

Annual Suicide Mortality Report: Behavioral Health Fiscal Year 2017



D·B·H·D·D

Georgia Department of Behavioral Health and Developmental Disabilities

May 2019 Report

This is the inaugural annual suicide mortality report by DBHDD. The purposes of this report are to provide information about what DBHDD has learned about suicide deaths, to identify trends or patterns in suicide deaths, and to identify indicators that may assist DBHDD in the prevention and treatment of certain risk factors and practices that may be associated with suicide mortality during fiscal year 2017.

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Abstract

Objectives

An analysis of data about individual deaths and trends in suicide mortality is a component of health and safety oversight and is part of the Georgia Department of Behavioral Health and Developmental Disabilities' (DBHDD) quality management and improvement system. This is the inaugural annual suicide mortality report by DBHDD. The purposes of this report are to provide information about what DBHDD has learned about suicide deaths, to identify trends or patterns in suicide deaths, and to identify indicators that may assist DBHDD in the prevention and treatment of certain risk factors and practices that may be associated with suicide mortality during fiscal year 2017 (FY 2017).

Background

Given recent increases in suicide death rates in Georgia and the United States, research is needed to examine the risk and protective factors for suicide in vulnerable populations, especially those receiving behavioral health services.

Methods

This report (1) calculated DBHDD's age-adjusted suicide mortality rate and (2) utilized logistic regression models with suicide as the outcome, adjusted for numerous variables that tend to be correlated with suicide: gender, race, primary diagnostic category, level of housing stability, income, health insurance coverage, urbanicity, age, and suicide risk. Based on Community Mortality Review Committee (CMRC) reviews, this report also includes an analysis of deficient practices regarding suicide deaths using data from the Corrective Action Tracking System (CATS).

Results

DBHDD's age-adjusted mortality rate of 17.0 suicides per 100,000 for FY 2017 does not differ significantly from Georgia's calendar year 2017 age-adjusted suicide mortality rate of 13.6 suicides per 100,000 individuals. Logistic regression models indicated the importance of recent suicide history (≤ 30 days), especially within the past 24 hours, a critical period when considering suicide mortality risk. This analysis did not find statistically significant associations between other commonly-referenced risk factors and suicide. In addition, assessment and treatment planning deficiencies were the most prominent factors identified by the CMRC when reviewing suicide deaths.

Conclusions

Assessment and treatment planning deficiencies were the most prominent factors identified by the CMRC when reviewing suicide mortality. By considering the overlap of the statistical risk factor analyses and suicide mortality review, this analysis provided convergent validity from two types of data that one of the most important factors that was associated with DBHDD reported suicides in FY 2017 was deficient practices in suicide risk assessment and treatment planning.

A graphic summary of the report's main findings can be found on the following page.



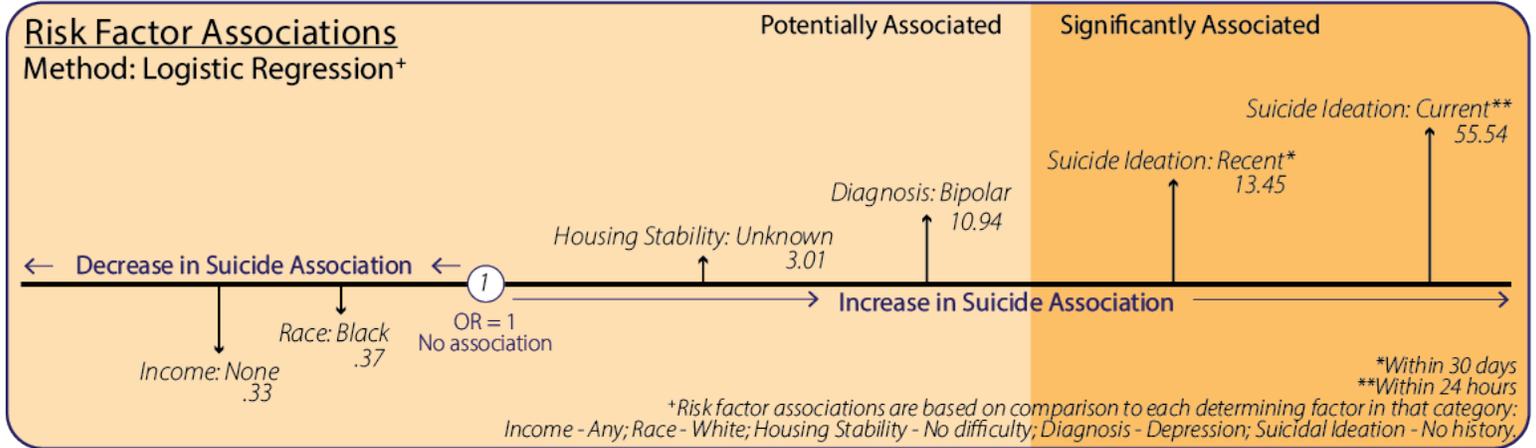
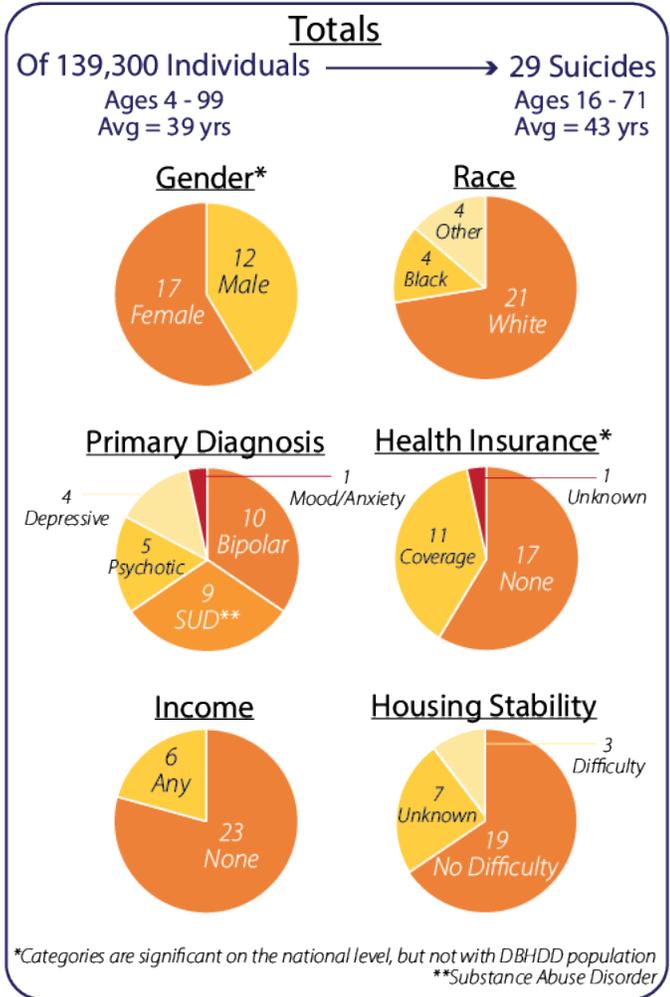
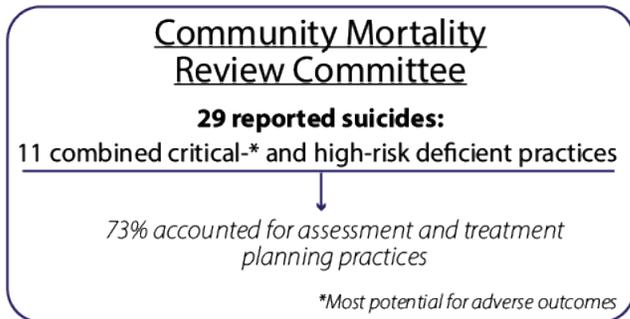
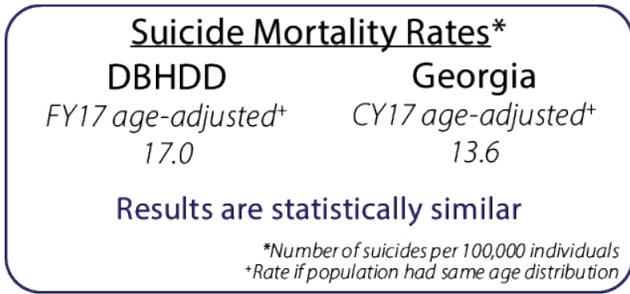
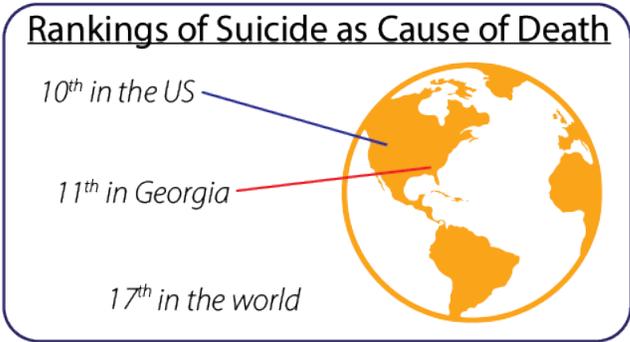
Department of Behavioral Health and Developmental Disabilities
Office of Performance Analysis

Behavioral Health Suicide Analysis, FY17

A component of health and safety oversight, quality analysis, and improvement

Main Purpose
To understand the factors associated with suicide mortality.

Most Important Factors
Deficient practices in suicide risk assessment and treatment planning.



DBHDD is committed to following suicide mortality trends to understand better the factors associated with suicide. The goal is to prevent suicide when possible and improve the lives of individuals who may be at risk for suicide.



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Introduction

An analysis of individual deaths and trends in suicide mortality is a component of health and safety oversight and is part of the Georgia Department of Behavioral Health and Developmental Disabilities' (DBHDD) quality management and improvement system. This is the inaugural annual suicide mortality report by DBHDD.

The purposes of this report are to provide information about what DBHDD has learned about suicide deaths, to identify trends or patterns in suicide deaths, and to identify indicators that may assist DBHDD in the prevention and treatment of certain risk factors and practices that may be associated with suicide mortality.

Between 1999 and 2016, suicide¹ death rates increased in nearly every state, including a 16.2 percent increase in Georgia and a 25.4 percent increase nationally.² Almost 45,000 Americans aged 10+ died by suicide in 2016, making suicide the tenth-leading cause of death in the United States.³ Globally, nearly 800,000 people die by suicide each year, making suicide the seventeenth leading cause of death in the world in 2015.⁴ Moreover, for each suicide, more than 20 others may attempt.⁴

Most individuals (about 95%) who die by suicide have been diagnosed with a mental disorder; however, most individuals who have been diagnosed with a mental disorder do not attempt or die by suicide, even when accounting for the diagnoses that have the highest prevalence and suicide rates.^{5,6} Consider a meta-analysis (41 studies, N = 31,159) conducted in 2000 of the hierarchy of suicide risk with affective disorders.⁷ Overall, it found that patients with affective disorders had an increased risk of suicide, compared to the general population; however, no risk factor was reliably associated with suicide, including diagnostic subtype of affective disorder.

Given recent increases in suicide death rates, research is needed to examine the risk and protective factors for suicide in vulnerable populations, especially those receiving behavioral health services. This analysis considered a wide range of factors that have been shown to be correlated with suicide, including gender, race, primary diagnostic category, level of housing stability, income, health insurance coverage, urbanicity, age, and suicide risk.

The following section reviews the literature on suicide from a local, national, and international perspective. Next, the data, measures, and statistical procedures are described. After summarizing the

¹ Per the Centers for Disease Control and Prevention (CDC), suicide is defined as “death caused by self-directed injurious behavior with an intent to die as a result of the behavior.” The CDC defines a suicide attempt as “a non-fatal, self-directed, potentially injurious behavior with an intent to die as a result of the behavior” that “might not result in injury.” <https://www.cdc.gov/violenceprevention/suicide/definitions.html>.

² CDC's National Vital Statistics System. CDC Vital Signs: June 2018.

³ https://www.cdc.gov/injury/images/lc-charts/leading_causes_of_death_age_group_2016_1056w814h.gif (Accessed November 26, 2018)

⁴ www.who.int/mental_health/prevention/suicide/suicideprevent/en/ (Accessed November 26, 2018)

⁵ Cavanagh, J. T., Carson, A. J., Sharpe, M., & Lawrie, S. M. (2003). Psychological autopsy studies of suicide: A systematic review. *Psychological Medicine*, 33, 395-405.

⁶ Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, Jr., T. E. (2010). The interpersonal theory of suicide. *Psychological Review*, 117(2), 575-600.

⁷ Bostwick, J. M., & Pankratz, V. S. (2000). Affective disorders and suicide risk: a reexamination. *American Journal of Psychiatry*, 157(12), 1925-1932.

results, this report concludes by discussing the strengths and limitations of the analyses, as well as the implications of the major findings.

This report does not issue recommendations, as these will emanate from later processes when DBHDD has had the opportunity to consider findings and observations reported within this document.

Literature Review

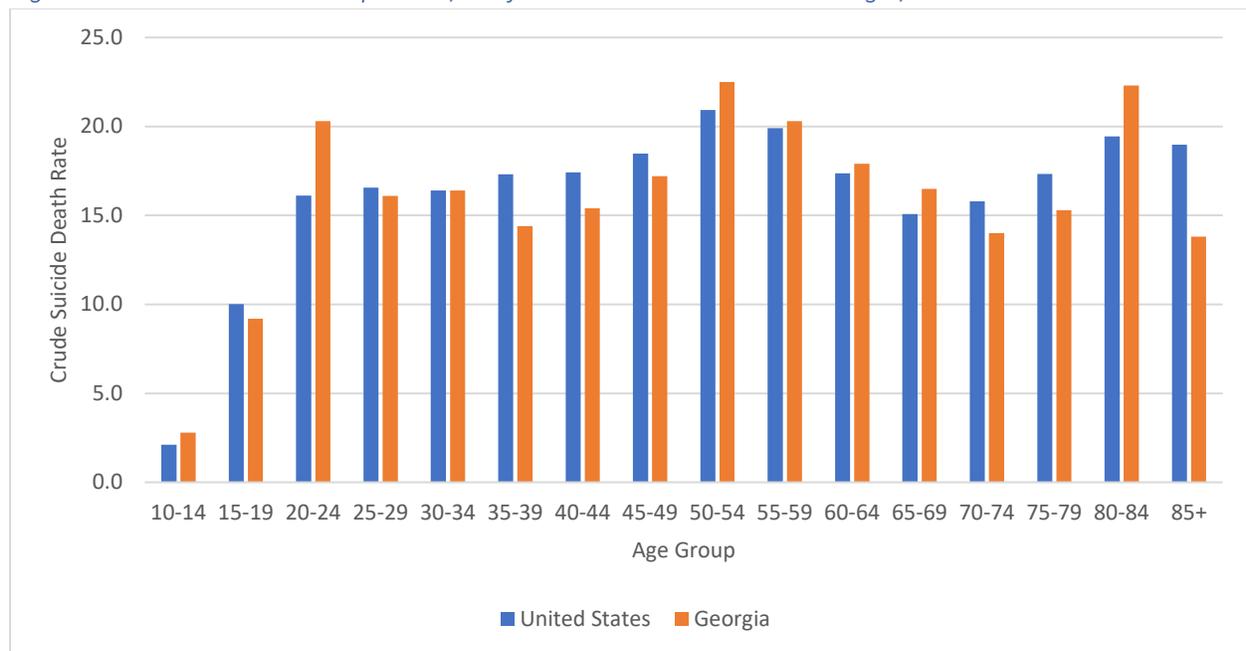
Suicide in Georgia and the United States

In Georgia, suicide is the third-leading cause of death for individuals ages 15-24; second-leading cause of death for individuals ages 25-34; fourth-leading cause of death for individuals ages 35-54; tenth-leading cause of death for individuals ages 55-64; and seventeenth-leading cause of death for ages 65+.⁸

Overall, suicide ranks as the eleventh-leading cause of death in Georgia.⁸ Georgia's suicide death rate (13.3 per 100,000 people) is statistically similar to the United States' suicide death rate (13.4 per 100,000 people).⁹ Georgia's suicide death rate is ranked thirty-third among all states.⁸

While suicide is a concern among all age groups, suicide deaths at the national level tend to be highest among those aged 50-59 and 75+, especially among older white adults.⁹ Outcomes in Georgia are similar. (See Figure 1).¹⁰

Figure 1: Suicide Death Rates per 100,000 for the United States and Georgia, 2016^{6,7}



⁸ American Foundation for Suicide Prevention. Suicide Facts & Figures: Georgia 2018. <https://afsp.org/about-suicide/state-fact-sheets/#Georgia>. (Accessed November 26, 2018)

⁹ WISQARS. Fatal Injury Reports, National, Regional and State, 1981 – 2016.

¹⁰ <https://oasis.state.ga.us/oasis/webquery/qryMortality.aspx> (Accessed November 26, 2018)

Suicide is a preventable and costly public health concern, both in the United States and Georgia. According to the Georgia Department of Public Health and the CDC:

- 3,356 persons were hospitalized, and 6,468 persons visited hospital emergency rooms for suicidal behaviors in Georgia in 2014;
- Suicide costs Georgia roughly \$1.3 billion of combined lifetime medical and work loss cost in 2010, or nearly \$1.2 million per suicide death;
- 1,265 persons died from suicide in Georgia in 2014, and 1,274 persons died from suicide in Georgia in 2015.^{11,12}

Correlates of Suicide and Suicidal Behavior

The CDC lists the following as risk factors that have been found to be associated with suicide:

- Family history of suicide;
- History of child maltreatment;
- Previous suicide attempt(s);
- History of mental disorders, particularly clinical depression;
- History of alcohol or substance abuse;
- Feelings of hopelessness;
- Impulsive or aggressive tendencies;
- Cultural and religious beliefs (e.g., belief that suicide is a noble resolution of a personal dilemma);
- Local epidemics of suicide;
- Isolation, a feeling of being cut off from other people;
- Barriers to accessing mental health treatment;
- Loss (relational, social, work, or financial);
- Physical illness;
- Easy access to lethal methods;
- Unwillingness to seek help because of the stigma attached to mental health and substance use disorders or to suicidal thoughts.¹³

¹¹ <https://dbhdd.georgia.gov/suicide-prevention> (Accessed November 26, 2018)

¹² American Foundation for Suicide Prevention. Suicide Facts & Figures: Georgia 2018. <https://afsp.org/about-suicide/state-fact-sheets/#Georgia>. (Accessed November 26, 2018)

¹³ <https://www.cdc.gov/violenceprevention/suicide/riskprotectivefactors.html> (Accessed November 26, 2018)

Demographic factors correlated with suicidal behavior and suicide differ.^{14,15,16,17,18,19,20,21} Demographic risk factors for suicidal behavior include being female, younger, unmarried, lower educational attainment, and being unemployed. Suicide is correlated with being non-Hispanic white or Native American and being an adolescent or older adult. Psychiatric correlates of suicide and suicidal behaviors include mood disorders, impulsive-aggressive behaviors, substance misuse, psychotic disorders, and personality disorders—all of which are associated with increased risk for suicidal behaviors and suicide.

The above-referenced risk factors have been distilled from voluminous studies across decades and have been found to be consistently associated with suicide. It is important to note, however, that none of the risk factors listed above has been found to be associated uniformly or universally with suicide. While the abovementioned risk factors have emerged as commonly found (with accumulated evidence), not all studies report convergent findings, even for the most commonly-accepted risk factors. Consider, for example, that depression seems to increase the risk for suicidal ideation, though it does not increase the risk for suicide attempts beyond its association with ideation.²² A meta-analysis published in 1999 concerning the association between suicide and depression showed mixed results: roughly half of studies found a positive association between depression and suicide, while roughly 49 percent found either a negative association or mixed effects between depression and suicide.²³ The overall conclusion from this meta-analysis—though not all studies—found support that depression and suicide were associated. However, this does not explain why so many individuals with depression do not die by suicide.

Each correlate noted above has a complex relationship and association with suicide. For example, a strong predictor of suicide is a previous or repeated attempt. Only a small proportion of individuals who consider suicide will attempt suicide, and even fewer will die by suicide, regardless of the risk factor.²⁴ Data indicate that 34 percent of those with suicidal ideation develop a suicide plan; 72 percent of persons with a suicide plan make a suicide attempt; 26 percent of persons with suicidal ideations without a plan make an

¹⁴ Nock, M. K., Borges, G., Bromet, E. J., Cha, C. B., Kessler, R. C., & Lee S. (2008). Suicide and suicidal behavior. *Epidemiologic Reviews*, 30(1), 133-154.

¹⁵ Nock, M. K., Borges, G., Bromet, E. J., et al. (2008). Cross-national prevalence and risk factors for suicidal ideation, plans, and attempts in the WHO World Mental Health Surveys. *British Journal of Psychiatry*, 192, 98-105.

¹⁶ Nock, M. K., & Kessler, R. C. (2006). Prevalence of and risk factors for suicide attempts versus suicide gestures: Analysis of the National Comorbidity Survey. *Journal of Abnormal Psychology*, 115, 616-623.

¹⁷ Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry*, 56, 617-626.

¹⁸ Mann, J. J., Waternaux, C., Haas, G. L., & Malone, K. M. (1999). Toward a clinical model of suicidal behavior in psychiatric patients. *American Journal of Psychiatry*, 156, 181-189.

¹⁹ Schaffer, D., Gould, M. S., Fisher, P., et al. (1996). Psychiatric diagnosis in child and adolescent suicide. *Archives of General Psychiatry*, 53, 339-348.

²⁰ Yen, S., Shea, M. T., Pagano, M., et al. (2003). Axis I and axis II disorders as predictors of prospective suicide attempts: findings from the Collaborative Longitudinal Personality Disorders Study. *Journal of Abnormal Psychology*, 112, 375-381.

²¹ Dumais, A., Lesage, A. D., Alda, M., Rouleau, G., Dumont, M., Chawky, N., Roy, M., Mann, J. J., Benkelfat, C., & Turecki, G. (2005). Risk factors for suicide completion in major depression: A case-control study of impulsive and aggressive behaviors in men. *American Journal of Psychiatry*, 162 (11), 2116-2124.

²² Nock, M. K., Hwang, I., Sampson, N.A., et al. (2009). Cross-national analysis of the associations among mental disorders and suicidal behavior: Findings from the WHO World Mental Health Surveys, *PLoS Medicine*, 6, e1000123.

²³ Wulsin, L.R., Vaillant, G. E., & Wells, V. E. (1999). A systematic review of the mortality of depression. *Psychosomatic Medicine* 61(1), 6-17.

²⁴ http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/ (Accessed November 26, 2018)

unplanned attempt. The presence of suicide ideation and a suicide plan increases the risk of a suicide attempt, and findings also indicate that suicide risk among those without a plan is limited to the first year after the onset of suicidal ideation.²⁵ However, almost half of suicides occur on the first attempt.²⁶

Complications of Suicide Research

Why is suicide so difficult to analyze, and why do so many mixed or conflicting results exist? Research has attempted to answer this as follows:

- Suicide is a rare event, meaning that the base rate of suicide attempts and suicides in the general population is low, which requires very large samples to study.²⁷
- Clinical and empirical predictors and risk factors are unreliable because of the low base rate of suicides. In the absence of large samples, then, associations and statistics may vary across studies.²⁸
- It is difficult to evaluate risk factors among homogenous populations. Small samples may suffer from population homogeneity of risk factors and outcomes. Large samples are needed that allow for the detection of statistically significant differences.²⁹
- Suicidal ideation and suicidal behavior often are exclusionary criteria for clinical trials due to safety precautions.³⁰
- Psychological assessment may not be possible for those who have died by suicide.³¹
- Much of the research on risk factors has extended theories of personality and psychopathology to study particular factors associated with suicide (e.g., cognitive behavior theory and therapies). Most suicide research, however, lacks comprehensive theoretical models that integrate the various known risk factors of suicide.³¹

Suicide risk factor research also has been complicated by several issues, such as relying on cross-sectional research that cannot demonstrate that a factor precedes an outcome or is causally related to it. Furthermore, suicide risk factor research has summarized findings from across multiple studies on diverse groups (e.g., general population, clinic populations, outpatient, inpatient, etc.), which makes it difficult to determine which factors may or may not vary within or among the groups. For example, risk factors often vary depending if the variable being studied is suicidal ideation, suicide attempt, or suicide. Summarizing statistical associations across several outcomes (e.g., suicidal ideation versus suicide) obscures factors that may be associated but not necessarily risk factors.³²

²⁵ Kessler, R. C., Borges, G., & Walters, E. E. (1999). Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Archives of General Psychiatry*, *56*, 617-626.

²⁶ Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, Jr., T. E. (2010). The interpersonal theory of suicide. *Psychological Review*, *117*(2), 575-600.

²⁷ Moscicki, E. K. (2001). Epidemiology of completed and attempted suicide. Toward a framework for prevention. *Clinical Neuroscience Research*, *1*, 310-323.

²⁸ Goldney, R. D. (2000). Prediction of suicide and attempted suicide. In: Hawton, K., van Heeringen, K. (Eds.), *The International Handbook of Suicide and Attempted Suicide*. Wiley, Chichester, 585-595.

²⁹ Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry*, *54*, 337-343.

³⁰ Rudd, M. D., Joiner, T. E., & Rajab, M. H. (2001). Treating suicidal behavior: An effective, time-limited approach. *Treatment manuals for practitioners*. New York, NY: Guilford.

³¹ Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, Jr., T. E. (2010). The interpersonal theory of suicide. *Psychological Review*, *117*(2), 575-600.

³² Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry*, *54*, 337-343.

Because populations may be defined in different ways (though still named the same across different studies), identification and profiles of risk factors may vary across conditions and disorders, thereby making it difficult to define actual risk factors for a disorder or outcome. This is another reason for disparities across studies, groups, and conditions for risk factors in research. In this way, some factors have been inadvertently classified as risk factors; however, they are, in fact, correlated factors.³²

Summary

The main point from the above literature review is that even for the most reliable and commonly-accepted risk factors for suicide, research exists that supports the association between a given risk factor and suicide, and research also exists that does not support or counters the association between a given risk factor and suicide. The risk and protective factors outlined above have been distilled from numerous studies across time, and the evidence is not uniform for each risk factor. Thus, it is important to keep in mind that research has found mixed support for each risk and protective factor.

Data and Methods

Data Collection Process

Based on the literature review above, efforts were made to identify data elements from DBHDD demographic and clinical information to investigate statistical associations with suicide. Demographic data were extracted from service authorizations. The data collection process in this investigation involved examining all reported suicides between July 1, 2016 and June 30, 2017 and any active authorization for children, youth, and adults in DBHDD behavioral health services³³ during the same date range.

The total number of individuals with active DBHDD authorizations was 140,584. This analysis excluded individuals who had missing data for gender (n = 31), race (n = 32), primary diagnostic category (n = 11), housing stability (n = 174), health insurance status (n = 174), and urbanicity³⁴ (n = 1,073). This analysis excluded some individuals based on more than one exclusion criteria. As such, using listwise deletion,³⁵ a total of 1,284 (0.8%) individuals were excluded, resulting in a final sample size of 139,300 individuals.

Measures

Several variables were transformed due to a low number of responses in some categories. Information about variable transformation can be found below and in **Appendix A**.

The dependent variable of interest was whether the individual died by suicide during fiscal year 2017 (FY 2017), measured as a binary variable (1 = died by suicide; 0 = did not die by suicide).

This analysis controlled for the following demographic and clinical characteristics: gender (male, female, other), race (white, black, other), primary diagnostic category³⁶ (bipolar, psychotic, substance use disorder

³³ Does not include Georgia Housing Voucher Program or PASRR services.

³⁴ Urbanicity refers to whether an individual resides in an urban or rural county, as defined using metropolitan statistical areas (MSAs). MSAs were used to classify counties as urban or rural; thus, missing values for urbanicity indicate missing values for county of residence.

³⁵ Listwise deletion is a method for handling missing data, whereby an entire record is excluded from analysis if any single value is missing.

³⁶ See Appendix A for more information regarding the construction of diagnostic categories.

[SUD]/other, depressive, mood/anxiety), housing stability (difficulty, no difficulty, unknown), income (1 = any income during previous month; 0 = no income during previous month), health insurance (coverage, no coverage, unknown), urbanicity (1 = urban; 0 = rural), age (in years), and suicide risk³⁷ (no evidence found of suicide risk; history of suicidal ideation/gesture, but not within previous 30 days; recent suicidal ideation/gesture, but not within previous 24 hours; current (<24 hours) suicidal ideation and intent).

Analysis

Statistical analyses are useful to identify associations and trends among variables. Statistics commonly refers to statistical significance. Sometimes associations or patterns occur due to random chance. A statistically significant difference for a result or relationship has a likelihood that it is caused by something other than mere random chance. It is a natural tendency to assume when there is a statistically significant difference or association that it must result from the something other than a random chance and that the difference must have a specific cause. It is important to exercise caution when interpreting statistical significance in this manner, as sufficient facts may not necessarily be present to conclude a specific idea of what that something is. It is important that statistical significance should be studied further by gathering additional information and by completing a more extensive analysis through additional steps. It also should be noted that statistical significance does not equate to importance or meaningful significance. Meaning and importance of findings can only be determined by more careful examination of additional information. This report does not make conclusions about any differences or statistically significant findings. As such, these statistical findings will be presented to be considered along with other information for further exploration to understand the findings. This report considers $p < 0.01$ to be statistically significant.

Descriptive statistics were calculated for each measure among the full sample, then separately among those who did and did not die by suicide (**Table 1**). The presence of any diagnosis was then determined among the full sample (regardless if primary or not; **Table 2**); however, for model simplicity, multivariable analyses only included primary diagnoses. Age-adjusted³⁸ suicide rates were calculated by using a standard population of suicide mortality data.

Finally, to examine potential associations between risk factors and suicide, logistic regression analyses were performed (**Table 3** and **Table 4**). **Table 3** includes the full analytic sample ($n = 139,300$). **Table 4** includes a subset of the full analytic sample and is restricted to only those individuals who received CANS/ANSA suicide risk assessments.³⁹ Thus, the logistic regression model in **Table 4** includes CANS/ANSA suicide risk screening or assessment variables, while the model in **Table 3** does not.

Several advantages of using logistic regression exist. First, logistic regression allows one to determine the association of a variable without the influence of other variables. That means, logistic regression analysis

³⁷ Suicide risk assessment data come from the most recent CANS/ANSA assessments on file.

³⁸ Age-adjusted rates allow for fairer comparisons between groups with different age distributions. A "standard" population distribution is used to adjust death rates. In this analysis, age-adjusted suicide rates were calculated using CDC suicide statistics as the standard. The age-adjusted rates are rates that would have existed if the population under study had the same age distribution as the "standard" population.

³⁹ Suicide risk assessments are conducted to assess level of suicide risk and imminent danger. Assessing or screening for suicide risk involves using different types of tools, such as the Columbia Suicide Severity Rating Scale (C-SSRS) and CANS/ANSA. This report only includes suicide risk assessment data from the CANS/ANSA tools. Missing CANS/ANSA data do not necessarily indicate missed assessment or screening opportunities, as consumers may have been assessed or screened for suicide risk elsewhere.

about, for example, age, pertains only to the effects of age and suicide without the effect of other variables. Another advantage is that logistic regression can be used to determine the importance of each variable. Logistic regression produces an odds ratio for each variable. An odds ratio is a measure of association between a variable and an outcome occurring, such as death by suicide in these analyses. The odds ratio represents the odds of death occurring given an event or condition compared to the odds of death occurring in the absence of that variable. An odds ratio of one indicates no association between a variable and the outcome. An odds ratio that is above one indicates a positive or risk association such that as the variable increases (or is present), so does the risk of having died by suicide. Conversely, an odds ratio between zero and one indicates a “protective” association such that as the variable decreases (or is absent), so does the risk of having died by suicide.

Logistic regression results are displayed as adjusted odds ratios⁴⁰ (aORs) and 99 percent confidence intervals (CIs). All statistical analyses were conducted by using Stata version 15.⁴¹

Results

Demographic and Clinical Characteristics

The sample included 139,300 unduplicated individuals aged 4-99, with a mean age of 39.2 (**Table 1**). Of these, 50.6 percent were female, 49.3 percent were male, and 0.1 percent were classified as other gender. The sample was majority white (51.2%), followed by black (42.6%), and other racial/ethnic background (6.3%). Most of the sample had stable housing (80.1%), reported no income during the previous month (58.9%), lacked health insurance coverage (54.9%), and lived in urban counties (75.0%).

The most common primary diagnostic category was SUD/other (36.8%), followed by depressive (25.1%), psychotic (18.3%), bipolar (14.7%), and mood/anxiety (5.2%) disorders. Among the full sample (**Table 2**), 54.3 percent exhibited the presence of an SUD/other diagnosis (regardless if primary or not), followed by depressive (31.2%), psychotic (19.5%), bipolar (17.0%), and mood/anxiety (15.7%) disorders.

Suicide Mortality Rates

Twenty-nine suicides were reported to DBHDD in FY 2017,⁴² resulting in a crude mortality rate⁴³ of 20.8 suicides per 100,000 individuals. DBHDD’s age-adjusted FY 2017 suicide mortality rate was 17.0 suicides per 100,000 individuals served, which exceeds the age-adjusted 2017 suicide mortality rate of 13.6 per 100,000 individuals for Georgia⁴⁴; however, the rates are statistically equivalent.

⁴⁰ Throughout this document, “adjusted odds,” “adjusted odds ratios,” or “aORs” refer to the fact that each logistic regression model controls for—or is adjusted for—numerous demographic and clinical characteristics, such as gender, race, primary diagnostic category, level of housing stability, income, health insurance coverage, urbanicity, age, and suicide risk. “Adjusted” models statistically “extract” or “exclude” extraneous influences of variables that may influence another variable so the variable being investigated or reported is the “pure” effect of that variable by itself, with the effects of other variables being removed from it.

⁴¹ StataCorp. 2017. *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.

⁴² The number of suicide deaths is among the unduplicated analytic sample that is characterized in Table 1 (n = 139,300). Crude suicide mortality rates and age-adjusted suicide mortality rates were calculated using the unduplicated analytic sample.

⁴³ The crude suicide mortality rate is a measure of how many people out of every 100,000 served by DBHDD died within the study period. It is determined by multiplying the number of people who died by suicide during the year times 100,000 and dividing this by the total number of adults served in behavioral health services during the same year.

⁴⁴ <https://oasis.state.ga.us/oasis/webquery/qryMortality.aspx>. (Accessed November 26, 2018)

Table 1: Sample Characteristics

Characteristic	Full Sample	No Suicide	Suicide
Total	139,300 (100.0)	139,271 (100.0)	29 (100.0)
<i>Gender</i>			
Male	68,734 (49.3)	68,722 (49.3)	12 (41.4)
Female	70,464 (50.6)	70,447 (50.6)	17 (58.6)
Other	102 (0.1)	102 (0.1)	0 (0.0)
<i>Race</i>			
White	71,326 (51.2)	71,305 (51.2)	21 (72.4)
Black	59,144 (42.6)	59,140 (42.5)	4 (13.8)
Other	8,830 (6.3)	8,826 (6.3)	4 (13.8)
<i>Primary diagnostic category</i>			
Bipolar	20,420 (14.7)	20,410 (14.7)	10 (34.5)
Psychotic	25,508 (18.3)	25,503 (18.3)	5 (17.2)
Substance use disorder (SUD)/other	51,263 (36.8)	51,254 (36.8)	9 (31.0)
Depressive	34,931 (25.1)	34,927 (25.1)	4 (13.8)
Mood/anxiety	7,178 (5.2)	7,177 (5.2)	1 (3.5)
<i>Housing stability</i>			
Difficulty	11,703 (8.4)	11,700 (8.4)	3 (10.3)
No difficulty	111,538 (80.1)	111,519 (80.1)	19 (65.5)
Unknown	16,059 (11.5)	16,052 (11.5)	7 (24.1)
<i>Income (previous month)</i>			
Any income	57,322 (41.2)	57,316 (41.2)	6 (20.7)
No income	81,978 (58.9)	81,955 (58.9)	23 (79.3)
<i>Health insurance</i>			
Coverage	60,038 (43.1)	60,027 (43.1)	11 (37.9)
No coverage	76,516 (54.9)	76,499 (54.9)	17 (58.6)
Unknown	2,746 (2.0)	2,745 (2.0)	1 (3.5)
<i>Urbanicity</i>			
Urban	104,512 (75.0)	104,489 (75.0)	23 (79.3)
Rural	34,788 (25.0)	34,782 (25.0)	6 (20.7)
Age, mean (SD)	39.2 (15.5)	39.2 (15.5)	43.1 (14.5)

Notes: Shown for each variable and group are totals/subtotals, with percentages in parentheses, unless otherwise indicated. Total percentages may not total to 100.0 because of rounding.

Table 2: Presence of Any Diagnosis (n = 139,300)

Diagnostic Category	Count With	% With	Count Without	% Without
Bipolar	23,687	17.0	115,613	83.0
Psychotic	27,161	19.5	112,139	80.5
Substance use disorder (SUD)/other	75,621	54.3	63,679	45.7
Depressive	43,469	31.2	95,831	68.8
Mood/anxiety	21,806	15.7	117,494	84.4

Inferential Suicide Data Analysis

Logistic regression results are presented in **Table 3** and **Table 4**. In **Table 3**, none of the variables in the model reached statistical significance ($p < 0.01$); however, multiple variables were close to statistical significance ($p < 0.05$) and are worth mentioning as these findings may be suggestive, though do not reach the level of statistical significance.

For example, compared with white individuals, black individuals had lower adjusted odds of suicide (aOR = 0.23; 99% CI, 0.05-1.09; $p = 0.011$). Individuals whose primary diagnostic category was bipolar disorder, relative to those with depressive disorders, had higher adjusted odds of suicide (aOR = 4.26; 99% CI, 0.92-19.68; $p = 0.015$). Individuals whose housing stability status was unknown, compared with individuals who reported no housing stability difficulties, had higher adjusted odds of suicide (aOR = 3.01; 99% CI, 0.74-12.23; $p = 0.043$). Individuals who reported no income during the previous month, relative to individuals who reported any amount of income during the previous month, had lower adjusted odds of suicide (aOR = 0.32; 99% CI, 0.09-1.16; $p = 0.023$). Again, these findings are suggestive only. Gender, health insurance coverage, urbanicity, and age were neither statistically significant nor suggestive of being associated with suicide mortality in this model.

Table 3: Logistic Regression of Suicide (n = 139,198)

Characteristic	aOR	99% CI	Significance
<i>Gender</i>			
Female	1.29	0.48-3.51	NS
<i>Race</i>			
Black	0.23	0.05-1.09	NS
Other	1.70	0.39-7.30	NS
<i>Primary diagnostic category</i>			
Bipolar	4.26	0.92-19.68	NS
Psychotic	2.47	0.42-14.55	NS
Substance use disorder (SUD)/other	1.07	0.19-6.10	NS
Mood/anxiety	1.21	0.07-21.77	NS
<i>Housing stability</i>			
Difficulty	1.58	0.31-8.05	NS
Unknown	3.01	0.74-12.23	NS
<i>Income (previous month)</i>			
No income	0.32	0.09-1.16	NS
<i>Health insurance</i>			
Coverage	1.29	0.42-3.95	NS
Unknown	1.25	0.08-18.68	NS
<i>Urbanicity</i>			
Rural	1.29	0.39-4.30	NS
Age	1.02	0.98-1.06	NS
Pseudo R^2	0.06		

Notes: One variable (other gender) was automatically dropped from the model because it perfectly predicted failure, likely because there were no suicide deaths among those who reported other genders, resulting in the loss of 102 observations. Adjusted odds ratios, 99% CIs, and statistical significance are displayed; coefficients available on request.

In **Table 4**, most of the variables did not reach statistical significance ($p < 0.01$). There were two exceptions related to CANS/ANSA suicide risk assessment or screening. First, individuals who exhibited recent suicidal ideation/gestures, relative to individuals who did not exhibit suicide risk, had higher adjusted odds of suicide (aOR = 13.45; 99% CI, 1.37-131.75; $p = 0.003$). Second, individuals who exhibited current suicidal ideation/intent, relative to individuals who did not exhibit suicide risk, had higher adjusted odds of suicide

(aOR = 55.54; 99% CI, 2.78-1,108.36; $p = 0.001$). Gender, race, primary diagnostic category, income, health insurance coverage, and age were not found to be associated with having died from suicide in this model.

The inclusion of suicide risk assessment/screening variables in the second model increased the amount of variance⁴⁵ (pseudo R^2) explained, rising from six percent (as reported in **Table 3**) to 13 percent (as reported in **Table 4**). This increase indicates that the inclusion of suicide risk assessment/screening variables provides a fuller explanation of suicide mortality.⁴⁶

Table 4: Logistic Regression of Suicide (n = 36,324)

Characteristic	aOR	99% CI	Significance
<i>Gender</i>			
Female	1.05	0.22-4.97	NS
<i>Race</i>			
Black	0.37	0.06-2.29	NS
Other	0.96	0.06-15.73	NS
<i>Primary diagnostic category</i>			
Bipolar	10.94	0.69-174.17	NS
Psychotic	6.70	0.35-128.14	NS
<i>Income (previous month)</i>			
No income	0.33	0.06-1.81	NS
<i>Health insurance</i>			
Coverage	1.61	0.30-8.60	NS
<i>Age</i>			
	1.03	0.98-1.09	NS
<i>Suicide Risk</i>			
History of risk without recent ideation/gesture	3.83	0.67-21.98	NS
Recent suicidal ideation/gesture	13.45	1.37-131.75	$p = 0.003$
Current suicidal ideation/intent	55.54	2.78-1,108.36	$p = 0.001$
Pseudo R^2	0.13		

Notes: Seven variables (other gender, mood/anxiety primary diagnostic category, substance use disorder [SUD]/other primary diagnostic category, unknown housing stability, housing stability difficulty, unknown health insurance, and county type) were automatically dropped from the model because they perfectly predicted failure, resulting in the loss of 46,694 observations. Adjusted odds ratios, 99% CIs, and statistical significance are displayed; coefficients available on request.

⁴⁵ The logistic regression models presented in this report measure variance using pseudo R^2 , which is a statistical measure of fit that indicates how much variation of a dependent variable is explained by the independent variable(s) in a regression model. In this case, a pseudo R^2 of 1.00 (or 100%) would mean that suicide mortality is completely explained by the independent variables included in each model. The logistic regression model presented in **Table 3** explains six percent of suicide mortality variance, while **Table 4** explains 13 percent of suicide mortality variance.

⁴⁶ In addition to the focal analyses presented above, an additional set of analyses was conducted. First, because suicide was generally uncommon in the sample, this analysis assessed whether conventional logistic regression models were appropriate. To address this concern, multivariable analysis was conducted using a model that adjusted the maximum likelihood estimation of the logistic model, which tends to suffer from small-sample bias. Because the results of this supplemental analysis were substantively identical to the standard logistic regression analyses, the presentation of results is limited to the standard logistic regression results. Second, as an added precaution, additional models were estimated that imputed missing data on all independent variables using the multiple imputation function in Stata. Although the use of multiple imputation would have allowed the retention of an additional 1,284 individuals in the first logistic regression model, listwise deletion was employed because the results were substantively identical. All supplemental analyses are available by request.

Community Mortality Review Committee and Deficient Practice Analysis

Overview of the CMRC

As defined by CMRC policy,⁴⁷ DBHDD conducts thorough reviews of deaths of individuals receiving services by or through DBHDD community providers for the purpose of reducing morbidity or mortality and evaluating and improving the quality and efficiency of services rendered. DBHDD has established two community mortality review committees. The behavioral health community mortality review committee is responsible for reviewing deaths of individuals receiving behavioral health services in the community. The intellectual/developmental disability community mortality review committee is responsible for reviewing deaths of individuals receiving intellectual/developmental disability services in the community. For individuals receiving services through both the intellectual/developmental disability and behavioral health systems, the community mortality level 1 review team determines which CMRC will review the death. A clinical mortality review is conducted for unexpected deaths and suicides of individuals who are receiving services from community providers. The CMRC then reviews information to determine ways to improve the quality of services.

The CMRC policy includes a requirement that providers self-report deaths (and other critical incidents). When deficient practices are identified, through the CMRC process or other critical incident review, they are managed by DBHDD through a corrective action tracking system. A corrective action plan (CAP) is developed to address a health- and safety-related deficiency, or operational or fiscal deficiency, and to prevent, so far as is practicable, a recurrence.

Deficiency Tracking

Deficiencies or provider practices that are found to be deficient are categorized as critical, high, moderate, or low risk. CMRC reviews may reveal no deficient practices, or multiple deficient practices for each death, resulting in tracking multiple deficiencies and corrective actions. More information about the deficiency determinations and tracking processes can be found in DBHDD policy [Internal and External Reviews and Corrective Action Plans, 13-101](#).

The analysis of deficient practices and deficiency tracking presented below is based on data from the Corrective Action Tracking System (CATS). These 2017 CMRC and CATS data and analyses are presented as baseline performance.

Statewide Analysis of Number and Type of Deficient Practices

Corrective actions may be required for any deficient practices identified during investigations in accordance with [Internal and External Reviews and Corrective Action Plans, 13-101](#) and [Internal and External Reviews: Accountability and Enforcement Actions, 13-103](#). DBHDD expects that providers will address all deficiencies.

In FY 2017, among the 29 reported suicides, eleven combined critical- and high-risk deficient practices were identified by the CMRC in review of suicide deaths—the ones with the most potential for adverse outcomes. Deficient provider practices in assessment and treatment planning accounted for 73 percent

⁴⁷ More information regarding the CMRC policy can be found here: <https://gadbhdd.policystat.com/policy/4551977/latest/>. This report analyzed data about suicides that occurred prior to the revision of the current policy referenced here, which was February 2018. The suicide mortality data and findings of this report were not affected by the policy revision. This policy version is referenced to provide information about DBHDD's current, improved processes.

of the 11 high- and critical-risk deficient practices identified by CMRC mortality reviews. Most suicide deaths in FY 2017 were not found to be associated with high- or critical-risk deficient practices. Based on data about deficient provider practices identified during the course of suicide mortality investigations, it appears that assessment of and planning treatment to address suicide risk was a concern.

Analysis Limitations and Strengths

Limitations

This analysis is limited in at least five key aspects. First, given the small number of suicides, suicide is considered a rare event in this report. In fact, the base rate of suicide attempts and suicides tends to be low within most populations, meaning it is necessary to have very large samples when studying such a rare event, thereby allowing for the detection of statistically significant differences.⁴⁸

Second, there is no gold-standard approach for statistically modeling suicide. This analysis used logistic regression. This is an accepted, often-used, logical, and valid approach. Other approaches were considered; yet, most statistical approaches face limitations when attempting to model events that are not that common, such as suicide. Comparison of such small numbers may produce unreliable estimates. However, as noted earlier, this concern was addressed by running the multivariable analysis using a model that adjusts the maximum likelihood estimation of the logistic model. The results of the supplemental analysis were substantively identical to the standard logistic regression analyses; thus, the presentation of results is limited to the standard logistic regression results.

Third, the initial part of this analysis employs a ubiquitous and most-widely used approach of attempting to find statistical associations between suicide having occurred and numerous demographic and clinical variables—suicide risk factor and correlate research. However, this approach to studying suicide risk factors and correlates lacks a comprehensive theoretical framework that would specify what variables should be included and how the factors relate to suicide. Some theoretical models of suicide have been developed which may provide a means to modeling, testing, and interpreting specific factors and how they relate to suicide.

Fourth, this analysis did not consider utilization of services or quality of services received. It may be helpful to consider how utilization of services may be related to suicide.^{49,50,51,52,53}

Fifth, this analysis employs a cross-sectional design. Thus, this analysis is unable to determine if certain key factors precede suicide or are causally related to suicide.

⁴⁸ Moscicki, E. K. (2001). Epidemiology of completed and attempted suicide. Toward a framework for prevention. *Clinical Neuroscience Research, 1*, 310-323.

⁴⁹ Turecki, G., & Brent, D. A. (2016). Suicide and suicidal behavior. *The Lancet, 387*, 1227-1239.

⁵⁰ While, D., Bickley, H., Roscoe, A., et al. (2012). Implementation of mental health service recommendations in England and Wales and suicide rates, 1997-2006: A cross-sectional and before-and-after observational study. *Lancet, 379*, 1005-1012.

⁵¹ Posner, K., Brown, G. K., Stanley, B., et al. (2011). The Columbia-Suicide Severity Rating Scale: Initial validity and internal consistency findings from three multisite studies with adolescents and adults. *American Journal of Psychiatry, 168*, 1266-1277.

⁵² Nock, M. K., & Banaji, M. R. (2007). Assessment of self-injurious thoughts using a behavior test. *American Journal of Psychiatry, 164*, 820-832.

⁵³ Inagaki, M., Kawashima, C., et al. (2015). Interventions to prevent repeat suicidal behavior in patients admitted to an emergency department for a suicide attempt: A meta-analysis. *Journal of Affective Disorders, 175*, 66-78.

Strengths

Those limitations notwithstanding, it is important to consider the strengths of this analysis. First, this analysis employed three types of data—demographic, clinical, and suicide mortality review data. The analysis also used multivariable statistical modeling in addition to expert clinical mortality review of individual cases of suicide. Therefore, this analysis combined multiple approaches with multiple types of data with different strengths and limitations, which is referred to as a form of triangulation research. This approach enhances the validity of conclusions that result from the convergence of findings from different research methods, approaches, and data.

Second, this analysis considered a wide range of factors that have been shown to be correlated with suicide, including gender, race, primary diagnostic category, level of housing stability, income, health insurance coverage, urbanicity, age, and suicide risk.

Conclusion: The Critical Importance of Assessment and Treatment Planning

DBHDD's age-adjusted mortality rate of 17.0 suicides per 100,000 for FY 2017 does not differ significantly from Georgia's calendar year 2017 age-adjusted suicide mortality rate of 13.6 suicides per 100,000 individuals. Logistic regression models indicated the importance of recent suicide history (≤ 30 days), especially within the past 24 hours, a critical period when considering suicide mortality risk. This analysis did not find statistically significant associations between other commonly-referenced risk factors and suicide. As noted earlier: variability in the findings of statistical risk factor analyses between this study and extant research was not surprising—even anticipated.

One may be left questioning, then, how to reconcile these disparate findings that this report's findings align with some key suicide risk factors and not others. A key contribution of this analysis, then, comes from considering the overlap between this report's risk factor statistical analyses using demographic and clinical data and deficient practices identified during mortality reviews of suicides adds critical value to this analysis.

Specifically, logistic regression analyses indicated the importance of assessment for recent (≤ 30 days) and current (< 24 hours) suicide history. Moreover, assessment and treatment planning deficiencies were the most prominent factors identified by the CMRC when reviewing suicide mortality. By considering the overlap of the statistical risk factor analyses and suicide mortality review, this analysis provides convergent validity from two types of data that one of the most important factors associated with DBHDD reported suicides in FY 2017 was deficient practices in suicide risk assessment and treatment planning.

Appendix A: Transformation of Variables

Variable Category	Sub-Categories Used for Analysis	Comprises the Following Responses
Gender	Male	Male
	Female	Female
	Other	Transgender male to female; Transgender female to male; Other/unknown
Race	Black	Black; African American
	White	White; Caucasian
	Other	American Indian/Alaskan Native; Native Hawaiian/other Pacific Islander; Asian; Multiracial; Other single race; Unknown/refused
Primary diagnostic category	Bipolar	Bipolar and related disorders
	Psychotic	Schizophrenia spectrum and other psychotic disorders
	Substance use disorder (SUD)/other	Alcohol-related disorders; Opioid-related disorders; Trauma- and stressor-related disorders; Attention-deficit/hyperactivity disorder; Disruptive, impulse-control, and conduct disorders; Other mental disorders; Intellectual disabilities; Stimulant-related disorders; Cannabis-related disorders; Combined other substance disorders; Combined other substance disorders; Informational; Autism spectrum disorder; Sedative-, hypnotic-, or anxiolytic-related disorders; Hallucinogen-related disorders; Substance-related disorders; Somatic symptom and related disorders; Personality disorders; Antisocial personality disorder; Gender dysphoria; Paraphilic disorders; Dissociative disorders; Inhalant-related disorders; Sleep-wake disorders; Other neurodevelopmental disorders; Intellectual disabilities, neurodevelopmental disorder – other; Feeding and eating disorders – other; Feeding and eating disorders – binge eating; Feeding and eating disorders – anorexia & bulimia; Elimination disorders
	Depressive	Depressive disorders
	Mood/anxiety	Mood disorder due to medical condition; Obsessive-compulsive and related disorder due to another medical condition
Housing stability	Difficulty	Homeless; At imminent risk of losing housing; At risk of homelessness
	No difficulty	Stably housed
	Unknown	Unknown