Administration issued warnings about increased rates of self-harm including suicidal ideation in adolescents and young children and youth under the age of 18 exposed to Paxil [21]. As a group of drugs, SSRIs intake has been linked to suicidal thoughts [22-24], causing aggressive behavior [25,26] and mania [27].

Homicidal ideation has been operationalized as one having thoughts about committing deadly violence toward a selected target regardless if homicide is attempted or completed [28]. In comparison, although there are no universally accepted consonant definition for suicidal ideations (SI), it is a term used broadly to describe a range of thoughts, wishes, and preoccupations with death and suicide [29].

These occurrences aside, it has been advocated that clinicians must pay detailed attention to factors that could result in suicidality and homicidal that may occur due to SSRI-induced akathisia or/and acute adjustment disorders (AD) [30-32]. Breggin noted that these adverse drug reactions include but are not limited to “overlapping clinical phenomena: A stimulant profile that ranges from mild agitation to manic psychoses, agitated depression, obsessive preoccupations that

are alien or uncharacteristic of the individual, and akathisia” [8]. Some researchers suggest that neural activity related to dopamine D1 and D2 receptors in the nucleus accumbens core and shell play a tentative role in these outcomes since impaired inhibitory control over behavior is a key feature in various psychiatric disorders [33]. Even with such scientific insights, there is more to learn on the neurological factors associated with psychiatric drug intake and acts of senseless violence, as well as what direction behavioral neuroscience research should go in to address these issues. With this in mind, the purpose of this paper is to examine in detail the neurological processes that may be involved in these negative outcomes and present a perspective for future research in neurosciences to develop a 'risk-benefit' profile for treating children and adolescents.

In theory, it is presupposed that the neuromodulator serotonin is important in the regulation of aggressive behavior in vertebrates and that by increasing synaptic levels of serotonin with SSRIs, one can decrease the expression of aggressive behavior [34]. However, laboratory experiments demonstrate that the consumption of SSRIs during crucial developmental periods results from changes in brain circuitry that enables the aforementioned maladaptive behaviors to continue into adulthood [35]. Some of these behavioral side effects, including suicidal ideation and self-injurious behavior, were not as uncommon as proponents of the use of these drugs on adolescents and young children proclaim [36].

## Current Status

Before the nineteneighties, acts of senseless violence in the form of mass shootings were relatively unheard of. Then major pharmaceutical corporations began to roll out a highly targeted class of antidepressants, led by Prozac, which hit the U.S. market in 1987, followed by Zoloft in 1991 and Paxil in 1992 [22,23]. Coincidentally, after this period mass shootings started to be reported more frequently. Although different circumstances and situations were associated with each of these unfortunate events, one commonality frequently noted was the perpetrator's history of having mental health issues and use of psychotropic drugs.

For example, Eric Harris and Dylan Klebold killed twelve students and a teacher at Columbine High School. Eric was on Luvox, an antidepressant [25]. On April 16, 2007, Cho Seung-Hui shot and killed thirty-two people while on antidepressant(s) [26]. In February 2008, Steven Kazmierczak entered a large lecture hall at Northern Illinois University and shot twenty-four people of which six died, including Kazmierczak, who killed himself before the police arrived. According to reports, Kazmierczak had discontinued the use of Prozac 3 weeks before the killings [26,27]. Kip Kinkel was withdrawing from Prozac when he shot twenty-two

classmates and killed two after he had murdered his mother and stepmother [28]. James Holmes was under the care of a psychiatrist who opened fire in a Colorado movie theater killing twelve people and wounding fifty-eight. However, to this date, no information regarding the psychotropic drugs he was taking at the time or prior [29,30].

Unfortunately, this is just antidotal information therefore, no statistical relationship can be stated nor any measure of causality be applied. However, such research needs to be conducted to address this serious modern-day problem. What is known is that many of the individuals who carry out mass acts of violence have a history of ADHD or Depression, without a prior history of violent behavior who suddenly become violent or suicidal ex post facto to being proscribed psychotropic drugs. Research does confirm that violence and suicide can be an outcome of the intake of psychotropic drugs in an attempt to address mental health issues [31-34].

### Research Implications

This cursory review presented herein on child and adolescent violent behavior and psychotropic medication use in this post-SARS-CoV-2 environment has several major research implications for the areas of behavioral health and epidemiology moving forward. This is essential if the goal is to draw well-informed conclusions from data and address this concern. Observing that most mental health issues begin to manifest during adolescence and young adulthood, individuals in these age groups may need to be specifically targeted for empirical investigations and must not only evaluate symptomology due to ongoing stressors but also past stressors including but not limited to social isolation, online activity and school closures (remote learning) [32]. Research has already shown a minor correlation between negative mental health outcomes in children [33].

Another research focus should be on the relationship between social isolation and loneliness, specifically, as it pertains to children who have been diagnosed with mental health problems such as depression. One recommendation would be to conduct sex-based comparisons as a function of age and type (brand) of medication members of the target population may have been prescribed. This is paramount based on the observation that SARS-CoV-2 proffers a major disparity within populations of children and adolescents who come from disadvantaged home environments [34].

Temporal factors such as the length of social isolation, recency of clinical diagnosis, rate of prescription drug use, and frequency of violent and aggressive outbursts equally should be studied given research documents a relationship between loneliness, social isolation, and violent behavior [35]. This also suggests that the measure of social isolation not be considered the same

as loneliness, seeing this is the age of the internet and instant connectivity. Additional areas of interest need to target communities of color since the pandemic's mental health impact has been pronounced among Black and Hispanic communities as evidenced by disproportionately high rates of COVID-19 cases and deaths [36].

### Conclusion

There is much left to be understood about the use of psychotropic drugs, in particular SSRIs, and their role in aggressive, violent, and suicidal behavior among adolescents and children. Research notes that exposure to SSRIs increased the risk of completed or attempted suicide [37,38] and homicidal ideation among adolescents [39,40]. Kauffman cites a website run by the International Coalition for Drug Awareness in cooperation with the Prozac Survivors Support Group that has more than 1,600 violent incidents associated with SSRI use are described including more than 360 suicides as well as more than 400 murder incidents, including multiple murders all connected with SSRI use [41-43].

This review is designed to provide cursory observations regarding the relationship between violent/homicidal behaviors and the use of psychotropic medications. Given the increase in the diagnosis of mental health disorders [44-46] and prescriptions for psychotropic medications [47-49], it is not unreasonable to see correlations between the use of the drugs and violent and even homicidal behavior, as noted by Moore and associates [50]. Other researchers under the notion that adverse drug events that might result in physical injury and/or death to others are rarely studied and documented in the literature [49] also advanced this perspective.

In the future, research should be aimed at evaluating how possible distinctions in mental health and psychiatric disorders are influenced in terms of the type and make of drugs prescribed to deal with the health concern and the extent to which violent behaviors are manifested. It may be wise to stratify this type of data by time such as before hospitalization or post-hospitalization. Eikelenboom-Schieveld and Fogleman suggested that research should also be conducted to examine the interaction between psychotropic drugs and various neurotransmitters to determine whose neurological functioning is impacted [51-53]. Moreover, based on the multitude of structural variables [54] involved in human behavioral change due to an unexpected pandemic, exploring the correlates of homicidal ideation and the impact of psychotropic medications on such ideation will put scientists in a position to have a nuanced understanding of the complex interplay between mental health and violent thoughts [55]. By assuming the aforementioned position, researchers will

be better prepared to unravel the intricate connections between mental health, medication, and violent ideation, such that clinicians can refine their approaches to better address the complexities of this challenging phenomenon.

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