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# OKLAHOMA CITY UNIVERSITY LAW REVIEW

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VOLUME 42

NUMBER 3

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## NOTES

### USING MARIJUANA AS MY ANTIDEPRESSANT AND NOW I FEEL BETTER: A CALL FOR MORE RESEARCH INTO THE VIABILITY OF MARIJUANA AS TREATMENT FOR DEPRESSION, ANXIETY, AND BIPOLAR DISORDER

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#### I. INTRODUCTION

Marijuana has growing popularity and acceptance in the legal system. In November 2016, residents of California, Massachusetts, and Nevada voted to legalize recreational use of marijuana.<sup>1</sup> As of now, nine states and the District of Columbia have legalized marijuana for recreational use.<sup>2</sup>

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1. Thomas Fuller, *Voters Legalize Marijuana in Three States*, N.Y. TIMES (Nov. 9, 2016), <http://www.nytimes.com/2016/11/09/us/politics/election-ballot.html> [https://perma.cc/2YD2-EGWB].

2. *Marijuana Overview*, NATIONAL CONFERENCE OF STATE LEGISLATURES (Aug. 30, 2017), <http://www.ncsl.org/research/civil-and-criminal-justice/marijuana-overview.aspx>

Twenty-one other states, Guam, and Puerto Rico have legalized botanical marijuana for medical use only,<sup>3</sup> with Arkansas, Florida, Indiana, North Dakota, and West Virginia as the newest members of the club.<sup>4</sup> These states have recognized medical marijuana as a legitimate treatment for physical illnesses including cancer, glaucoma, HIV or AIDS, Crohn's disease, epilepsy, and numerous other conditions.<sup>5</sup>

However, the statutes recognizing the medical value of marijuana have failed to consider mental illness adequately. Only a few of these states have enumerated mental illnesses as conditions eligible for medical marijuana prescriptions;<sup>6</sup> the mental illnesses generally include post-traumatic stress disorder, and even fewer states have recognized anorexia.<sup>7</sup> While pharmaceutical antidepressants are currently used to treat the anxiety symptoms associated with PTSD,<sup>8</sup> studies show that these systems could be effectively treated with a drug like marijuana that targets the endocannabinoid system in the brain.<sup>9</sup> Marijuana, a drug some patients may already be using, targets this system.<sup>10</sup> Curiously, no state has listed depression, anxiety, or bipolar disorder as an enumerated mental illness,<sup>11</sup>

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[<https://perma.cc/33LC-UUCF>].

3. Cf. *id.*; 29 *Legal Medical Marijuana States and DC: Laws, Fees, and Possession Limits*, PROCON.ORG (Nov. 30, 2017, 4:16 PM), <https://medicalmarijuana.procon.org/view.resource.php?resourceID=000881>

[<https://perma.cc/5AD2-BLJD>].

4. See Fuller, *supra* note 1; *State Medical Marijuana Laws*, NAT'L CONF. ST. LEGISLATURES (Aug. 30, 2017), <http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx> [<https://perma.cc/CDN3-AR5S>].

5. See, e.g., ARIZ. REV. STAT. ANN. § 36-2801(3) (Westlaw through 1st Reg. Sess. of 53rd Legislature).

6. See 29 *Legal Medical Marijuana States and DC: Laws, Fees, and Possession Limits*, *supra* note 3.

7. See *id.*

8. *Id.* at 1.

9. *Id.* at 2.

10. See *id.*; J. Michael Bostwick, *Blurred Boundaries: The Therapeutics and Politics of Medical Marijuana*, 87 MAYO CLINIC PROC. 172, 178 (2012).

11. ALASKA STAT. § 17.37.070(4)(A)–(C) (2016), ARIZ. REV. STAT. ANN. § 36-2801(3)(a)–(c) (2017–2018); CAL. HEALTH & SAFETY CODE § 11362.7(h)(1)–(12) (Deering 2010); CONN. GEN. STAT. § 21a-408(2) (2015); DEL. CODE ANN. tit. 16, § 4902A(3)(a)–(c) (1974 & Supp. 2017); D.C. CODE § 7-1671.05(17)–(18) (2001); FLA. STAT. § 10.29(b)(1) (2017); HAW. REV. STAT. ANN. § 329-121(1)–(3) (West 2016); 410 ILL. COMP. STAT. ANN. 130/5(a)–(c), 130/10(h)(1)–(2) (West 2016); LA. STAT. ANN. § 40:1046(A) (2013); ME. REV. STAT. ANN. tit. 22, § 2422(2)(A)–(E) (2017); MD. CODE ANN., HEALTH–GEN. § 13-3304(d)(i)–(ii) (LexisNexis 2015); MICH. COMP. LAWS ANN. § 333.26423(b)(1) (West 2013); MINN. STAT. § 152.22(14)(1)–(10) (2016); MONT. CODE

even though each of these disorders has anxiety symptoms that could be reduced by medical marijuana.<sup>12</sup> This neglect of mental disorders is less curious when one considers the illegality of marijuana use at the federal level and the second-class treatment of people with mental illness. Nevertheless, it needs a solution. The several states and the federal government should allow more research to investigate the potential benefits of marijuana for patients with mental disorders.

## II. STIGMA OF MENTAL ILLNESS HINDERS TREATMENT

Mental illness has been associated with stigma, a mark of shame or degradation, since ancient times.<sup>13</sup> In ancient Greece, some mental illnesses, like epilepsy, were regarded as holy, while other illnesses brought the sufferer shame.<sup>14</sup> If society did not tolerate the mentally ill, “afflicted persons [would] be shunned, locked up, or, probably on rare occasions, put to death.”<sup>15</sup> Someone with a mental illness dealt with this shame by hiding whenever the person was about to have an episode.<sup>16</sup> They would hide in their homes or run to a deserted area in hopes that only a few people would see them succumb to the illness.<sup>17</sup> Stigma attached to mental illness in part because most people at that time believed an angry

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ANN. § 50-46-302(4)(a)–(k) (2017); N.H. REV. STAT. ANN. § 126-X:1(IX)(a)(1)–(2) (2015); N.Y. PUB. HEALTH LAW § 3360(7)–(8) (Consol. 1997 & Supp. 2017); 21 R.I. GEN. LAWS ANN. § 21-28.6-3(5)(i)–(iii) (West 2006 & Supp. 2017); VT. STAT. ANN. tit. 18, § 4472(4)(A)–(C) (2017); WASH. REV. CODE ANN. § 69.51A.010(6)(a)–(g) (LexisNexis 2014); W. VA. CODE ANN. § 16A-2-1(3)(A)–(O) (LexisNexis 2017). California’s statute allows for the possibility of the treatment of these mental illnesses, but only if they qualify as a disability under the Americans with Disabilities Act of 1990. CAL HEALTH & SAFETY CODE § 11362.7(hx1)-(1) (Deering 2010).

12. See AM. PSYCHIATRIC ASS’N, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS: DSM-5, at 124, 125, 127, 132, 133, 134, 161, 162, 168, 169, 222 (5th ed. 2013). Bipolar disorders and depressive disorders have similar symptoms including fatigue, difficulty concentrating, and a disturbance in sleep regulation. See *id.* at 125, 133, 161, 168, 222. Some bipolar or depressed patients may also suffer from anxious distress. *Id.* at 149, 184.

13. Bennett Simon, *Shame, Stigma, and Mental Illness in Ancient Greece*, in STIGMA AND MENTAL ILLNESS 29, 30 (Paul Jay Fink & Allan Tasman eds., 1992).

14. *Id.* at 30.

15. *Id.* Those with a mental illness did not enjoy societal acceptance at this time. Generally, treatment of someone with a mental illness consisted of treating the person as an undesirable while not taking any affirmative action against the mentally ill person. See *id.*

16. See *id.* at 31.

17. *Id.*

god caused it as punishment for an earlier trespass.<sup>18</sup> Some physicians during this era would explain the illnesses in terms of which gods caused them.<sup>19</sup>

Given the fantastical explanations of mental illness, it is not surprising that the first treatments were equally bizarre and fantastical.<sup>20</sup> Thinking that mental illness was caused by evil spirits or angry deities, people in 5000 B.C.E. treated mental illness by carving a hole in the patient's head from which the evil could escape.<sup>21</sup> "In ancient Mesopotamia, priest-doctors treated the mentally ill with magico-religious rituals . . . Exorcisms, incantations, prayer, atonement, and other various mystical rituals were used to drive out the evil spirit."<sup>22</sup> Ancient Hebrews would pray to God for forgiveness, believing that mental illness was a result of His wrath.<sup>23</sup> The ancient Persians did not have a treatment for mental illness, but believed practicing good hygiene and performing good deeds would prevent an onset.<sup>24</sup> The Egyptians, who were more advanced in medicine and understanding of the human body, recommended attending concerts, going to dances, and painting to alleviate symptoms.<sup>25</sup>

By 400 B.C.E., the cause of mental illness was considered an abnormality in the four humors rather than the vengeance of spirit.<sup>26</sup> This thinking lasted through the Middle Ages.<sup>27</sup> Treatments for mental illness then included emetics, laxatives, and bloodletting.<sup>28</sup> Patients also received customized diets depending on the illness suffered.<sup>29</sup> However, some treatments still included "secular exorcisms, prayers, charms, amulets, and other mythical treatments."<sup>30</sup>

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18. Allison M. Foerschner, *The History of Mental Illness: From Skull Drills to Happy Pills*, INQUIRIES J. (2010), <http://www.inquiriesjournal.com/articles/283/the-history-of-mental-illness-from-skull-drills-to-happy-pills> [https://perma.cc/35Q7-CYTJ]. "INQUIRIES Journal, formerly *Student Pulse*, is an open-access academic journal that highlights the work of students at the undergraduate level and above." *About*, INQUIRIES J., <http://www.inquiriesjournal.com/about-inquiries-journal> [https://perma.cc/Y567-3RMU].

19. Simon, *supra* note 13, at 31.

20. See Foerschner, *supra* note 18.

21. *Id.*

22. *Id.*

23. *Id.*

24. *Id.*

25. *Id.*

26. See *id.*

27. *Id.*

28. *Id.*

29. *Id.*

30. *Id.*

When treatment was unsuccessful or unobtainable, the care of the mentally ill was the duty of the person's family.<sup>31</sup> Abuse and neglect ran rampant.<sup>32</sup> Poor families who could not afford treatment or to send their mentally ill relatives to an asylum would dig a five-foot hole in which the sick relative would stay.<sup>33</sup> The family was able to give the mentally ill relative food, but the relative in the hole died there.<sup>34</sup> The chief of psychiatry at the Royal Julius Hospital, Anton Müller, recounted the abuse patients faced before coming to the asylum.<sup>35</sup> A father kept his mentally ill son in a pigpen for years.<sup>36</sup> A wife chained her husband to a wall for five years.<sup>37</sup> It was common for patients to come in beaten and bloody from injuries at home.<sup>38</sup> Similar abuse occurred in multiple countries.<sup>39</sup> In Switzerland, about 20% of people with mental illness suffered abuse from their families.<sup>40</sup> In China, parents hid away their mentally ill children, fearing that the public would find out and associate the illness with bad morals within the family.<sup>41</sup> If not caged, locked in cellars, or left to the servants for care, mentally ill people in Europe were abandoned to beg on the streets.<sup>42</sup> Some with mental illnesses were found fastened to stakes in workhouses in England.<sup>43</sup>

This abuse continued in America.<sup>44</sup> The mentally ill were locked in cages or pens.<sup>45</sup> Others in Massachusetts were confined to almshouses in poor conditions.<sup>46</sup> People with mental illnesses were beaten or abandoned, and yet today society associates them with iconic "village idiots" or a "'fool' with his staff."<sup>47</sup>

Asylums were little refuge. Asylum staff were untrained.<sup>48</sup> The

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31. See EDWARD SHORTER, *A HISTORY OF PSYCHIATRY* 2 (1997).

32. See *id.* at 2–4.

33. *Id.* at 1–2.

34. *Id.* at 2.

35. *Id.*

36. *Id.*

37. *Id.* at 3.

38. *Id.* at 2–3.

39. See *id.* at 3; Foerschner, *supra* note 18.

40. SHORTER, *supra* note 31, at 3.

41. Foerschner, *supra* note 18.

42. *Id.*

43. SHORTER, *supra* note 31, at 3.

44. *Id.* at 3–4.

45. *Id.*

46. *Id.*

47. *Id.* at 2.

48. Foerschner, *supra* note 18.

mentally ill were chained in dark and cramped rooms that were never cleaned.<sup>49</sup> Waste and a small amount of straw covered the floor.<sup>50</sup> The only human contact the patients had during the day was when the patients received food.<sup>51</sup> Patients in London were put on display as freak shows to entertain the masses.<sup>52</sup> It was not until the eighteenth century that asylums started to treat patients, rather than acting as somewhere to contain the mentally ill after their families grew tired of caring for them.<sup>53</sup>

Although society is more aware of mental illness today, society cannot escape its ugly past.<sup>54</sup> Mental illness is still stigmatized.<sup>55</sup> Those with mental disorders are seen as dependent and unpredictable.<sup>56</sup> Between 14–33% of respondents believed that people with depression are dangerous.<sup>57</sup> Twenty-six percent believed that people with anxiety are dangerous.<sup>58</sup> Americans in the 1950s were less likely to believe that mentally ill individuals were dangerous than American respondents today.<sup>59</sup> Regardless of which illness a person suffered, the public tended to distance itself from that person.<sup>60</sup> This avoidance is a form of discrimination against the mentally ill.<sup>61</sup>

This stigma hinders medical treatment of mental illness.<sup>62</sup> Even though most Americans believe that medication helps treat mental disorders, a majority of those same respondents would refuse to take it.<sup>63</sup> Around 40% of people with serious mental illnesses do not seek treatment.<sup>64</sup> This statistic does not include patients who start, but later

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49. *Id.*

50. *Id.*

51. *Id.*

52. *Id.*

53. See SHORTER, *supra* note 31, at 8.

54. See M.C. Angermeyer & S. Dietrich, *Public Beliefs About and Attitudes Towards People with Mental Illness: A Review of Population Studies*, 113 ACTA PSYCHIATRICA SCANDINAVICA 163, 164, 171–72 (2006).

55. *Id.* at 164.

56. *Id.* at 169–70.

57. *Id.* at 170.

58. *Id.*

59. *Id.* at 171.

60. *Id.* at 170.

61. *Id.* at 170–71.

62. Patrick Corrigan, *How Stigma Interferes with Mental Health Care*, 59 AM. PSYCHOLOGIST 614, 615–16 (2004).

63. Angermeyer & Dietrich, *supra* note 54, at 169.

64. Corrigan, *supra* note 62, at 615.

discontinue, treatment.<sup>65</sup> Taking medication for mental illness associates a person with the group and the accompanying stigma.<sup>66</sup> Then, once a person is labeled as mentally ill, the public is more likely to reject that person.<sup>67</sup> People who need treatment for their mental illness may avoid or fail to continue treatment in part to avoid stigma<sup>68</sup> and the ensuing prejudice, discrimination, and stigmatization.<sup>69</sup>

### III. DEPRESSION, ANXIETY, AND BIPOLAR DISORDER

Depression is one of the most common mental disorders; 20% of the general population will suffer from depression at some point in their lives.<sup>70</sup> There are many types of depression including dysthymia and major depressive disorder.<sup>71</sup> In any one year, about seven percent of the U.S. population has major depressive disorder.<sup>72</sup> Depression may be caused by chronic unpredictable stress and “chronic exposure, usually due to stressful life events.”<sup>73</sup> Major depressive disorder usually appears in the patient’s twenties, but an onset late in life is not unusual.<sup>74</sup> Females are one-and-one-half to three times more likely to develop major depressive disorder than males.<sup>75</sup> “Major depressive disorder is associated with high mortality, much of which is accounted for by suicide . . . .”<sup>76</sup> Dysthymia, on the other hand, can appear earlier in life, and is chronic.<sup>77</sup> When a person experiences dysthymia earlier in life, the person is more likely to suffer from other mental illnesses.<sup>78</sup>

Dysthymia is a condition marked by the patient experiencing a depressed mood more often than not for at least two years.<sup>79</sup> For two or

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65. *Id.*

66. *See id.*

67. Angermeyer & Dietrich, *supra* note 54, at 170.

68. Corrigan, *supra* note 62, at 615.

69. Angermeyer & Dietrich, *supra* note 54, at 171.

70. Ian Mahar et al., *Stress, Serotonin, and Hippocampal Neurogenesis in Relation to Depression and Antidepressant Effects*, 38 NEUROSCIENCE & BIOBEHAVIORAL REVS. 173, 174 (2014).

71. AM. PSYCHIATRIC ASS’N, *supra* note 12, at 155.

72. *Id.* at 165.

73. *See* Mahar et al., *supra* note 70, at 174, 177–79.

74. AM. PSYCHIATRIC ASS’N, *supra* note 12, at 165.

75. *Id.*

76. *Id.* at 164.

77. *Id.* at 170.

78. *Id.*

79. *Id.* at 168.

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more months, at least two of the following symptoms must accompany the depressed mood:

1. Poor appetite or overeating.
2. Insomnia or hypersomnia.
3. Low energy or fatigue.
4. Low self-esteem.
5. Poor concentration or difficulty making decisions.
6. Feelings of hopelessness.<sup>80</sup>

Major depressive disorder, on the other hand, is a condition in which at least five of the following symptoms occur during a particular two week period.

1. Depressed mood most of the day . . . .
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation).
3. Significant weight loss when not dieting or weight gain . . . or decrease or increase in appetite nearly every day.
4. Insomnia or hypersomnia nearly every day.
5. Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down).
6. Fatigue or loss of energy nearly every day.
7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick).
8. Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).
9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.<sup>81</sup>

Anxious distress can also be present with either dysthymia or major depressive disorder, though it is more significant in major depressive

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80. *Id.*

81. *Id.* at 160–61.



disorder.<sup>82</sup>

Anxiety disorders occur when anxiety is excessive, uncontrollable, or has the potential to negatively affect the person's daily life.<sup>83</sup> Anxiety disorders affect more than 18% of the "US population," and almost one-fourth of these cases are severe.<sup>84</sup> About seven percent of the US population has social anxiety disorder,<sup>85</sup> and the prevalence of social anxiety disorder is higher in American Indians than other races.<sup>86</sup> About four percent of the US population has generalized anxiety disorder.<sup>87</sup> Generalized anxiety disorder can occur at any age, but the median age of onset is age 30.<sup>88</sup> Anxiety disorders are also more likely to affect women.<sup>89</sup>

There are many different types of anxiety disorders including panic disorders, generalized anxiety disorder, and social anxiety disorder.<sup>90</sup> Social anxiety disorder is a condition marked by excessive fear of one or more social situations that causes clinically significant distress or impairment.<sup>91</sup> The anxious patient may fear accidentally showing symptoms and being publicly judged.<sup>92</sup> The patient will either avoid social situations or endure them while suffering from excessive "fear" becomes "worry."<sup>93</sup> This "fear" becomes "worry" must persist for six months or longer.<sup>94</sup> A person with generalized anxiety disorder also suffers from excessive anxiety that lacks a specific trigger.<sup>95</sup> Generalized anxiety disorder is a condition of clinically significant distress or impairment, experienced with three or more of the following symptoms: irritability, restlessness, muscle tension, difficulty concentrating, fatigue, and sleep disturbance.<sup>96</sup> The symptoms must not be a physiological response to a

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82. *Id.* at 184.

83. *Any Anxiety Disorder Among Adults*, NAT'L INST. MENTAL HEALTH, <https://www.nimh.nih.gov/health/statistics/prevalence/any-anxiety-disorder-among-adults.shtml> [<https://perma.cc/2ZH5-SJ5H>].

84. *Id.*

85. AM. PSYCHIATRIC ASS'N, *supra* note 12, at 204.

86. *Id.*

87. *See id.* at 223.

88. *Id.*

89. NAT'L INST. MENTAL HEALTH, *supra* note 83.

90. *See* AM. PSYCHIATRIC ASS'N, *supra* note 12, at 190, 195, 197, 202, 208, 214, 217, 222.

91. *Id.* at 202–03.

92. *Id.* at 202.

93. *Id.* at 202–03.

94. *Id.* at 203.

95. *Id.* at 222.

96. *Id.*

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drug or other medical condition.<sup>97</sup>

Bipolar disorder is a condition characterized by a cycle of manic and depressive stages.<sup>98</sup> The cycle causes significant changes in the “mood, energy, and activity levels” of the individual.<sup>99</sup> While this disorder only affects about two to three percent of the US population, a majority of these cases (82.9%) are severe.<sup>100</sup> Bipolar I disorder is also more prevalent in the United States than it is internationally.<sup>101</sup> In the United States, the prevalence of bipolar I disorder is higher in African Americans and Caucasians than for Afro-Caribbeans.<sup>102</sup> Eighteen years of age is the average age of onset for bipolar I, while bipolar II tends to show up later when the person is in his or her mid-twenties.<sup>103</sup> A patient with bipolar I disorder is at least 15 times more likely to commit suicide than the general population.<sup>104</sup> Females with a bipolar disorder are more likely to suffer from another mental illness and are more likely to suffer from depressive symptoms.<sup>105</sup>

There are a few types of bipolar disorders; the most well-known are: bipolar I, bipolar II, and cyclothymic disorder.<sup>106</sup> Because bipolar disorder may involve a combination of manic and depressive stages,<sup>107</sup> the symptoms of bipolar disorders may overlap with symptoms of anxiety disorders and major depressive disorder.<sup>108</sup> The types of bipolar disorders are distinguished by the kind of manic stage experienced: hypermanic episodes are a characteristic of bipolar I, while hypomanic episodes are a characteristic of bipolar II.<sup>109</sup> Manic episodes consist of “persistently elevated, expansive, or irritable mood . . . lasting at least [one] week.”<sup>110</sup> Hypomanic episodes are stages of similar changes in mood lasting four

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97. *Id.*

98. See *Bipolar Disorder Among Adults*, NAT'L INST. MENTAL HEALTH, <https://www.nimh.nih.gov/health/statistics/prevalence/bipolar-disorder-among-adults.shtml> [<https://perma.cc/SHU2-YSDK>].

99. *Id.*

100. *Id.*

101. AM. PSYCHIATRIC ASS'N, *supra* note 12, at 136.

102. *Id.* at 130.

103. *Id.* at 130, 136.

104. *Id.* at 131.

105. *Id.* at 130.

106. *Id.* at 123.

107. *Id.*

108. *Id.* at 131.

109. *Id.* at 123, 135.

110. *Id.* at 124.

days or more.<sup>111</sup> Bipolar depressive stages are very similar to the depressive stages of major depressive disorder: a two-week period during which at least five or more symptoms of major depression are present.<sup>112</sup> Cyclothymic disorder is similar to bipolar II (depressive and hypomanic stages), but the symptoms are less severe and must occur at least every two months.<sup>113</sup> Those suffering from a bipolar disorder may also experience anxious distress.<sup>114</sup>

#### IV. CURRENT MEDICATIONS

Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) are commonly used to improve symptoms of depression and anxiety.<sup>115</sup> SSRIs are sometimes recommended to treat severe depressive stages of bipolar disorder.<sup>116</sup> SSRIs and SNRIs improve symptoms of depression and anxiety.<sup>117</sup> Serotonin is a chemical in the brain known for regulating anxiety, sleep, and mood.<sup>118</sup> When a neuron releases serotonin in the brain, and after the serotonin has had a chance to bind to the receptors of another neuron, excess serotonin is gathered by a transporter and taken back into the neuron that originally released the serotonin (reuptake).<sup>119</sup> SSRIs and SNRIs bind to the transporter to prevent reuptake of the serotonin.<sup>120</sup> The serotonin remains in the synapse between the interacting neurons where it can continue binding to receptors to regulate mood, anxiety, sleep, and other bodily functions.<sup>121</sup>

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111. *Id.*

112. *Id.* at 125.

113. *Id.* at 138–39.

114. *Id.* at 127, 134.

115. Jack Alan McCain, *Antidepressants and Suicide in Adolescents and Adults: A Public Health Experiment with Unintended Consequences?*, 34 PHARMACY & THERAPEUTICS 355, 355 (2009).

116. See Gary S. Sachs et al., *The Expert Consensus Guideline Series: Medication Treatment of Bipolar Disorder 2000*, 76 POSTGRADUATE MED. J. (SPECIAL REPORT) 1, 8 (2000).

117. Giovanni B. Cassano et al., *Psychopharmacology of Anxiety Disorders*, 4 DIALOGUES CLINICAL NEUROSCIENCE 271, 274 (2002).

118. *Id.* at 216.

119. *Id.* at 218–19.

120. See *id.* at 218; *Selective Serotonin Reuptake Inhibitors (SSRIs)*, MAYO CLINIC (June 14, 2016), <https://www.mayoclinic.org/diseases-conditions/depression/in-depth/ssris/art-20044825> [<https://perma.cc/MY67-5YW4>].

121. See Steven M. Stahl, *Mechanism of Action of Serotonin Selective Reuptake*

Benzodiazepines are prescribed to treat anxiety and insomnia.<sup>122</sup> Benzodiazepines work by targeting the gamma-amino butyric-acid (GABA) receptors.<sup>123</sup> GABA inhibits the neuron, resulting in reduced activity.<sup>124</sup> GABA in effect calms the brain and reduces anxiety.<sup>125</sup> Benzodiazepines enhance the effectivity of GABA and attach to GABA receptors, making them an effective treatment for several symptoms of anxiety disorders including anxiety, insomnia, muscle tension, and restlessness.<sup>126</sup>

## V. NEGATIVE SIDE EFFECTS OF CURRENT TREATMENTS

While the aforementioned medications treat debilitating mental illnesses, they are not without their drawbacks. Long-term benzodiazepine use may lead to dependency and, if the dosage is lowered or ceased, withdrawal.<sup>127</sup> Side effects of SSRIs (including anxiety, nausea, insomnia, sexual dysfunction, and gastrointestinal dysfunction)<sup>128</sup> are immediate and appear before any therapeutic effect of the drug, but eventually dissipate.<sup>129</sup> However, both of these medications are prone to more serious and potentially deadly complications.

SSRIs and SNRIs started to replace tricyclic antidepressants because they were “safe.”<sup>130</sup> High doses of tricyclic antidepressants sometimes caused cardiovascular problems, like arrhythmia, in patients without prior heart disease.<sup>131</sup> An overdose of tricyclic compounds may also cause death, especially in children.<sup>132</sup> Further research revealed that SSRI use may also cause cardiovascular problems or worsen a pre-existing

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*Inhibitors: Serotonin Receptors and Pathways Mediate Therapeutic Effects and Side Effects*, 51 J. Affective Disorders 215, at 219 fig.10 (1998).

122. Greg Neale & Allan J. Smith, *Self-harm and Suicide Associated with Benzodiazepine Usage*, 57 BRIT. J. GEN. PRAC. 407, 407 (2007).

123. Charles E. Griffin III et al., *Benzodiazepine Pharmacology and Central Nervous System-Mediated Effects*, 13 OCHSNER J. 214, 214 (2013).

124. *Id.*

125. *See id.* at 214–15.

126. *See id.* at 214.

127. Neale & Smith, *supra* note 122, at 407.

128. Stahl, *supra* note 121, at 228 tbls.23 & 24, 229 tbls.25 & 26, 230 tbls.27 & 28.

129. *See id.* at 220, 224.

130. *See* McCain, *supra* note 115, at 355–56.

131. Pal Pacher & Valeria Kecskemeti, *Cardiovascular Side Effects of New Antidepressants and Antipsychotics: New Drugs, Old Concerns?*, 10 CURRENT PHARMACEUTICAL DESIGN 2463–2464 (2004).

132. *Id.*

condition.<sup>133</sup> SSRIs caused an abnormally slow heartbeat (bradycardia) in patients with a normal heartbeat before use.<sup>134</sup> However, the reduction was only a few beats per minute and only occurred in three to four percent of the experimental group.<sup>135</sup> Research has also linked SSRI use to cardiac dysrhythmia (an abnormality in the rhythm of the heart)<sup>136</sup> and syncope<sup>137</sup> (fainting from low blood pressure).<sup>138</sup>

Antidepressant use presents more health problems for older patients. Patients over 30 are 80% more likely to develop diabetes mellitus if they use SSRIs or tricyclic antidepressants in high dosages every day.<sup>139</sup> However, research reveals no increased risk of developing diabetes if treatment with antidepressant lasted for shorter periods or was administered in lower doses.<sup>140</sup> Elderly patients are at a greater risk of orthostatic hypotension (lower blood pressure of 10 mm Hg when standing as compared to when sitting)<sup>141</sup> and fainting.<sup>142</sup> Elderly patients taking SSRIs are also at a greater risk of falling (probably because of fainting) and hip fractures.<sup>143</sup>

Studies show that females, young and old, are more at risk of experiencing negative side effects of antidepressants.<sup>144</sup> Females are also more likely to report experiencing at least three negative side effects of antidepressants, including insomnia, drowsiness during the day, restlessness, dry mouth, profuse sweating, nausea, constipation, and dizziness.<sup>145</sup> Weight gain is also associated with female patients taking antidepressants for longer durations, an association not found in males taking antidepressants.<sup>146</sup> SSRI use for postmenopausal women is just as

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133. *See id.*

134. *Id.*

135. *Id.*

136. *See Cardiac*, DICTIONARY OF MEDICAL TERMS 60 (4th ed. 2005); *Dysrhythmia*, DICTIONARY OF MEDICAL TERMS 119 (4th ed. 2005).

137. Pacher & Kecskemeti, *supra* note 131, at 2464.

138. *Syncope*, DICTIONARY OF MEDICAL TERMS 406 (4th ed. 2005).

139. Frank Andersohn et al., *Long-term Use of Antidepressants for Depressive Disorders and the Risk of Diabetes Mellitus*, 166 AM. J. PSYCHIATRY 591, 592, 594 (2009).

140. *Id.* at 594.

141. *Orthostatic Hypotension*, DICTIONARY OF MEDICAL TERMS 280 (4th ed. 2005).

142. *See* Pacher & Kecskemeti, *supra* note 131, at 2464.

143. *Id.*

144. Pierre M. Bet et al., *Side Effects of Antidepressants During Long-term Use in a Naturalistic Setting*, 23 EUR. NEUROPSYCHOPHARMACOLOGY 1443, 1446, 1447 tbl.3 (2013).

145. *Id.* at 1445, 1447 tbl.3.

146. *Id.* at 1445–46.

dangerous as using tricyclic antidepressants, resulting in a 40% increased risk of stroke and 32% increased risk of death by any cause.<sup>147</sup> Pregnant women are also at risk of complications from antidepressant use.<sup>148</sup> Women who used antidepressants during pregnancy were significantly more likely to have a child with autism (without intellectual disability).<sup>149</sup> Studies also show that children are more likely to develop problems with glucose regulation if the mother uses antidepressants during pregnancy.<sup>150</sup> The negative effects females experience from taking antidepressants are especially worrisome considering that women are more likely to develop depression<sup>151</sup> and take antidepressants.<sup>152</sup>

Even more troubling is the association between antidepressant and benzodiazepine use and an increased risk of committing suicide.<sup>153</sup> Suicide is the tenth leading cause of death in the United States,<sup>154</sup> and unfortunately, antidepressants might be part of the cause for that statistic.<sup>155</sup> The FDA became concerned with antidepressants in 2003,<sup>156</sup> and later the Psychopharmacologic Drugs Advisory Committee reinvestigated clinical studies and found an increased risk of suicidal thinking with antidepressant use.<sup>157</sup> Effexor, an antidepressant, increased

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147. Jordan W. Smoller et al., *Antidepressant Use and Risk of Incident Cardiovascular Morbidity and Mortality Among Postmenopausal Women in the Women's Health Initiative Study*, 169 ARCHIVES INTERNAL MED. 2128, 2129–30 (2009).

148. Dheeraj Rai et al., *Parental Depression, Maternal Antidepressant Use During Pregnancy, and Risk of Autism Spectrum Disorders: Population Based Case-Control Study*, 346 BRIT. MED. J., no. 7907 (May 11, 2013) at 1, 1, 4, <http://www.bmj.com/content/bmj/346/bmj.f2059.full.pdf> [<https://perma.cc/C9QP-FJ3N>].

149. *Id.*

150. See Bengt Källén, *Neonate Characteristics After Maternal Use of Antidepressants in Late Pregnancy*, 158 ARCHIVES PEDIATRICS & ADOLESCENT MED. 312, 312–14, 314 tbls.2 & 3 (2004).

151. Smoller et al., *supra* note 147, at 2129; Marco Piccinelli & Greg Wilkinson, *Gender Differences in Depression*, 177 BRIT. J. PSYCHIATRY 486, 486–87 (2000).

152. Laura A. Pratt et al., *Antidepressant Use in Persons Aged 12 and Over: United States, 2005–2008*, NCHS DATA BRIEF, no. 76 (Oct. 2011) at 1, 2.

153. See Neale & Smith, *supra* note 122, at 408; JOYCE LIBAL, ANTIDEPRESSANTS AND SUICIDE: WHEN TREATMENT KILLS 55–56 (2008).

154. NAT'L CTR. FOR HEALTH STATISTICS, U.S. DEP'T OF HEALTH & HUMAN SERVS., PUB. NO. 2017–1232, HEALTH, UNITED STATES, 2016: WITH CHARTBOOK ON LONG-TERM TRENDS IN HEALTH 128 tbl.19 (2017); see also *Suicide Statistics*, AM. FOUND. FOR SUICIDE PREVENTION, <https://afsp.org/about-suicide/suicide-statistics/> [<https://perma.cc/6QP8-KFSW>].

155. LIBAL, *supra* note 153, at 51.

156. *Id.* at 58.

157. See McCain, *supra* note 115, at 357 tbl.2.

suicidal ideation in children,<sup>158</sup> and other antidepressants have reduced the time between suicidal thoughts and patients' acting upon those thoughts.<sup>159</sup> More than twenty new studies have linked antidepressants like Celexa, Luvox, Paxil, Prozac, and Zoloft to increased suicidal thoughts and actions.<sup>160</sup> In 2007, the FDA responded by requiring a warning about the increased risk of suicide for patients up to age twenty-four.<sup>161</sup> Two studies have also linked benzodiazepine use with an increased risk of suicidal attempts and completed suicide.<sup>162</sup>

Other research has shown that antidepressants do not have this effect.<sup>163</sup> Suicide rates steadily decreased when SSRIs joined the drug market.<sup>164</sup> A study of clinical trial data found no significant difference in suicide rates among subjects who took antidepressants and subjects who took placebos.<sup>165</sup> However, suicide is still an issue for people suffering from depression without treatment.<sup>166</sup> The solution is not to cease all treatment for depression but to find a better way to treat anxiety, depression, and bipolar disorder.

## VI. HISTORY OF MEDICAL MARIJUANA

Marijuana has a long medical history. While he was emperor of China, Shen-Nung prescribed medical marijuana over five thousand years ago.<sup>167</sup> Marijuana was recognized as an anesthetic in China at least two thousand years ago.<sup>168</sup> Marijuana also played a role in Hindu medicine to treat muscle spasms, mental conditions, pain, and severe physical stress.<sup>169</sup> One physician in medieval times also included marijuana in his medicine.<sup>170</sup> In the 1800s, an Irish doctor prescribed marijuana to treat symptoms that

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158. LIBAL, *supra* note 153, at 56.

159. *See id.* at 55.

160. *Id.* at 60, 62.

161. McCain, *supra* note 115, at 357 tbl.2.

162. Neale & Smith, *supra* note 122, at 408.

163. McCain, *supra* note 115, at 358 & tbl.3.

164. *Id.* at 355, 358 tbl.3.

165. *Id.* at 358 & tbl.3.

166. *See id.* at 362.

167. Bostwick, *supra* note 10, at 173.

168. R. Mechoulam & E.A. Carlini, *Toward Drugs Derived from Cannabis*, 65 *NATURWISSENSCHAFTEN* 174, 174 (1978).

169. Mechoulam & Carlini, *supra* note 168, at 174.

170. Bostwick, *supra* note 10, at 173.

marijuana is used to treat today, including pain, vomiting, and spasticity.<sup>171</sup> During the 1880s and 1900s, physicians in England used marijuana to treat “epilepsy, neuralgia, migraine[s], and psychosomatic disorders.”<sup>172</sup> Physicians in the United States also used marijuana to treat medical ailments before Congress criminalized marijuana use in 1970.<sup>173</sup>

The demonization of marijuana in the United States began in the 1930s.<sup>174</sup> Propaganda reduced marijuana to a social evil that turned users insane.<sup>175</sup> Public fear of marijuana motivated Congress to take its first step against medical marijuana: a tax.<sup>176</sup> Though preventing illegal use of marijuana was the main purpose of the legislation, each ounce of medical marijuana was taxed one dollar.<sup>177</sup> After 1942, the US Dispensary no longer recognized marijuana as having any legitimate medical value.<sup>178</sup> In 1970, the US Congress proclaimed marijuana use illegal, despite an absence of scientific proof that marijuana had no medicinal use.<sup>179</sup> Today, two types of cannabidiol are available on the market to treat illnesses in the United States, but cannabis remains a schedule I controlled substance.<sup>180</sup>

## VII. MARIJUANA AS TREATMENT FOR MENTAL ILLNESS

Despite its categorization as a schedule I controlled substance, marijuana has several medical uses. States have recognized this by legalizing medical marijuana use, even though it is still criminalized by the federal government.<sup>181</sup> Medical marijuana is an effective replacement for pharmaceuticals in treating nausea and anorexia.<sup>182</sup> It has also gained recognition as treatment for many other illnesses.<sup>183</sup> The components of

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171. *Id.*

172. Mechoulam & Carlini, *supra* note 168, at 174.

173. *See* Bostwick, *supra* note 10, at 173, 181.

174. *Id.* at 181.

175. *Id.*

176. *See id.*

177. *Id.*

178. *See id.*

179. *Id.*

180. *Id.* at 180–81.

181. *See id.* at 182–83.

182. *See id.* at 174.

183. ALASKA STAT. § 17.37.070(4)(A)–(C) (2016). ARIZ. REV. STAT. ANN. § 36-2801(3)(a)–(c) (2017–2018); CAL. HEALTH & SAFETY CODE § 11362.7(h)(1)–(12) (Deering 2010); CONN. GEN. STAT. § 21a-408(2) (2015); DEL. CODE ANN. tit. 16, § 4902A(3)(a)–(c)



marijuana (CBD and THC) could potentially supplement or replace pharmaceutical antidepressants and benzodiazepines if such treatment is ineffective.<sup>184</sup>

#### A. Anxiety

Some scientists have investigated the role of cannabinoid receptor CB<sub>1</sub> in reduced anxiety levels of mice and rats.<sup>185</sup> Musty found that cannabidiol reduces the development of stress-induced ulcers as effectively as diazepam.<sup>186</sup> Studies of SR-141716 (an artificial CB<sub>1</sub> receptor antagonist) have shown marijuana can reduce anxiety in mice, but the effect is not present when given to the mice multiple times (suggesting the mice quickly developed a tolerance for the drug).<sup>187</sup> THC, a CB<sub>1</sub> receptor agonist, has also been effective in reducing anxiety in mice in low doses.<sup>188</sup> However, the therapeutic effect is lost in higher doses of THC.<sup>189</sup> In these cases, the mice become more anxious.<sup>190</sup>

Rey and others experimented with cannabinoid receptors to investigate the diverse effects cannabinoids seem to have on anxiety.<sup>191</sup> The researchers studied mice, measuring anxiety symptoms displayed when given two different types of cannabinoids: cannabinoids targeting

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(1974, Supp. 2017); D.C. CODE § 7-1671.05(17)–(18) (2001); FLA. STAT. § 10.29(b)(1) (2017); HAW. REV. STAT. ANN. § 329-121(1)–(3) (West 2016); 410 ILL. COMP. STAT. ANN. 130/5(a)–(c), 130/10(h)(1)–(2) (2016); LA. STAT. ANN. § 40:1046(A) (2013); ME. REV. STAT. ANN. tit. 22, § 2422(2)(A)–(E) (2017); MD. CODE ANN., HEALTH-GEN. § 13-3304(d)(i)–(ii) (LexisNexis 2015); MICH. COMP. LAWS ANN. § 333-26423(b)(1) (West 2013); MINN. STAT. § 152.22(14)(1)–(10) (2016); MONT. CODE ANN. § 50-46-302(4)(a)–(k) (2017); N.H. REV. STAT. ANN. § 126-X:1(IX)(A)(1)–(2) (2015); N.Y. PUB. HEALTH LAW § 3360(7)–(8) (Consol. 1997, Supp. 2017); 21 R.I. GEN. LAWS ANN. § 21-28.6-3(5)(i)–(iii) (West 2006, Supp. 2017); VT. STAT. ANN. tit. 18, § 4472(4)(A)–(C) (2017); WASH. REV. CODE ANN. § 69.51A.010(6)(a)–(g) (LexisNexis 2014); W. VA. CODE ANN. § 16A-2-1(3)(A)–(O) (LexisNexis 2017).

184. See Richard E. Musty, *Cannabinoids and Anxiety*, in CANNABINOIDS AS THERAPEUTICS 141, 141 (Raphael Mechoulam ed., 2005).

185. *Id.*

186. *Id.*

187. *Id.* at 142.

188. *Id.*

189. *Id.*

190. *Id.*

191. Alejandro Aparisi Rey et al., *Biphasic Effects of Cannabinoids in Anxiety Responses: CB<sub>1</sub> and GABA<sub>B</sub> Receptors in the Balance of GABAergic and Glutamatergic Neurotransmission*, 37 NEUROPSYCHOPHARMACOLOGY 2624, 2624–25 (2012).

GABA sensitive neurons and cannabinoids targeting glutamate.<sup>192</sup> These two types of cannabinoids were administered to mutant mice and wild mice.<sup>193</sup> The mutant mice came in two varieties: mice with no cannabinoid receptors on glutamate sensitive neurons and mice with no cannabinoid receptors on GABA sensitive neurons.<sup>194</sup> After observing the behavior of the mice, the researchers found that the presence of cannabinoids targeting GABA-sensitive neurons decreased the anxiety of the wild mice in low doses but had the opposite effect for the wild mice in high doses.<sup>195</sup> The cannabinoids targeting glutamate sensitive neurons also increased and decreased the anxiety of the wild mice, depending on the dose.<sup>196</sup> The mutant mice without cannabinoid receptors on GABA sensitive neurons experienced less anxiety regardless of the dosage.<sup>197</sup> The cannabinoids targeting glutamate sensitive neurons were unsuccessful in decreasing the mutant mice's anxiety at a low dose.<sup>198</sup> This experiment showed that cannabinoids and the dosage could be manipulated to optimize treatment of anxiety.<sup>199</sup>

De Mello Schier and his associates reviewed several studies with rats and CBD, and they also found evidence that CBD could act as an effective anxiolytic (an antianxiety medication).<sup>200</sup> De Mello Schier and associates gathered evidence that CBD has antidepressant properties as well.<sup>201</sup> In 2011, depressed rats were given 15, 30, or 60 mg of CBD, imipramine, or saline.<sup>202</sup> The researchers then placed the rats in a pool of water in which the rats had to swim to a stand where the water was shallow.<sup>203</sup> Depressed rats will normally stay in the water instead of swimming to the stand.<sup>204</sup> The rats treated with 30 mg of CBD and imipramine were more likely to

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192. *Id.* at 2625.

193. *Id.*

194. *Id.*

195. *Id.* at 2626, 2627 fig.1.

196. *Id.*

197. *Id.*

198. *Id.* at 2626.

199. *See id.* at 2626, 2627 fig.1, 2633.

200. Alexandre R. de Mello Schier et al., *Antidepressant-like and Anxiolytic-like Effects of Cannabidiol: A Chemical Compound of Cannabis Sativa*, 13 *CNS & NEUROLOGICAL DISORDERS – DRUG TARGETS* 953, 955, 956–57 tbl.1 (2014).

201. *Id.* at 955.

202. *Id.*

203. *Id.*

204. *Id.*

swim to the stand, a sign that the drugs reduced depressive symptoms.<sup>205</sup> A higher percentage of rats with saline and with other doses of CBD stayed in the water, suggesting that there was no reduction in the depressive symptoms.<sup>206</sup> Other studies found similar antidepressant effects in rats given CBD, but this therapeutic effect was dosage sensitive in one study.<sup>207</sup>

Cannabinoids have been effective in reducing anxiety in humans as well.<sup>208</sup> Dr. Crippa and colleagues found that CBD reduces the effects of social anxiety.<sup>209</sup> They studied ten men suffering from severe social phobia with limited experience using marijuana.<sup>210</sup> The researchers took images of each subject's brain to monitor the activity of the brain during a stressful event (the imaging process complete with invasion of personal space with a large medical device and an unfamiliar environment).<sup>211</sup> Each subject also self-reported how anxious he felt before, during, and after the stressful event.<sup>212</sup> The brain images and the self-evaluations showed that the subjects felt less anxious during the brain imaging process, and increasingly less anxious after, when the subjects took 400 mg of CBD rather than a placebo.<sup>213</sup> None of these subjects took any antianxiety medication during the experiment, so the decrease in anxiety symptoms was most likely due to the CBD.<sup>214</sup>

Bergamaschi and associates' research confirmed that CBD has an anxiety reducing effect on social anxiety disorder.<sup>215</sup> Three groups of subjects participated in the experiment: people without social anxiety disorder, people with social anxiety disorder given a placebo, and people with social anxiety disorder given CBD.<sup>216</sup> Researchers evaluated the

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205. *See id.* at 955, 956–57 tbl.1.

206. *Id.* at 955.

207. *Id.*

208. José Alexandre S. Crippa et al., *Neural Basis of Anxiolytic Effects of Cannabidiol (CBD) in Generalized Social Anxiety Disorder: A Preliminary Report*, 25 J. PSYCHOPHARMACOLOGY 121, 121 (2011).

209. *Id.* at 125.

210. *Id.* at 122.

211. *Id.*

212. *Id.* at 122–23.

213. *See id.* at 122, 125.

214. *See id.* at 122.

215. *See* Mateus M. Bergamaschi et al., *Cannabidiol Reduces the Anxiety Induced by Simulated Public Speaking in Treatment-Naïve Social Phobia Patients*, 36 NEUROPSYCHOPHARMACOLOGY 1219, 1222–24, 1223 fig.2 (2011).

216. *Id.* at 1220, 1222 & tbl.2.

severity of each subject's social anxiety disorder and measured psychological and physiological reactions such as subjective anxiety, skin conductance, blood pressure, and heart rate.<sup>217</sup> The researchers measured psychological and physiological reactions with a VAMS self-evaluation to measure subjective anxiety, skin conductance, blood pressure, and heart rate.<sup>218</sup> Measurements were recorded eighty minutes after the drug was taken.<sup>219</sup> The subjects were then instructed to give a four-minute speech, which would be recorded.<sup>220</sup> Data was recorded at an interruption two minutes into the speech, fifteen minutes after the speech was over, and again after an additional 20 minutes had passed.<sup>221</sup> At almost every stage in the experiment, the healthy control group felt the least anxiety, discomfort, sedation, and cognitive impairment.<sup>222</sup> The subjects with social anxiety disorder scored the highest in these categories.<sup>223</sup> The subjects with social anxiety disorder treated with CBD scored somewhere in between the other two groups at almost every stage of the experiment.<sup>224</sup> But this group experienced the least anxiety overall fifteen minutes and 35 minutes after the end of the speech.<sup>225</sup> These results demonstrate that marijuana has a significant anxiolytic effect on people with social anxiety disorder during and after a stressful event.<sup>226</sup>

Consroe, Zuardi, and others found similar effects in experiments testing anxiety in humans when given THC and CBD respectively. In this study, 85% of the patients with multiple sclerosis self-reported less anxiety.<sup>227</sup> The effect on patients with spinal cord injuries was similar.<sup>228</sup> When "instructed to smoke marijuana until they reached their 'usual' level of intoxication," subjects showed signs of reduced anxiety, suggesting that THC can reduce symptoms of anxiety.<sup>229</sup> CBD can also reduce anxiety.<sup>230</sup> When administered to subjects after performing a stressful activity, CBD

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217. *Id.* at 1220.

218. *Id.* at 1221.

219. *Id.*

220. *Id.*

221. *Id.*

222. *See id.* at 1222, 1223 fig.1.

223. *See id.*

224. *See id.*

225. *Id.* at 1221, 1223 fig.2.

226. *See id.* at 1224, 1223 figs.1 & 2.

227. Musty, *supra* note 184, at 144.

228. *Id.*

229. *Id.*

230. *Id.*

reduced the systolic blood pressure and subjective anxiety of the subjects without inducing physical sedation, as diazepam did.<sup>231</sup>

### *B. Depression*

Denson and Earleywine completed their own study investigating depression and marijuana in response to the 2003 literature review by Degenhardt, Hall, and Lynskey.<sup>232</sup> They found that regular marijuana users were generally less depressed.<sup>233</sup> More frequent use of cannabis increased this positive effect, with daily users reporting the least depressed mood of the subject groups.<sup>234</sup> Those who used marijuana medically, rather than recreationally, “reported less negative affect ... than those who had never used marijuana.”<sup>235</sup> To find the answer, more research is needed.<sup>236</sup>

Evidence exists that marijuana could also have therapeutic value in treating depression. CB<sub>1</sub> receptor activity “is linked to a reduction in depressive behaviors.”<sup>237</sup> But Degenhardt, Hall, and Lynskey’s 2003 literature review found a different association between depression and marijuana.<sup>238</sup> Daily cannabis use was associated with higher rates of depression in those with heroin dependence.<sup>239</sup> People with bipolar disorder (who also suffer from symptoms of depression) are also likely to abuse marijuana, with the rate of abuse anywhere between 3% and 19%.<sup>240</sup> High schoolers using cannabis were also more likely to think about committing suicide; however, no increase in depressive symptoms presented in college students using cannabis.<sup>241</sup> Women who used cannabis in their lifetimes were also five times more likely to develop depression.<sup>242</sup> Male army draftees using marijuana, and no other drugs,

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231. *Id.*

232. See Thomas F. Denson & Mitchell Earleywine, *Decreased Depression in Marijuana Users*, 31 ADDICTIVE BEHAVS. 738, 738–39 (2006).

233. *Id.* at 741.

234. *Id.* at 741, 740 tbl.1.

235. See *id.* at 741.

236. *Id.*

237. Louisa Degenhardt et al., *Exploring the Association Between Cannabis Use and Depression*, 98 ADDICTION 1493, 1494 (2003).

238. See *id.* at 1497–99, 1501.

239. *Id.* at 1495.

240. *Id.*

241. *Id.*

242. *Id.*

also showed signs of increased depression.<sup>243</sup> However, Degenhardt, Hall, and Lynskey warn against generalizing these results to the public because the above studies had a limited number of subjects.<sup>244</sup>

The literature review also covers studies of the general population linking marijuana use and depression.<sup>245</sup> The Epidemiologic Catchment Area Study and the National Comorbidity Survey both found a correlation between depression and drug abuse or dependence; per the ECA study people meeting the criteria for a substance abuse disorder were between 3.5 and 10.7 times more likely to have a mood disorder too.<sup>246</sup> Using this data, Grant and colleagues found that people who abused or were dependent on cannabis were about 6.4 times more likely to develop major depression.<sup>247</sup> To a lesser extent, this pattern was also present in Australian teenagers aged thirteen to seventeen years.<sup>248</sup> The evidence gathered does not explain why this correlation exists.<sup>249</sup> Degenhardt, Hall, and Lynskey posit two theories to be explored by further research: cannabis use causes depression, and depressed people self-medicate with cannabis.<sup>250</sup>

An earlier study of cannabis use in Australian adults conducted by Degenhardt, Hall, and Lynskey supports the idea that cannabis use does not directly cause either depression or anxiety.<sup>251</sup> Degenhardt, Hall, and Lynskey selected subjects by asking one adult in each randomly selected private residence whether the person had used cannabis more than five times within the previous twelve months.<sup>252</sup> Every respondent was then assessed for the presence of DSM-IV criteria<sup>253</sup> for major depressive disorder, dysthymia, bipolar I and II disorders, and anxiety disorders

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243. *Id.*

244. *Id.*

245. *Id.* at 1496.

246. *Id.*

247. *Id.*

248. *Id.*

249. *Id.* at 1501.

250. *See id.* at 1497–99.

251. *See* L. Degenhardt et al., *Relationship Between Cannabis Use, Depression and Anxiety Among Australian Adults: Findings from the National Survey of Mental Health and Well-being*, 36 SOC. PSYCHIATRY & PSYCHIATRIC EPIDEMIOLOGY 219, 225 (2001).

252. *Id.* at 221.

253. AM. PSYCHIATRIC ASSOCIATION, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS: DSM-IV-TR (4th ed. 2000). Those within the fields of psychology and psychiatry generally regard the DSM as *the* authority for what is and is not a mental disorder. Christopher L. Heffner, *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*, ALLPSYCH, <https://allpsych.com/disorders/dsm/> [<https://perma.cc/92QR-CHYL>].

(including social phobia and generalized anxiety disorder).<sup>254</sup> The researchers found that cannabis dependence correlated with a higher chance of having an anxiety disorder: 17% percent of cannabis-dependent respondents also had an anxiety disorder.<sup>255</sup> The correlation also worked in the other direction:<sup>256</sup> Respondents with an anxiety disorder, as compared to those without, were more likely to report cannabis use, abuse, and dependence.<sup>257</sup> A similar correlation was found in respondents with affective disorders (such as depressive disorders and bipolar disorders).<sup>258</sup> Those with an anxiety, depression, or bipolar disorder were more likely to use, abuse, or be dependent on cannabis, and vice versa.<sup>259</sup> However, these results were affected by other demographics including age, employment status, and sex.<sup>260</sup> Degenhardt's study leaves open the possibility that the correlation between cannabis use and affective disorders might be explained by other correlating factors, such as the use of other drugs.<sup>261</sup> These results suggest, since marijuana use likely does not *cause* depression or anxiety, that those afflicted self-medicate with marijuana.

### C. Bipolar Disorder

Since marijuana is helpful in treating depression and anxiety, it is not surprising that marijuana could also be effective in treating bipolar disorder, which involves depressive and manic episodes.<sup>262</sup> Marijuana is one substance that could treat both stages of bipolar disorder.<sup>263</sup> Dr. Grinspoon and Bakalar interviewed five bipolar patients who found marijuana helped with the patient's symptoms.<sup>264</sup> The first patient, a forty-seven-year-old woman, used cannabis to treat her symptoms of bipolar disorder because she experienced multiple unwanted side effects from the

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254. Degenhardt et al., *supra* note 251, at 222.

255. *Id.* at 223.

256. *Id.*

257. *Id.*

258. *See id.*

259. *See id.*

260. *Id.*

261. *See id.* at 223, 226.

262. Lester Grinspoon & James B. Bakalar, *The Use of Cannabis as a Mood Stabilizer in Bipolar Disorder: Anecdotal Evidence and the Need for Clinical Research*, 30 J. PSYCHOACTIVE DRUGS 171, 172 (1998).

263. *See id.* for one patient's account of how marijuana use improved both phases of her bipolar disorder.

264. *See id.* at 172–75.

prescribed lithium carbonate.<sup>265</sup> The second patient, a thirty-five-year-old woman suffering from severe bipolar disorder, tried multiple medications to treat her mental illness.<sup>266</sup> These medications either did not treat her symptoms or had negative effects like fatigue and trouble communicating.<sup>267</sup> The second patient only truly felt relief from her symptoms after smoking marijuana.<sup>268</sup> The third patient, a twenty-year-old man, also used marijuana to replace more conventional bipolar disorder medications.<sup>269</sup> After taking his lithium medication, he “act[ed] like an Alzheimer’s patient.”<sup>270</sup> He lost his ability to concentrate and became detached from the rest of the world.<sup>271</sup> Smoking marijuana became the only way the patient could “feel normal.”<sup>272</sup> The last two subjects of the study used marijuana in conjunction with conventional medication, rather than replacing it altogether.<sup>273</sup> A study of five people is hardly generalizable to the public, but it does show marijuana’s potential for treating bipolar disorder.

#### VIII. ADVANTAGES OVER CURRENT MEDICATIONS

There are several potential benefits of medical marijuana beyond treating symptoms of anxiety, depression, and bipolar disorder already treated by current pharmaceuticals. Medical marijuana would increase options for treatment available to patients. Current SSRIs are completely ineffective for some patients.<sup>274</sup> An abnormality of serotonin regulation causes only some cases of depression,<sup>275</sup> so current medications can only treat some cases of depression. SSRIs cannot alleviate symptoms of depression if there is no problem with the serotonin regulation to begin with. In addition, SSRIs are also only effective in two-thirds of cases in which depression is caused by dysfunction in serotonin regulation, leaving the other third of cases without viable treatment.<sup>276</sup> About the same

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265. *Id.* at 172.

266. *Id.* at 173.

267. *Id.*

268. *See id.*

269. *Id.* at 173–74.

270. *Id.* at 174.

271. *Id.*

272. *Id.*

273. *Id.* at 174–75.

274. Stahl, *supra* note 121, at 219.

275. *See id.*

276. *Id.*



percentage of bipolar patients are dissatisfied with available treatments for bipolar disorder.<sup>277</sup> The current medications for bipolar disorder do not consistently treat the disorder or patients cannot tolerate them.<sup>278</sup> Social anxiety disorder is likewise poorly treated by available pharmaceuticals.<sup>279</sup> “Only about 30% of the [cases] achieve true recovery or remission without” any symptoms.<sup>280</sup> Current pharmaceuticals do not perform at optimal efficiency,<sup>281</sup> which results in subpar treatment for some patients suffering from one or more mental illnesses.

Marijuana could solve this problem. Isolated cannabinoids may be able to treat the mental illness and reduce unwanted side effects.<sup>282</sup> If treatment with an isolated cannabinoid does not effectively alleviate the symptoms, a patient could be given botanical marijuana as treatment.<sup>283</sup> There are many cannabinoids in marijuana.<sup>284</sup> Marijuana itself may be more effective than the artificially isolated cannabinoids, resulting in better therapeutic outcomes.<sup>285</sup> In fact, there have been no reported cases of a person dying from an overdose of marijuana.<sup>286</sup> The same is not true for either tricyclic antidepressants or benzodiazepines.<sup>287</sup>

Medical marijuana would also give patients more control over their mental illness and their treatment. Patients would have more access to treatment because botanical marijuana would be cheaper and more readily available than pharmaceutical cannabinoids.<sup>288</sup> Patients could also

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277. See Grinspoon & Bakalar, *supra* note 262, at 172.

278. *Id.*

279. Bergamaschi et al., *supra* note 215, at 1219.

280. *Id.* at 1219–20.

281. Mahar et al., *supra* note 70, at 174.

282. See Bostwick, *supra* note 10, at 180.

283. *See id.*

284. *See id.*

285. See Ethan B. Russo, *Taming THC: Potential Cannabis Synergy and Phytocannabinoid-Terpenoid Entourage Effects*, 163 *BRIT. J. PHARMACOLOGY* 1344, 1345 (2011).

286. Bostwick, *supra* note 10, at 179. *But see* Ellie Silverman, *The Truth Behind the ‘First Marijuana Overdose Death’ Headlines, To Your Health*, *WASH. POST* (Nov. 17, 2017), [https://www.washingtonpost.com/news/to-your-health/wp/2017/11/17/the-truth-behind-the-first-marijuana-overdose-death/?utm\\_term=.237aef7f479e](https://www.washingtonpost.com/news/to-your-health/wp/2017/11/17/the-truth-behind-the-first-marijuana-overdose-death/?utm_term=.237aef7f479e) [<https://perma.cc/8ZXY-6KX9>].

287. See Pacher & Kecskemeti, *supra* note 131, at 2464; Mei-Sing Ong et al., *Provider Patient-sharing Networks and Multiple-provider Prescribing of Benzodiazepines*, 31 *J. GEN. INTERNAL MED.* 164, 164 (2015).

288. See Bostwick, *supra* note 10, at 180.

potentially control how much medicine they use and when.<sup>289</sup> Smoking marijuana has rapid effects<sup>290</sup> as opposed to antidepressants, which can take weeks to have any therapeutic effect.<sup>291</sup> Marijuana also has the benefit of being discrete. Since physicians may prescribe marijuana to treat many different illnesses, use of medical marijuana may not automatically label someone as mentally ill and attach the associated stigma to the patient. There may be less risk that a person will cease treatment, or avoid it altogether, for fear of stigma.

## IX. POTENTIAL PROBLEMS WITH MEDICAL MARIJUANA

Similar to other psychopharmaceuticals, medical marijuana is not without its downsides. There are potential unwanted consequences, physical and legal. Not every state has passed legislation allowing research into marijuana's potential as medication for mental illness. Complete understanding of both the undesired and therapeutic effects of marijuana requires adequate research.

### A. Adverse Health Effects

Marijuana use has some adverse health effects; these effects can appear after both short-term and long-term use.<sup>292</sup> With marijuana use, there is the potential for addiction, especially in younger people.<sup>293</sup> Experimental use leads to addiction in 9% of people; this percentage jumps to 25–50% with more frequent use.<sup>294</sup> However, opiates are also highly addicting, and this fact has not prevented medical use of opiates like hydrocodone and morphine; the “addicting liability alone has not automatically been allowed to contraindicate” the use of controlled substances as medicine.<sup>295</sup> The best way to control dosage and titration of marijuana is to smoke it,<sup>296</sup> but smoking is detrimental to health.<sup>297</sup> A link

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289. *See id.* at 175.

290. *See id.* at 174–75.

291. *See* Maher et al., *supra* note 70, at 174.

292. *See* Kevin P. Hill, *Medical Marijuana for Treatment of Chronic Pain and Other Medical and Psychiatric Problems*, 313 JAMA 2474, 2477–78 (2015).

293. Nora D. Volkow et al., *Adverse Health Effects of Marijuana Use*, 370 NEW ENG. J. MED. 2219, 2219 (2014).

294. *Id.*

295. Bostwick, *supra* note 10, at 182.

296. *Id.* at 174–75.

297. *Id.* at 178.

between long-term marijuana smoking and lung cancer has not yet been clearly established.<sup>298</sup> However, marijuana smokers are more likely to have chronic bronchitis with symptoms including inflammation of the large airways and lung hyperinflation.<sup>299</sup> Vaporizers can reduce the negative effects of inhaling marijuana.<sup>300</sup> Marijuana shares characteristics with gateway drugs, which have an association with increased risk of using illicit drugs and priming the brain for a more potent reaction to illicit drugs.<sup>301</sup> But this association could also be explained by a personal characteristic that makes a person more likely to use marijuana and other illicit drugs.<sup>302</sup> Marijuana use could also act as a triggering event for people with a predisposition for schizophrenia, since using marijuana during adolescence has been linked to schizophrenia.<sup>303</sup> However, only 3% of heavy users later develop schizophrenia.<sup>304</sup> Prohibiting use of cannabis at younger ages may reduce the risk of developing schizophrenia.<sup>305</sup> However, the cannabinoids in marijuana associated with these risks are unknown; thus, further research could discover and fix these problems.

There are also other negative effects of using marijuana at an early age. The brain is particularly vulnerable to adverse effects from marijuana use during puberty.<sup>306</sup> This is potentially due to the reorganizing of the brain during puberty, particularly in the frontal lobe and the cerebellum.<sup>307</sup> These adverse effects include memory deficiencies, increased likelihood of developing schizophrenia, increased risk of anxiety and depressive disorders, problems concentrating, abnormal social behavior, and reduced reaction time of neurons.<sup>308</sup> Marijuana use by teens can also lead to reduced neural activity in the brain including the prefrontal regions and the hippocampus, areas that are critical for memory and decision-making functions like inhibition.<sup>309</sup> However, limiting the legal use of marijuana to those at least eighteen years old could reduce these effects.<sup>310</sup>

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298. See Volkow et al., *supra* note 293, at 2222.

299. *Id.*

300. See Bostwick, *supra* note 10, at 178.

301. See Volkow et al., *supra* note 293, at 2220–21.

302. *Id.* at page 2221.

303. See Bostwick, *supra* note 10, at 176.

304. *Id.* at 177.

305. *See id.*

306. *Id.*

307. *See id.*

308. *See id.*; Volkow et al., *supra* note 293, at 2219–21.

309. See Volkow et al., *supra* note 293, at 2220.

310. See Bostwick, *supra* note 10, at 177.

Use of marijuana can also lead to unwanted social consequences. Marijuana abuse and dependence rates have doubled in states that have legalized marijuana for medical use.<sup>311</sup> Residents of states with medical marijuana laws are also almost twice as likely to use marijuana, and an individual's chances of becoming dependent on marijuana increased by 1.81 times.<sup>312</sup> However, this association is not necessarily causal.<sup>313</sup> Marijuana use is also associated with impaired driving and auto accidents.<sup>314</sup> Smoking marijuana substantially impairs driving and increases the overall risk of an accident.<sup>315</sup> With levels of THC increasing in marijuana since 1980, use has become more dangerous.<sup>316</sup> Since the 1980s, the number of emergency room visits resulting from marijuana use has substantially increased.<sup>317</sup>

Regardless of the research available on medical marijuana, the illegal status of marijuana in some states and on the federal level poses a problem. Currently, physicians in states that have legalized medical marijuana must warn patients about federal laws against marijuana use whenever he or she recommends marijuana.<sup>318</sup> Physicians cannot prescribe marijuana use, because it is still federally illegal.<sup>319</sup> It is also a crime to dispense or possess marijuana under federal law.<sup>320</sup> Some physicians are hesitant to recommend marijuana use, even when marijuana could benefit the patient, because federal agents can enforce federal law in states that have legalized medical marijuana.<sup>321</sup> The patient could be prosecuted for possessing marijuana.<sup>322</sup> Patients using marijuana consistently with state law are still subject to prosecution, and potential conviction, under federal law.<sup>323</sup>

The illegal nature of marijuana use in the eyes of federal law has also

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311. Magdalena Cerdá et al., *Medical Marijuana Laws in 50 States: Investigating the Relationship Between State Legalization of Medical Marijuana and Marijuana Use, Abuse and Dependence*, 120 *DRUG & ALCOHOL DEPENDENCE* 22, 24 (2012).

312. *Id.*

313. *Id.* at 25.

314. Volkow et al., *supra* note 293, at 2221.

315. *Id.* at 2222.

316. *See id.*

317. *Id.*

318. Hill, *supra* note 292, at 2478.

319. *Id.*

320. Diane E. Hoffmann & Ellen Weber, *Medical Marijuana and the Law*, 362 *NEW ENG. J. MED.* 1453, 1453 (2010).

321. *See* Hill, *supra* note 292, at 2478.

322. Hoffmann & Weber, *supra* note 320, at 1453.

323. Bostwick, *supra* note 10, at 182.

been an obstacle to research.<sup>324</sup> Researchers must apply to the National Institute of Drug Abuse to get permission to use the only federally authorized strain of marijuana.<sup>325</sup> The National Institute on Drug Abuse controls the supply of marijuana for research purposes.<sup>326</sup> This strain of medical marijuana is obtained from the University of Mississippi.<sup>327</sup> Before experiments begin, the FDA must authorize the research.<sup>328</sup> Researchers must also have a license from the DEA to perform the experiments before beginning the study.<sup>329</sup> The number of federal agencies and politics hamper efforts to learn more about medical marijuana. Research is impaired by a paradigm focused on the dangers of marijuana instead of balancing the risks and the benefits.<sup>330</sup> Politics prevent marijuana from receiving the type of research normally conducted on investigational drugs.<sup>331</sup> Researchers are unable to perform a balanced inquiry into the medicinal value of marijuana.<sup>332</sup> Federal penal law and politics quash attempts to investigate the potential therapeutic uses of medical marijuana.<sup>333</sup> “[R]esearch-driven scientific knowledge . . . cannot accrue until federal prohibitions on research are lifted.”<sup>334</sup>

In turn, this lack of research is an obstacle to medical marijuana’s acceptance. The limited studies available concerning the medical uses of marijuana for mental illness contradict themselves. As stated earlier, some studies show that marijuana would be helpful for treating anxiety and depression.<sup>335</sup> Other studies suggest that marijuana may increase the risk of having depression.<sup>336</sup> Other studies say that mental illness and marijuana use have no direct association.<sup>337</sup> Conflicting studies suggest that marijuana use both causes and does not cause substance abuse issues for patients using marijuana medically.<sup>338</sup> More research is needed to get

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324. *See id.* at 181–82.

325. *Id.* at 181.

326. *Id.*

327. *Id.*

328. *Id.* at 182.

329. *Id.*

330. *Id.* at 181–82.

331. *Id.* at 182.

332. *Id.* at 181.

333. *Id.* at 182.

334. *Id.*

335. Denson & Earleywine, *supra* note 232, at 741; Musty, *supra* note 184, at 144.

336. Degenhardt et al., *supra* note 237, at 1496.

337. Degenhardt et al., *supra* note 237, at 225.

338. *See id.* at 177–78.

a straight answer on what marijuana does and can do.

There is also the problem of how to draft laws decriminalizing research into medical marijuana. However, adopting language specifying how to conduct research into medical marijuana would easily solve this problem. Pennsylvania devoted an entire chapter of its Medical Marijuana Act to research programs.<sup>339</sup> The provision covers funding, who can do the research, how research must be conducted, how to keep records, and where to get the marijuana for the experiments.<sup>340</sup> The provision could potentially stand alone, making it easier for states that have not yet legalized marijuana use to adopt a statute legalizing use for research purposes only.

One flaw of the Pennsylvania provision is § 10231.1902 of the Medical Marijuana Act which establishes a program authorizing research on medical marijuana and the creation of a database for research.<sup>341</sup> Unfortunately, this statute requires approval from the FDA and the DEA before researchers can conduct experiments.<sup>342</sup> Sharing the role of regulating marijuana research among multiple federal agencies inhibits objective research.<sup>343</sup> The statute could better ensure safe and objective research if the FDA was in charge of approving each study while the DEA licensed each facility to handle controlled substances, similar to the licensing requirement for physicians prescribing controlled substances. After tweaking section (b)(5) to include the above suggestion, this provision could provide a blueprint for other states to adopt similar provisions allowing research on medical marijuana.

## X. CONCLUSION

Antidepressants and benzodiazepines could kill patients, yet few Americans are concerned about the negative effects of these drugs.<sup>344</sup> Antidepressants remain the third most commonly prescribed medication in the United States.<sup>345</sup> They can result in numerous negative side effects including an increased risk of cardiovascular diseases,<sup>346</sup> in utero

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339. See 35 PA. STAT. AND CONS. STAT. ANN. §§ 10231.1901–10231.1908 (West, Westlaw through 2017 Reg. Session Act 32).

340. *Id.* § 10231.1903 (West).

341. *Id.*

342. *Id.* § 10231.1902(b)(5) (West).

343. Bostwick, *supra* note 10, at 182.

344. Angermeyer & Dietrich, *supra* note 54, at 169.

345. Smoller et al., *supra* note 147, at 2128; Pratt et al., *supra* note 152, at 1.

346. Pacher & Kecskemeti, *supra* note 131, at 2463–64.

development of autism,<sup>347</sup> diabetes,<sup>348</sup> and suicide.<sup>349</sup> Patients also have to wait for weeks before the symptoms of the illness improve.<sup>350</sup> With about ten percent of the American population aged twelve and older using prescribed antidepressants,<sup>351</sup> there needs to be a better option.

Medical marijuana could be that better option. Cannabinoids, such as CBD and THC, have value as medication for anxiety and depression. Medical marijuana would allow patients immediate relief from the symptoms of depression, anxiety, or bipolar disorder. It would also give patients relief from the stigmatizing label of mental illness, a known obstacle for patients' seeking treatment. There are also negative effects of marijuana use. Marijuana is addicting and has been associated with developing mental disorders like schizophrenia and depression.<sup>352</sup> However, the limited number of studies available do not establish causality.<sup>353</sup>

The federal government and states without a system for medical marijuana research should authorize more research regarding medical marijuana and its potential as a treatment for mental illnesses. Legalizing medical marijuana would improve access to viable treatment for debilitating mental illnesses like anxiety, depression, and bipolar disorder. The first step is to replace a long-standing and increasingly irrational<sup>354</sup> fear of marijuana with new scientific discovery and acceptance of marijuana at the state and federal levels.

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347. Rai et al., *supra* note 148, at 1.

348. Andersohn et al., *supra* note 139, at 591.

349. McCain, *supra* note 115, at 355.

350. Mahar et al., *supra* note 70, at 174.

351. Pratt et al., *supra* note 152, at 1.

352. Volkow et al., *supra* note 293, at 2221.

353. *Id.*

354. Bostwick calls the federal ban "increasingly irrational" given that a number of states have legalized medical marijuana. Bostwick, *supra* note 10, at 183.