Epi-Aid # 2017-019: Undetermined Risk Factors for Suicide among Youth Aged 10-17 years – Utah, 2017

Final Report

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Contents

Acronyms and Abbreviations

CDC	Centers for Disease Control and Prevention
CDC WONDER	CDC's Wide-ranging Online Data for Epidemiologic Research
DVP	Division of Violence Prevention
EISO	Epidemic Intelligence Service Officer
ED	Emergency Department
ICD-9	International Classification of Disease, Ninth Revision
ICD-10	International Classification of Disease, Tenth Revision
NCIPC	National Center for Injury Prevention and Control
NVDRS	National Violent Death Reporting System
PNA	Prevention Needs Assessment
QPR	Question, Persuade and Refer
SHARP	Student Health and Risk Prevention
UDOH	Utah Department of Health
U.S.	United States
UTVDRS	Utah Violent Death Reporting System

Executive Summary

Background

An invitation letter for an Epidemiologic Assistance (Epi-Aid) in Utah was received by the Division of Violence Prevention (DVP), National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC) on January 19th, 2017. According to the Utah Department of Health (UDOH), the state identified an increased rate of suicide among youth aged 10-17 years from 2011 to 2013 and this increase continued to 2015, which was the most complete recent data at the time. In addition, suicidal ideation among youth in this age group from the Utah's Prevention Needs Assessment (PNA) was reported to have significantly increased from 14.1% in 2013 to 16.6% in 2015. The UDOH requested that the CDC conduct an Epi-Aid with the following objectives:

1. Characterize the epidemiology of and trends in fatal and non-fatal suicidal behaviors among youth aged 10-17 years occurring from 2011 through 2015 in Utah.

2. Identify risk and protective factors for fatal and non-fatal suicidal behaviors among Utah youth aged 10-17 years.

3. Map the three most utilized suicide prevention initiatives in Utah (QPR, Hope Squad and Hope for Tomorrow) by school district and compare components of these programs to evidence-based suicide prevention initiatives and national recommendations for suicide prevention.

Datasets Used

The following datasets were used to address the objectives of the investigation:

1. CDC's Wide-ranging Online Data for Epidemiologic Research (CDC WONDER)

2. Utah Violent Death Reporting System (UTVDRS)

3. Additional data abstracted in the field - from medical examiner, law enforcement, autopsy, and toxicology reports, as well as obituary and online news articles

4. Emergency Department Visit Data

5. Inpatient Hospitalization Data

6. Utah Prevention Needs Assessment (PNA)

7. Documentation, such as training manuals, protocol and procedure for program implementation, and sample training presentations, for Question, Persuade and Refer (QPR), Hope Squad, and Hope for Tomorrow

Key Findings by Dataset

CDC WONDER

- From 2011-2015, 150 Utah youth aged 10-17 years died by suicide, and 77.4% of decedents were male.
- The combined crude suicide rate among Utah youth aged 10-17 years during 2011-2015 was 7.9 per 100,000 whereas the rate among United States (U.S.) youth of the same age and time period was 3.8 per 100,000.
- The crude annual suicide rate among Utah youth aged 10-17 years increased at a faster rate (22.8% per year) than the crude annual suicide rate among U.S. youth aged 10-17 years (6.0% per year) during 2011-2015.
- Overall, the crude annual suicide rate among Utah youth aged 10-17 years increased by 136.0%, whereas the rate increased by 23.5% among U.S. youth during 2011-2015.

UTVDRS

- During 2011-2015, among Utah youth aged 10-17 years who died by suicide, suffocation and firearms were the most common mechanism of suicide.
- Among Utah youth aged 10-17 who died by suicide during 2011-2015 with circumstances data, precipitating circumstances included:
  - ✓ Approximately 35.2% of decedents with mental health information had a diagnosed mental health problem, and 31.0% were in a depressed mood at the time of death.
  - ✓ Approximately 29.6% of decedents had a history of suicidal ideation or suicide attempt.
  - ✓ More than half of decedents (55.3%) had experienced a recent crisis[a] before dying by suicide.
  - ✓ Approximately 23.9% of decedents disclosed their intent to die by suicide within the last month.
  - ✓ Approximately 47.2% of decedents left a suicide note.
  - ✓ Among decedents tested, 19.8% had one or more of the following substances in their system at the

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[a] Current event (within 2 weeks of death) that is indicated to have contributed to the death.

time of death: alcohol, cocaine, amphetamine, marijuana, and opiate.
- ✓ Approximately 68.3% of decedents had experienced two or more precipitating circumstance prior to dying by suicide.

Additional Data Abstracted in the Field

Of Utah youth aged 10-17 years who died by suicide during 2011-2015:

- Approximately 40.4% of decedents with information were identified as being religious, with the majority affiliated with the Church of Jesus Christ of Latter-day Saints.
- Approximately 12.6% of decedents with information had family conflicts that were the result of or that resulted in technology use restriction.
- Approximately 47.3% had ever disclosed their intent to die by suicide.
- Approximately 20.5% had a history of intentional self-harm in the form of cutting or had evidence of recent cutting.

Emergency Department Visits and Inpatient Discharge Data

- There were a total of 3,005 ED visits and 690 inpatient hospitalizations for self-inflicted injury among youth aged 10-17 years during 2011-2014[a].
- The crude rate for self-inflicted injury among Utah ED visitors aged 10-17 increased from 135.1 per 100,000 in 2011 to 258.9 per 100,000 in 2014 (annual percentage change (APC) of 25.3%, p<0.001).
- The crude rate of inpatient hospitalizations for self-inflicted injuries among Utah youth aged 10-17 increased from 28.8 per 100,000 in 2011 to 56.4 per 100,000 in 2011 (APC= 20.6, p=0.100)
- The majority of ED visits for self-inflicted injuries among Utah youth aged 10-17 occurred among females (72.5%), those aged 15-17 (66.8%), and white non-Hispanics (69.2%).
- Youth aged 10-17 years who were hospitalized for self-inflicted injury were predominantly female (71.5%), aged

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[a]Data from 2015 were available but due to the transition from ICD-9 to ICD-10 on October 1, 2015 and the challenges in identifying ICD-10 cases using the STIPDA standards, the 2015 data were excluded from the self-inflicted injuries analyses.

15-17 year age group (71.3%), and white, non-Hispanic (77.3%).

- Poisoning was the leading method of self-inflicted injury for ED visits among youth aged 10-17 years (71.0%), followed by cut/pierce (23.0%).
- The primary method of injury for nearly all inpatient hospitalizations related to self-inflicted injury among youth aged 10-17 was poisoning (94%), with small proportions by cutting/piercing (2%), suffocation (2%) or an unspecified method.
  - ✓ Poisoning most often involved salicylates, aromatic analgesics, propionic acid derivatives, and other antidepressants.
- Suicidal ideation (regardless of presence of self-inflicted injury) was present in 8,745 youth aged 10-17 years visiting the ED and 6,548 youth who were seen in the hospital during 2011-2015.
- The crude rate for suicidal ideation in Utah youth aged 10-17 who visited the ED increased from 272.7 per 100,000 in 2011 to 634.6 per 100,000 in 2015 (APC=22.0%, p<0.001).
- The crude rate for suicidal ideation in youth aged 10-17 in Utah who were hospitalized increased from 207.2 per 100,000 in 2011 to 535.4 per 100,000 in 2015 (APC=22.6%, p<0.001).
- Among ED patients aged 10-17 years in Utah with both suicidal ideation and self-inflicted injuries, 26.6% were discharged or transferred to a psychiatric facility.
- Among youth aged 10-17 in Utah who were hospitalized for self-inflicted injuries with suicidal ideation, 35.9% were transferred to a psychiatric facility.

Utah Prevention Needs Assessment

Of Utah youth aged 10-17 years who were enrolled in school and completed the Utah Prevention Needs Assessment[a] Survey in 2015:
- Approximately 19.0% considered or planned suicide in the past year and 8.6% attempted suicide.

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[a] A biannual, school based, cross-sectional behavioral risk survey conducted as part of the Utah's Student Health and Risk Prevention (SHARP) statewide survey.

- Protective factors for suicidal ideation and/or suicide attempt included: prosocial behaviors, positive community environment, positive school environment, positive peer environment, positive family environment, and having clear family rules
- Risk factors for suicidal ideation and/or suicide attempts included: mental health problems, substance use, low commitment to school, academic failure, experiencing violence or bullying in school, and involvement in anti-social behaviors.

Programmatic Documentations

Content analyses was performed for three youth suicide prevention programs - QPR, Hope Squad and Hope for Tomorrow.

- None of the three programs have been rigorously evaluated for effects on suicidal behavior, although findings from less rigorous evaluation show some preliminary positive results.
- Only QPR program which stands for Question, Persuade and Refer is included in the Suicide Prevention Resource Center (SPRC) Programs and Practice database and the National Registry of Evidence-based Programs and Practice (NREPP) database.
- QPR program was found to be promising in improving knowledge about suicide, gatekeeper self-efficacy, gatekeeper skills, and knowledge of suicide.
- A pre- and post-test of Hope Squad trainees found members to be active in providing help and support to fellow peers in their schools.
- Hope for Tomorrow program was found to help increase knowledge about and recognition of signs and symptoms of mental illness.

Recommendations

- Increase access to evidence-based mental health care for youth.

- Strengthen family relationships.

- Promote connectedness at the individual, interpersonal, organizational and community levels

- Identify and support youth at risk of suicidal behavior.

- Prevent other forms of violence in this population.

- Reduce access to lethal means among youth at risk for suicide.

- Teach coping and problem-solving skills.

- Consider implementing comprehensive and coordinated suicide prevention programs that address multiple risk and protective factors simultaneously, including primary prevention strategies that focus on upstream approaches to suicide prevention. Programs, practices, and policies addressing these factors should be based on the best available evidence in reducing suicidal behaviors or risk and protective factors for suicide.

- Conduct ongoing comprehensive evaluation of suicide prevention programs.

Background

Introduction

The age-adjusted suicide rate among Utahans has consistently been higher than the United States (U.S.) rate during the past decade.[1] For example, whereas the age-adjusted suicide rates for Utah in 2006 and 2015 were 16.0 and 22.4 per 100,000, respectively, the corresponding rates for U.S. were 11.0 and 13.3 per 100,000, respectively. Similarly, the age-specific suicide rate among Utah youth aged 10-17 had been higher than the rate for youth aged 10-17 nationwide.[1]

During 2013, as part of ongoing violent death surveillance, the UDOH observed an increase in the crude suicide rate among Utah youth aged 10-17 years in comparison to 2011 crude suicide rates. UDOH continued to monitor suicide among youth, while they worked to bring awareness to youth suicide across the state and to institute prevention programs to address the issue. Some of the UDOH specific activities around this issue included: data sharing with key suicide prevention stakeholders, including Suicide Prevention Coalition; presenting the data at local conferences and summits; developing and disseminating fact sheets on youth suicide; working with local health departments to increase their capacity in the area of suicide prevention, particularly around QPR training, and reducing access to lethal means among those at risk for suicide; and working with media on safe messaging and reporting of suicide based on established guidelines for reporting. As a result of the surveillance, the sharing of information with partners, and the attention brought to this problem, the Utah State Legislature established Suicide Prevention Coordinators in the State Office of Education and the Division of Substance Abuse and Mental Health and required parent seminars on youth protections to include suicide prevention presentations for parents. UDOH also established an evaluation team for this legislation. In addition, legislation was passed in 2014 to develop a firearm safety program as part of the State's suicide prevention strategy.[2] As a result, UDOH developed a firearm safety brochure and disseminated gunlocks to Utah residents who filed application for concealed firearm permit. Not only did UDOH take initiatives to bring awareness and implement

prevention strategies, schools and other suicide prevention stakeholders also acted in a similar fashion. Several schools implemented school-based suicide prevention programs. School districts in Utah received funding from the State Board of Education to implement suicide prevention programs in secondary schools. In addition, some organizations across the state implemented a number of suicide prevention programs aimed at preventing suicidal behaviors in their respective communities.

Despite these efforts, as of 2015, the suicide rate among Utah youth aged 10-17 years had not seen a decline from the rate in 2011. In addition, the results from Utah's Prevention Needs Assessment survey, a statewide representative survey of high school students, reported a significant increase in suicidal ideation among high school students from 14.1% in 2013 to 16.6% in 2015.[3] With no sign of rate decline, the UDOH requested CDC's assistance in January 2017 to investigate the factors contributing to the rate increase and to help characterize the epidemiology of suicides and non-fatal suicidal behaviors among Utah youth aged 10-17 years, so as to provide actionable public health recommendations to inform prevention strategies.

Three objectives were developed for the Epi-Aid:

1. Characterize the epidemiology of and trends in fatal and non-fatal suicidal behaviors among youth aged 10-17 years that occurred during 2011 through 2015 in Utah.

2. Identify risk and protective factors for fatal and non-fatal suicidal behaviors among Utah youth aged 10-17 years.

3. Map the three most utilized suicide prevention initiatives in Utah (QPR, Hope Squad and Hope for Tomorrow) by school district and compare components of these programs to evidence-based suicide prevention initiatives and national recommendations for suicide prevention.

Timeline of Activities

January 19, 2017: DVP received a formal request for an Epi-Aid to investigate undetermined risk factors for suicide among Utah youth aged 10-17 years, 2011-2015.

March 4-18, 2017: Field portion of investigation and analyses of existing datasets.

March 17, 2017: Presentation of preliminary findings to UDOH and suicide prevention stakeholders.

April-August, 2017: Final analyses and report writing.

November, 2017: Final report completed and submitted to UDOH.

About Utah

Utah is a home to 2,995,919 residents as of July 1, 2015.[4] The State has the 9th highest urban population in the country with 90.6% of the population concentrated in urban areas.[5] The vast majority of the population in the state is non-Hispanic white (79.0%).[6] Utah's population is relatively younger than the U.S. population; in 2015, approximately 30.8% of the state population was aged 18 and younger compared to 25% of the U.S. population.[7-8]

There are 29 counties in Utah, but over 75% of the state's population reside in the four counties along the Wasatch Front: Salt Lake, Utah, Davis and Weber.[5] The 29 counties have been organized into 13 local health districts: Beaver River, Central Utah, Davis County, Salt Lake County, San Juan County, Southeast Utah, Southwest Utah, Summit County, Tooele County, TriCounty, Utah County, Wasatch County and Weber-Morgan. Local health departments provide essential health services to their constituents. Figure 1 displays the 13 health districts in Utah, counties that form each health district and their geographic locations.

Epi-Aid Investigation Background

Epi-Aid investigations are rapid, short-term investigations of an urgent public health problem.[9] An Epi-Aid is initiated when a public health authority, such as a health department or a ministry of health, makes a formal request to the CDC for epidemiologic assistance. Epi-Aid investigations can focus on a variety of public health topical areas, such as communicable and non-communicable health problems, unexplained illnesses, as well as natural and manmade disasters. The goal of an Epi-Aid is to provide specific and actionable public health recommendations to the requesting authority that can be used to prevent and control the public health problem. An Epi-Aid is not a research study, rather a rapid investigation of an urgent public health problem that uses field epidemiology techniques and approaches. As part of the Epi-Aid mechanism, at least one Epidemic Intelligence Service (EIS) Officer, along with subject matter experts from CDC, provide technical assistance and support to requesting partners to engage in the rapid investigation.[9] The assistance and support include a field portion of the investigation, which is used to collect data needed to address the objectives of the investigation. Several Epi-Aids investigating undetermined risk factors for youth suicide have been conducted throughout the U.S in the past.[3, 10-12] The investigative approaches, strategies and the methods adopted for each of these Epi-Aids was different and unique, mostly informed by the objectives of the Epi-Aid, local context, and the availability of epidemiologic data.

Methods

The investigation consisted of the analyses of existing data and collection and analyses of additional data.

Suicide - data sources and description

CDC WONDER

Background: The CDC WONDER is a web application that gathers and manages public health data from nearly 20 sources in the U.S. and makes them available as an online database to provide public access to queries, charts, and maps. The system was used to examine the demographic characteristics of and trends in suicide among Utah youth and U.S. youth aged 10-17 years that occurred during 2011-2015.[1]

Data Analyses: The crude suicide rates and their 95% confidence intervals (CI) for Utah youth and U.S. youth aged 10-17 years during 2011-2015 were compared. The crude suicide rate for the combined 2011-2015 data as well as the year-specific rates were examined when there was large enough sample. CDC WONDER does not estimate rates for observations less than 20 because they are deemed unreliable. For this report, the rate was estimated if the count was 10 or more (unless otherwise noted). However, the rate was only reported if the relative standard error (RSE) was less than 30. The RSE (which is equal to the standard error of a survey estimate divided by the survey estimate and then multiplied by 100) provides an indicator of the stability of each predicted rate. Joinpoint regression was used to test the significance of overall trends in crude suicide rate for Utah youth and youth nationwide aged 10-17 years by sex during 2011-2015, and to estimate the annual percentage change (APC) during 2011-2015. Joinpoint statistical software[13] was used to perform the joinpoint analyses. The software uses trend data and fits the simplest joinpoint model that the data will allow.[14] A limitation of the CDC WONDER data was that since the month of death was not available, an epidemic curve could not be constructed using this data.

Background: UTVDRS is an active surveillance system that collects information about all cases of violent deaths in Utah. It is part of the National Violent Death Reporting System (NVDRS) and uses the NVDRS protocol.[15] Detailed methodology of the NVDRS is reported elsewhere.[16] The UDOH implemented the UTVDRS in 2009. The system is funded by CDC through a five-year cooperative agreement with Utah. Like the NVDRS, the main objective of the UTVDRS is to assist in the prevention of violent deaths through the provision of systematically and routinely collected, accurate, timely, and comprehensive data in Utah. The information collected included demographics, manner of death, ICD-10 codes, methods and place of injury, victims' life stressors, suspect-victim relationship (for homicides or homicide-suicides), the presence of intimate partner violence, toxicology results, weapon used, and other crimes related to the incident.[16] The system collects surveillance data about the following types of deaths: suicide (excluding legally assisted suicides), homicide, legal intervention (excluding executions), unintentional firearm deaths, deaths due to terrorism (excluding deaths due to act of war), and deaths of undetermined intent. The UTVDRS receives data from the death certificates, coroners/medical examiners reports, and law enforcement reports. Data from reports received from law enforcement and coroners/medical examiners are abstracted into variables and are also summarized as brief narratives within the UTVDRS. During the investigation, the data from UTVDRS were linked to the additional data abstracted while in the field to describe the epidemiologic trends, characteristics of decedents, and precipitating circumstances for fatal suicidal behaviors.

Data Analyses: Descriptive analyses were conducted to examine the precipitating circumstances and toxicology results for Utah youth aged 10-17 years who died by suicide during 2011-2015. Where there was large enough sample size, analyses was stratified by sex, race/ethnicity, and age. Three limitations to UTVDRS data need to be noted: (1) information about mental health diagnosis and other precipitating circumstances came from medical examiner reports and decedent family but not from medical records, which may have implications for over or underestimating the true prevalence of these circumstance information; (2) there were no information on

protective factors from the UTVDRS due to the nature of the source documents that tend to focus on risk factors associated with death; and (3) death certificate may under count suicide, therefore suicide rate may have been underestimated in this study.[17]

Additional data collected in the field

Epidemic Intelligence Service Officers Drs. Francis Annor, Amanda Wilkinson, and Marissa Zwald traveled to Utah to collect additional data from law enforcement reports, medical examiner's reports, autopsy and toxicology reports, as well as obituary and online news articles on suicides in Utah youth aged 10-17 years that occurred during January 2011 and December 2015.

The purpose was to gather information on factors related to fatal suicidal behaviors but that are not routinely collected by the UTVDRS, or if they existed in the UTVDRS, to gather additional information that were important for addressing some portions of the objectives of this investigation. Data collected centered on sexual orientation, religiosity/religious affiliation, family conflict that was the result of or that resulted in technology restriction, ever disclosing intent to die by suicide, and cutting behaviors. The reasons for gathering additional information on these specific variables are described below.

Sexual orientation: UDOH requested that additional data be gathered on sexual orientation given stakeholders' concerns and interest in relation to suicide among Utah youth aged 10-17. Previous studies have also suggested that non-fatal suicidal behaviors, which are risk factors for suicide at the population level, are common among sexual minority youth compared to heterosexual youth.[18-21] Similarly, an Australian study found that depression, relationship problems, and other life stressors, which are common precipitating circumstances for suicide were more common in sexual minority suicide decedents than non-sexual minority decedents.[22] Given that UDOH was interested in this variable but information in the UTVDRS is sparse, additional data were collected.

Religiosity/religious affiliation: UDOH expressed interest in examining religiosity/religious affiliation among suicide decedents since religion is an important part of the lives of Utahans but this information is not collected by the UTVDRS. For example, about 53% of Utahans reported attending a religious service at least once a week and 58% endorsed that religion is very important to them.[23] This is compared to 36% of the U.S. population who reported attending a religious service at least once a week and 53% who endorsed that religion was very important to them.[24] Over half (55%) of individuals affiliated with a religion in Utah are affiliated with the Church of Jesus Christ of Latter-day Saints.[23] In addition, several studies have observed an association between religiosity/religious affiliation and suicidal behaviors or some risk factors for suicidal behaviors such as depression.[25-29] A previous study among Utah males for example found that higher levels of religiosity were inversely associated with suicide among this population.[29] Additional information was therefore gathered to examine religious affiliation among decedents. The majority of the data on religiosity/religious affiliation came from obituaries. A major limitation in the use of obituaries to classify decedents or family as being religious or belonging to a religious body need to be noted. The fact that an obituary was held in a religious institution does not necessarily mean that the decedent or family belonged to or was a part of that religious body. Another limitation to gathering religiosity information overall is that attending a church or being affiliated with a church does not necessarily make one a religious.

Family conflicts that were the result of or that resulted in technology use restriction: The collection of additional information on this topic was informed by the initial reading of some of the case narratives where some decedents had family conflicts either due to technology restriction or that resulted in technology restriction seven or fewer days before the suicide. Not knowing what that meant and how common it was, the team decided to gather additional data to examine this specific context for family conflict.

Ever disclosed intent to die by suicide: Although, this is a variable in the UTVDRS, the UTVDRS gathers data about intent disclosed within 30 days before suicide and does not collect information about the channel through which intent was communicated. The team wanted to gather additional information about the medium through

which the intent was communicated and to also assess how common intent disclosure was in this population regardless of when intent was disclosed. This information could potentially help guide future prevention efforts.

Cutting behaviors: This information was collected based on the literature as previous research has associated cutting and other non-fatal self-harm behaviors with lower well-being among adolescents.[30] As a result, the Epi-Aid team wanted to examine how common this issue was among Utah youth so as to inform prevention strategies.

Data Analyses: In all the suicide data (CDC WONDER, UTVDRS, and the additional data collected), suicide was defined using the International Classification of Diseases, 10th Revision (ICD-10) underlying cause of death codes X60-X84. Data abstracted were merged with the UTVDRS data and descriptive analyses were subsequently performed on the data. Two important limitations to this additional data need to be highlighted: (1) there may be some bias in gathering more information with cases that had associated news articles than those without and (2) obituaries, one of the source documents for the additional data had limited information on suicide risk factors.

Non-fatal suicidal behaviors – data sources and description

Emergency Department (ED) Visits and Inpatient Discharge Data

Background: All licensed hospitals in Utah have an emergency Department (ED) treat and release patient dataset and a hospital inpatient discharge dataset, which include up to nine diagnostic fields and information on demographics, date of admission, treatment, and disposition. All licensed hospitals in Utah submit information from these two datasets into the Public Health Indicator Based Information System (IBIS), a database maintained by the UDOH, which was used as part of this investigation. The ED and inpatient discharge data in IBIS had been de-duplicated so that no single individual appears in both datasets for the same visit. For example, the records for a case that went through ED for self-inflicted injury but was admitted and discharged two days later would

be moved from the ED dataset and appear only in the inpatient discharge dataset. Both ED and inpatient

discharge data were encounter based and do not represent unique individuals. For example, if one patient visits

the ED three times for self-inflicted injury in one year, that patient would appear in the dataset three times.

Self-inflicted injuries were identified using the ICD-9 external codes (E-codes) in the range 950-959.9 from the

principal diagnostic fields (the primary reason for the visit). Prior to performing data analyses on the self-

inflicted injury data, the Epi-Aid team processed the data to be consistent with injury case definition standards

developed by the State and Territorial Injury Program Directors Association (STIPDA) Injury Surveillance

Workgroup.[31] For the self-inflicted injuries, only data from 2011 to 2014 were included in this report. Data from

2015 were available but due to changes from ICD-9 to ICD-10 on October 1, 2015 and challenges in identifying

ICD-10 cases using the STIPDA standards, the 2015 data were excluded from this report. In both the ED and

inpatient discharge data suicidal ideation was identified using ICD-9 code V62.84 from any diagnostic field

(diagnostic field 1 through 9) for cases seen between January 1, 2011 to September 30, 2015 and ICD-10 code

R455.81 for cases seen between October 1, 2015 to December 31, 2015. The 2011-2014 data on individuals with

self-inflicted injuries were combined with the 2011-2014 data on individuals with suicidal ideation and were

grouped into three mutually exclusive categories – suicidal ideation without self-inflicted injuries, self-inflicted

injuries without suicidal ideation, and suicidal ideation with self-inflicted injuries. This was done separately for

ED and inpatient discharge datasets.

Data Analyses: Descriptive analyses were performed separately on 2011-2014 self-inflicted injury data and

2011-2015 suicidal ideation data separately for ED and inpatient discharge datasets. The combined 2011-2014

ED data for self-inflicted injury and suicidal ideation were also analyzed to examine the factors associated with

ED discharge/transfer to a psychiatric facility among Utah youth aged 10-17 years. ArcGIS,[32] a geographic

information system software, was used to map the distribution of ED visits and inpatient discharge related to

self-inflicted injury cases and suicidal ideation across local public health districts. Joinpoint analysis was also

performed to test the significance of trends and to calculate the annual percentage change (APC) during 2011-

2014 for self-inflicted injuries and 2011-2015 for suicidal ideation. The analyses of the ED and inpatient discharge data also compared the characteristics of youth who visited the ED and those who were hospitalized due to self-inflicted injuries, suicidal ideation or both. Binary and multivariate logistic regression analyses were also performed to examine factors associated with discharge of ED visitors with self-inflicted injuries or suicidal ideation or both to a psychiatric facility. Some limitations to the ED and inpatient discharged data need to be noted. First, given that not all self-inflicted injuries or suicidal ideation may have been seen in the ED or inpatient hospitalizations, the rate in this report may have been underestimated. Second, provider training and experience and patient history may have influenced detection and diagnosis of suicidal ideation, therefore, differential reporting of suicidal ideation may have occurred across providers. Third, mental health treatment could not be definitely determined, as it was only possible to examine whether a visit was transferred directly to a psychiatric facility or not. Hospitals that had mental health facilities on site or patients who were discharged home for a later mental health treatment appointment were not taken into account during data analyses.

Prevention Needs Assessment (PNA)

Background: The Utah PNA survey is a biannual, cross-sectional behavioral risk survey that is conducted as part of Utah's Student Health and Risk Prevention (SHARP) statewide survey. The PNA survey collects self-reported data from students in grades 6, 8, 10, and 12 on various issues, such as mental health, suicidal behaviors, health behaviors and conditions, family life, academic perceptions, substance use, and other behavioral issues. I this investigation, the following group of variables were examined as being risk or protective factors along with demographic variables; school-related factors, drugs and substance use, anti-social behaviors, family relationship factors, mental health (psychological distress and depressive symptoms), and different social environments. [10, 33-37 33 38-39]

The survey is anonymous, and students are informed that the answers they provide will not be connected back to them. In order to participate in the survey, students had to return signed, parental consent forms. The survey

is stratified by school district and weighted to adjust for differential response rates by grade, sex, and school district.[40] Data from the most recent Utah PNA survey (2015) were used to identify risk and protective factors associated with self-reported suicidal ideation and suicide attempts among Utah youth aged 10-17 years.

For the 2015 PNA survey, there were 48,975 participants out of 75,652 students sampled (participation rate of 64.7%).[40] For this analysis, 8th through 12th grade students between the ages of 10 and 17 years who completed the survey were considered eligible (N=29,089). Participants missing data on suicidal behaviors were excluded from analyses, yielding a final analytic sample of 27,329 participants. Figure 2 depicts the number of students that were excluded by each criteria applied.

Measures used in the Prevention Needs Assessment (PNA)

Suicidal behaviors

Suicidal behaviors included suicidal ideation and suicide attempts. Suicidal ideation was a combined measure of seriously considering suicide and planning for it in the previous year. Participants were asked "During the past 12 months, did you ever seriously consider attempting suicide?" Response options were "no" and "yes." Participants were also asked "During the past 12 months, did you make a plan about how you would attempt suicide?" Response options were "no" and "yes." If participants responded yes to either of these items, suicidal ideation was categorized as yes. Suicide attempt was measured by asking participants "During the past 12 months, how many times did you actually attempt suicide?" Response options were "0 times," "1 time," "2 to 3 times," "4 to 5 times," or "6 or more times." Responses were dichotomized to no (0 times) and yes (1 or more times).

Demographic Characteristics

The following demographic characteristics were assessed: sex, age group, grade level, race, religious attendance and preference, and parent education level. Religious attendance was dichotomized into religious and less religious, using the modified scale by Koenig and colleagues.[26, 41] See Appendix 1 for the list of PNA questions used in this investigation.

Mental health (psychological distress and depressive symptoms)

Depressive Symptoms were assessed using three items measuring perceived low self-esteem, perceived failure, and depressed or sad on most days. All items were scored on a scale of 1 to 4 (NO!, no, yes, YES!). Responses were dichotomized to no and yes. Perceived low self-esteem was assessed using a statement of "At times, I think I am no good at all." Perceived failure was assessed using a statement of "All in all, I am inclined to think that I am a failure." Depressed or sad on most days was assessed using a question of "In the past year, have you felt depressed or sad MOST days, even if you felt OK sometimes?"

Psychological Distress was estimated using the K6 Scale that was developed with support from the National Center for Health Statistics for use in the National Health Interview Survey.[42] The tool screens for psychological distress by asking students: "During the past 30 days, how often did you: (a) feel nervous, (b) feel hopeless, (c) feel restless or fidgety, (d) feel so depressed that nothing could cheer you up, (e) feel that everything was an effort, (f) feel worthless?" Answers to each were scored based on the following responses: None of the time (0 points), A little of the time (1 point), Some of the time (2 points), Most of the time (3 points), and All of the time (4 points). The psychological distress variable was created by generating a composite score from the six items above. Students with a total score of 13 or more points were determined to have high psychological distress; students with a score of 7-12 points were considered to have moderate psychological distress; and students with a score of 0-6 points were considered to have no psychological distress.[43]

Substance use

Substance use in lifetime and the previous 30 days were assessed. Some of the questions assessing lifetime substance use were "How old were you when you first used marijuana (grass, pot) or hashish (hash, hash oil)?" and "How old were you when you first had more than a sip or two of beer, wine, or hard liquor (for example, vodka, whiskey, or gin)?" with response options "never," "10 or younger," "11," "12," "13," "14," "15," "16," and "17 or older." Some of the questions for substance use in the past 30 days included "On how many occasions (if any) have you used marijuana (grass, pot) or hashish (hash, hash oil) during the past 30 days?" and "On how many occasions (if any) have you had beer, wine, or hard liquor to drink during the past 30 days?" Response options were "0 occasions," "1-2 occasions," "3-5 occasions," "6-9 occasions," "10-19 occasions," "20-39 occasions," and "40+ occasions" (Appendix 1).

Tobacco use (cigarette, electronic cigarette, and chewing tobacco) in lifetime and previous 30 days were also assessed. Lifetime cigarette use was assessed by asking "Have you ever tried cigarettes, even just one puff?" with the response options being "no" and "yes." Cigarette use in the previous 30 days was also assessed by asking "During the past 30 days, on how many days did you smoke cigarettes?" Response options were "0 days," "1 or 2 days," "3 to 5 days," "6 to 9 days," "10 to 19 days," "20 to 29 days," and "all 30 days."

For ever substance or tobacco use, students were categorized into two – those who answered 'never' as one category vs. those who reported age at first use as 'ever'. Similarly, for substance or tobacco use in the past 30 days, students were categorized into 'none' (those reporting 0 occasions for substance use and 0 days for tobacco use)' vs at least one (those who reported using substance/tobacco one or more times during the past 30 days).

School-related factors

School Protective Factors*:* Ten items were used to assess opportunities and rewards for prosocial involvement in school. Three items were also used to assess extracurricular involvement in the previous year, including involvement in clubs, doing extra work for school, and volunteer service (Appendix 1). Some of the questions

used to assess opportunities and rewards for prosocial involvement included "In my school, students have lots of chances to help decide things like class activities and rules" and "There are lots of chances for students in my school to get involved in sports, clubs, and other school activities outside of class." Response options were scaled on a score from 1 to 4 (NO!, no, yes, YES!). One of the questions used to assess extracurricular activities was "How many times in the past year (12 months) have you participated in clubs, organizations, or activities at school?" Response options were "Never," "1-2 times," "3-5 times," "6-9 times," "10-19 times," "20-29 times," "30-39 times." and "40+ occasions."

School Risk Factors: Eight items were used to assess low commitment to school and academic failure, which included factors such as liking school, spending time on homework, perceiving the coursework as relevant, and grades in the previous year. Three items were used to assess school violence, including perceptions of safety at school, bullying on school property, and electronic bullying. Some of the questions used to assess low commitment to school and academic failure were "Now thinking back over the past year in school, how often did you enjoy being in school?" and "Now thinking back over the past year in school, how often did you try to do your best work in school?" with response options being "Never," "seldom," "sometimes," "often," and "almost always." One of the questions used to assess school violence and bullying was "During the past 12 months, how often have you been picked on or bullied by a student ON SCHOOL PROPERTY?" Response options were "0 times," "1 time," "2 or 3 times," "4 or 5 times," and "6 or more times."

Family-related factors

Family Protective Factors: Two items- eating family dinners together and clear family rules were used to assess family protective factors. These items were "My parents expect me to eat dinner at home with my family" and "My parents have set clear rules and expectations with me about NOT drinking ANY alcohol." Response options were scaled on a score from 1 to 4 (NO!, no, yes, YES!).

Family Risk Factors: Three items on family insults and arguments were used to assess family risk factor. These questions were "People in my family often insult or yell at each other," "We argue about the same things in my

family over and over," and "People in my family have serious arguments." Response options were scaled on a score from 1 to 4 (NO!, no, yes, YES!).

Social behaviors and environments

Involvement in Anti-social Behaviors: Lifetime and previous year involvement in anti-social behaviors were assessed. This included items such as school suspensions, arrests, carrying a handgun, attacking someone with the idea of seriously hurting them, belonging to a gang, selling illegal drugs, or stealing or trying to steal a motor vehicle (Appendix 1).

Prosocial Behaviors and Supportive Environments: These were assessed using composite scores developed and tested by staff at the UDOH, which included pro-social behaviors, community-level social environment, school social environment, peer environment, and family social environment.[44]

- Prosocial behaviors - a mean score was calculated from the following 3 items, which were on an 8-point Likert scale. Items asked included how many times in the past year: "Have you participated in clubs, organizations, or activities at school?"; "Have you done extra work on your own for school?"; and "Have you volunteered to do community service?" A higher mean score indicates stronger pro-social behaviors, with a possible range of 1-24.

- For positive community-level social environment - a mean score was calculated from the following 3 items, which were on a 4-point Likert scale. Statements included: "My neighbors notice when I am doing a good job and let me know about it"; "There are people in my neighborhood who are proud of me when I do something well"; and "There are people in my neighborhood who encourage me to do my best." A higher mean score indicates stronger community-level social environments, with a possible range of 1-12.

- For positive school social environment - a mean score was calculated from the following 5 items, which were on a 4-point Likert scale. Statements included: "In my school, students have lots of chances to help decide things like class activities and rules"; "There are lots of chances for students in my school to talk with a teacher one-on-one"; "My teachers notice when I am doing a good job and let me know about it"; "I have

lots of chances to be part of class discussions or activities"; and "Teachers ask me to work on special

classroom projects." A higher mean score indicates stronger school social environments, with a possible

range of 1-20.

- For supportive peer environment - a mean score was calculated from the following 5 items, which were on a

5-point Likert scale. Items asked in the past year, how many of your best friends have: "Participated in

school clubs"; "Made a commitment to stay drug-free"; "Tried to do well in school"; "Have liked school";

and "Regularly attended religious services." A higher mean score indicates stronger peer environments, with

a possible range of 1-25.

- For supportive family social environment - a mean score was calculated from the following 3 items, which

were on a 4-point Likert scale. Statements included: "My parents ask me what I think before most family

decisions affecting me are made"; "If I had a personal problem, I could ask my mom or dad for help"; and

"My parents give me lots of chances to do fun things with them." A higher mean score indicates stronger

family social environments, with a possible range of 1-12.

Data Analyses: Descriptive analyses were conducted to summarize the demographics, protective and risk factors

for non-fatal suicidal behavioral outcomes (suicide ideation and suicide attempt in the last 12 months). Bivariate

analyses were conducted for each demographic, protective, and risk factor by each suicidal behavioral outcome.

Multivariate logistic regression analyses that adjusted for socio-demographic variables were conducted to

examine the protective and risk behaviors and social environments (family, school, peer, and community)

associated with (1) suicidal ideation and (2) suicide attempts in the last 12 months. Odds ratios and 95%

confidence intervals were calculated. An odds ratio greater than one indicated that a variable was a risk factor

for the specific non-fatal suicidal behavior, and an odds ratio less than one indicated that a variable was a

protective factor. All statistical analyses were survey weighted and conducted using SAS (version 9.4),[45] and

SUDAAN (version 11.0.1).[46] An alpha level of 0.05 was used to determine statistical significance. ArcGIS[32] was

also used to visualize local public health district distribution of suicidal ideation and suicide attempts reported in

the 2015 Utah Prevention Needs Assessment. Some limitations of the PNA data include: (1) inability to make the determination whether the risk and protective factors assessed were precursors or consequences of non-fatal suicidal behaviors due to the cross-sectional nature of the data; (2) only to youth between 10 and 17 years who were attending public and charter schools in Utah were included in the analyses, therefore, data are not representative of all persons in this age group; (3) data are self-reported, therefore, may be subject to under- or over-reporting of non-fatal suicidal behaviors, including recall bias.

Suicide Prevention Program Documentations

One objective of the Epi-Aid was to examine components of some suicide prevention school-based programs being used in Utah relative to evidence-based suicide prevention initiatives and national recommendations for suicide prevention and to identify where these programs are being implemented. The three suicide prevention programs that were reviewed for this investigation were selected by the UDOH, and included QPR, Hope Squad, and Hope for Tomorrow. These programs were selected by the UDOH because they were the three most utilized suicide prevention programs in schools across the state. Documentation for each program was provided to the project team and content analyses were performed. Examples of program documentation reviewed included protocol and procedures for implementation, sample presentations for trainers, and materials for trainers. Data for mapping were only available for the Hope Squad program.

Other data analyses considerations

To ensure confidentiality, efforts were made to protect the identity of individuals. Data are presented in a way that will limit the possibility of identifying any individual or that will allow readers to infer the identity of individuals. We therefore did not report data when a cell size was less than 10 individuals. Per the *2005 CDC-ATSDR Data Release Guidelines and Procedures for Re-release of State-Provided Data,*[47] data were also not

presented even with a cell size larger than 10 when there were concerns that the detail being reported and

population/subgroup denominator size could allow the identity of some individuals to be known. Additionally,

names of individual school districts, schools, and cities were anonymized to ensure confidentiality within small

population communities. Public health districts were identified to provide practical recommendations to local

health departments within the state.

Results

Objective 1: *Characterize the epidemiology of and trends in fatal and non-fatal suicidal behaviors among youth aged 10-17 years that occurred during 2011 through to 2015 in Utah.*

Data Sources: CDC WONDER, UTVDRS, Data abstracted in the field, ED and inpatient discharge data.

CDC WONDER

CDC WONDER was used to calculate the crude suicide rate among Utah youth aged 10-17 years between 2011 and 2015 by year, gender, race, and urbanization and to compare with the corresponding suicide rates for U.S. youth in the same age category, during the same time period. The crude annual suicide rates per 100,000 comparing Utah and U.S. youth ages 10-17 during 2011-2015 are presented in Table 1. Between 2011 and 2015, the crude suicide rate among Utah youth aged 10-17 years was consistently higher and increased at a faster rate (APC was 22.8%, p<0.001) than the crude suicide rate among U.S. youth (APC = 6.0%, p<0.001). Between 2011 and 2015, the crude suicide rate among Utah youth aged 10-17 years was on average, 2 times higher than the crude suicide rate among U.S. youth, aged 10-17 years (Table 1). For example, whereas the crude suicide rate in Utah youth aged 10-17 was 4.7 (95% CI=2.7-7.5) per 100,000 during 2011, the rate in U.S. youth was 3.4 (95% CI=3.2-3.6) per 100,000, yielding a rate ratio of 1.4 (Table 1). At the end of 2015, the crude suicide rate among Utah youth aged 10-17 years had increased to 11.1 (95% CI=8.0-14.8) per 100,000 whereas the U.S. rate was at 4.2 (95% CI=4.0-4.4) per 100,000, yielding a rate ratio of 2.6 (Table 1). Between 2011 and 2015, the crude suicide rate among Utah youth aged 10-17 years increased by 136.0% whereas the crude rate among U.S. youth aged 10-17 years increased by 23.5%.

The trends in the crude suicide rate among Utah youth and youth nationwide aged 10-17 years were also examined using joinpoint regression analyses to test the significance of trends and to calculate the APC during 2011-2015. Overall, the crude suicide APC among Utah youth aged 10-17 years was 22.8% during 2011 through 2015, whereas the APC for youth nationwide was 6.0% during the same time (Figure 3). Each APC was

statistically significant at alpha level 0.05 (p<0.001). Among Utah youth aged 10-17 who died by suicide during 2011-2015, the crude APC was 22.5% for males whereas the APC was 23.9% in females (Figure 4).

Data from 2011 to 2015 were combined to allow for the calculation of a reliable crude suicide rate among Utah youth aged 10-17 years by gender, age categories, race, and urbanization and compared to the corresponding characteristics among U.S. youth of the same age group and during the same time period. As presented in Table 2, the crude suicide rate was higher for Utah youth compared to youth nationwide and stratified by sex, age, race and urbanization.

Among Utah youth who died by suicide during 2011-2015, the majority (75.4%, n=113) were aged 15-17 years and male (77.4%, n=116). Non-Hispanic white accounted for 81.3% of suicide decedents, whereas the remaining 18.7% (n=28) belonged to other race/ethnicity (Table 3). The two most common methods of suicide among Utah youth aged 10-17 who died by suicide during 2011-2015 were suffocation (46.0%, n=69) and firearm (45.3%, n=68) (Table 4). Suffocation included hanging, strangulation and deaths involving deprivation of oxygen due to inhalation of asphyxiant gases, such as helium, nitrogen, propane, argon, and butane. These findings are consistent with a previous study that found similar trends in the methods of suicide among youth aged 10-24 nationwide.[48] Suffocation was significantly more common in female decedents than in male decedents, whereas the use of a firearm was more common in male decedents than in female decedents (data not shown in a table).

UTVDRS

Between 2011 and 2015, there were 150 Utah residents aged 10-17 years who died by suicide; this number includes youth residents who died while out of state. The median age of suicide decedents was 15.3 years (standard deviation=1.6).

The majority of deaths by suicide among Utah youth aged 10-17 years during 2011-2015 occurred in the home[a] (83.7%, n=124). Dying by suicide in the home was significantly more common among male decedents than female decedents (not shown on table).

An epidemic curve was plotted to examine suicide incidence among Utah youth aged 10-17 years that occurred during 2011-2015, by the quarter of each year (Figure 5). Three peaks were observed during this period - quarter one of 2012, quarter one of 2013, and quarter four of 2014. Whereas the first and second peaks were sharp (persisted for only that quarter), the third peak was broad and persisted for an additional two quarters into quarters one and two of 2015.

Precipitating Circumstances

The precipitating circumstance information reflects specific variables that are reported or perceived in the investigative reports (medical examiner and law enforcement reports) to be related to the suicide. These circumstances include events that occurred or yet to occur (such as impending event e.g., a criminal trial) before the fatal injury. Both law enforcement and the medical examiner provided information of the various circumstances that might have precipitated the suicide. In some cases, there were no known precipitating circumstances documented. The investigation by the medical examiner and law enforcement depended on the information provided by family and friends of the decedent and circumstances included in these reports may not include all actual precipitating circumstances. The UTVDRS had information on several circumstances beyond what have been presented in this report. Those circumstances included in this report were selected because they had the most complete data that could be analyzed in a meaningful manner and those circumstances were also relevant to this population.

Table 5 provides a summary of selected precipitating circumstances for suicide among youth aged 10-17 years in Utah who died by suicide during 2011-2015. Eight decedents were missing information on circumstances

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[a] Homes included houses, apartments, rooming houses, as well as areas outside of homes such as driveways, porches, yards, and garages.

precipitating the suicide (except for information on recent crisis). Therefore, information on precipitating

circumstances were known for 95% (n=142) of suicide decedents.

Among suicide decedents with known circumstance information, 35.2% (n=50) had a diagnosis of a mental

health problem and 31.0% (n=44) were in a depressed mood (with 34 of those having no mental health

diagnosis) at the time of death (Table 5). Mental health problems included diagnoses such as major depression,

schizophrenia, and generalized anxiety disorder, as well as neurodevelopmental disorders (such as intellectual

disability, autism, attention-deficit /hyperactivity disorder), eating disorders, personality disorders, and organic

mental disorders.[3] Of those with diagnosed mental health problems, 84.0% (n=42) were noted to be receiving

mental health treatment at the time of death.

Among Utah youth aged 10-17 years who died by suicide during 2011-2017 and with known circumstance

information (n=142), 29.6% (n=42) had a history of suicidal ideation or suicide attempt (Table 5). Specifically,

18.3% (n=26) had a history of suicidal ideation and 16.2% (n=23) had a history of suicide attempt. Among

decedents with known circumstance information, 45 individuals (representing 31.7%) experienced family

relationship problems (e.g., argument with family), of which 31 had experienced this problem within two weeks

prior to death[a]. Similarly, 22 decedents (representing 15.7%) with information had dating partner[b] problems

(e.g., recent break-up with dating partner), of which 15 had occurred within the two weeks before the suicide[a].

More than half (55.3%, n=83) of decedents with information had experienced a recent crisis[c] before dying by

suicide (Table 5), which included but was not limited to family relationship problems, dating partner problems,

school problems (e.g., failing class, conduct problems at school), recent suicide of a friend or a family member,

and a criminal legal problems (e.g., recent arrest). Family relationship problems (n=31) and dating partner

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[a] Recent crisis.

[b] This variable is called intimate partner violence in the UTVDRS. But given the age of the decedents, this was referred to as dating partner problems in this report.

[c] Refers to a current or an acute event (within 2 weeks of death) that is indicated in one of the source documents to have contributed to the death. 15 Centers for Disease Control and Prevention. National Violent Death Reporting System (NVDRS) Coding Manual Revised: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention; 2015.

problems (n=15) were the most common recent crises in this population. Reasons for the recent crisis were not mutually exclusive; that is, a decedent may have experienced multiple crises before dying by suicide. For example, there were some decedents whose recent crises were related to both family relationship problems and dating partner problems. Other types of recent crises are not listed on Table 5 due to small counts. Among Utah youth aged 10-17 years who died by suicide during 2011-2015, 23.9% (n=34) disclosed their intent to die by suicide whereas 47.2% (n=67) left a suicide note. Overall, 68.3% (n=97) of decedents experienced two or more precipitating circumstances[a] before dying by suicide.

Examining the above precipitating circumstances by sex, age, or race was not feasible for the majority of circumstances due to small cell counts. For the few circumstances that had large enough sample, it was noted that among decedents with information, history of suicidal ideation or suicide attempt (combined) was more common in female decedents than in male decedents. In addition, among decedents with circumstance information, disclosing intent to die by suicide and leaving a suicide note were more common among female decedents than male decedents. Also, experiencing a recent crisis prior to suicide was more common in non-white decedents than in white non-Hispanic decedents. Finally, experiencing multiple circumstances prior to dying by suicide was more common in females than in male decedents (data not shown on table).

Alcohol and Other Substances Found in Decedents' System at Time of Death

Among Utah youth aged 10-17 who died by suicide during 2011-2015, 131 decedents were tested for the following five substances; alcohol, cocaine, amphetamine, marijuana and/or opiates. These five substances were selected by the Epi-Aid team because they were the substances that had the most complete information on

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[a] The following circumstances were used in estimating the proportion of decedents with multiple precipitating circumstances − Mental health diagnosis, current depressed mood, history of suicidal thoughts or plans, history of suicide ideation, recent crisis, recent disclosed suicidal thoughts or intent, left a suicide note, family relationship problems, dating partner problems, and left a suicide note.

testing status and test results. These substances were combined to increase the sample size for quantitative analyses. Among decedents tested, approximately one in five (19.8%, n=26) tested positive for one or more of those five substances (data not shown on a table).

Additional Data Abstracted in the Field

Again, the additional data abstracted while in Utah focused on the following: sexual orientation, religiosity/religious affiliation, family relationship problems that were the results of or that resulted in technology restriction, and cutting behaviors. Of the 150 youth suicide decedents, the Epi-Aid team was able to abstract additional information on 146.

Sexual Orientation

An attempt was made to identify sexual orientation of decedents using two criteria; sexual identity (if there was mention of the sexual identity of the decedents) or sexual behaviors (if there was mention of the sex of decedent's intimate partner) from any of the source documents reviewed. This information was missing for the majority of decedents (72.6%, n=106). For the 27.4% (n=40) of decedents with available information, 15% (n=6) were identified as gay or lesbian (sexual minority) youth. Due to the small count of sexual minority youth identified from the documents reviewed, the analyses could not be stratified by any demographic characteristics, precipitating circumstances, neither was further analyses performed to explore other characteristics of the sexual minority decedents in this investigation as that could potentially reveal decedents' identity.

Religiosity/religious affiliation

Data about religiosity/religious affiliation of Utah youth aged 10-17 years who died by suicide during 2011-2015 were gathered using two approaches:

(1) <u>Decedents' religiosity/religious affiliation</u> – Where documentation existed that decedent attended religious services, was part of a religious body or served in the church and;

(2) <u>Family's religiosity/religious affiliation</u>– If evidence existed that family belonged to a religious group, attended church, or conducted the decedent's funeral within a particular religious denomination or body.

Using the first approach, among decedents with information (N=146), 40.4% (n=59) were considered religious. Of those considered as being religious, 81.4% (n=48) were affiliated with the LDS church while the remaining (18.6%) were affiliated with other religious groups[a].

Using the second approach, more than half (57.5%, n=84) of decedents' families were identified as being religious. Of those identified as religious, 84.5% (n=71) were affiliated with the LDS church whereas the remaining 15.5% (n=13) were affiliated with other religious groups (Table 6).

Family relationship problems that were the result of or that resulted in technology restriction

Family relationship problems[b] in this report referred to situations in which a victim had relationship issues with a family member that appear to have contributed to the suicide.[15] As already mentioned elsewhere, the additional family relationship problems that were collected focused on family conflicts that were the result of or that resulted in technology use restriction. Of the 146 decedents for whom additional information was collected during the field portion of the investigation, 18 had family conflicts that were the result of or that resulted in a restriction in technology use a week prior to death (Table 6). These restrictions included, but were not limited to, devices such as phone, tablet, gaming system or laptop, being taken away by a parent or guardian, or devices that stopped working due to malfunction. It is important to note that this report is not inferring a causal relationship between conflicts as a result of technology restriction or conflicts that resulted in technology restriction (generally as a form of punishment) and suicide in this population; rather, to identify some of the

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[a] Other religious groups included Catholic, Protestants and other religion
[b] An example of a family relationship problem is when a decedent was despondent over his argument with his parents and dies by suicide.

circumstances that preceded death by suicide in this population. Given how broad this variable was, additional research is needed to understand the implications of this finding, including the extent to which this represents interruption to social support networks, distress over losing access to the electronic device, anger over being punished, or some other factors. Technology restriction could also be confounded with the reason for the punishment (such as poor grades).

Ever Disclosed Intent to Die by Suicide

This refers to a situation where the victim had disclosed to another person their thoughts and /or plans to commit suicide based on evidence from one of the following documents regardless of when the intent was disclosed; medical examiner's report, law enforcement report, autopsy and toxicology reports. The communication could be verbal, written or electronic.

Among Utah youth aged 10-17 years who died by suicide during 2011-2015, 47.3% (n=69) disclosed their intent to die by suicide at any point prior to dying by suicide. Of those who ever disclosed their intent, information was available for 64 decedents about who intent was disclosed to. Twenty-nine decedents disclosed intent to a classmate, boy/girlfriend, or ex-boy/girlfriend, whereas 47 disclosed intent to a parent/guardian (Table 6). Whom intent was disclosed to was not mutually exclusive, that is, a decedent may have disclosed intent to multiple individuals including parents, friends, boy/girlfriend, or ex-boy/girlfriends. Of the 69 who had ever disclosed their intent, information on the medium through which intent was communicated was available for 25 decedents. Of those 25 decedents, 18 did so through a text message and 11 through a telephone conversation or a posting on a social media website. The medium through which intent was communicated was not mutually exclusive.

Cutting and History of Cutting

Because previous literature has associated cutting and other non-fatal self-harm behaviors to lower well-being and suicidal behaviors among adolescents,[30] cutting and history of cutting behaviors among suicide decedents were also examined from the additional data collected in the field. Overall, 30 decedents, representing 20.5% of the 146 decedents for whom data abstraction was performed had a history of cutting or had been cutting near the time of death (Table 6). Recent cutting or history of cutting was significantly more common in decedents who had diagnosis of depression or were in a depressed mood at or near the time of death than those who did not have mental health diagnosis or in a depressed mood (data not shown on a table).

Emergency Department (ED) Visits and Inpatient Discharge Data

Self-inflicted Injury

There were 3,005 ED visits and 690 inpatient hospitalizations for self-inflicted injury among Utah youth aged 10-17 years during 2011–2014[a] (Table 7). An epi-curve was constructed to illustrate the distribution of counts of ED visits and inpatient hospitalizations for self-injurious behaviors over this period, by year and quarter (Figure 6). The counts of ED visits and inpatient hospitalizations for self-inflicted injurious behaviors have generally increased over time and both types of cases nearly doubled from quarter 1 of 2011 to quarter 1 of 2014. For the ED visits, the crude rate for self-inflicted injuries among both males and females increased from 135.1 per 100,000 in 2011 to 258.8 per 100,000 in 2014, corresponding to APC of 25.3% (p<0.001) (Figure 7). For inpatient hospitalizations, the crude rate increased from 28.8 per 100,000 in 2011 to 56.4 per 100,000 in 2014, also corresponding to APC of 20.6 (p=0.100) (Figure 8). Youth seen in the ED or those hospitalized with self-inflicted injury were predominantly female (ED=72.5% and inpatient hospitalizations=71.5%), aged 15-17 years

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[a] 2015 data was available for self-inflicted injuries but had to be excluded due to changes from ICD-9 to ICD-10 on October 1, 2015 and the challenges in identifying ICD-10 cases using the STIPDA standards.

(ED=66.8% and inpatient hospitalizations=71.3%), and white non-Hispanic (ED=69.2% and inpatient hospitalization=77.3%) (Table 8). While 18.0% of youth who visited the ED for self-inflicted injuries were discharged or transferred to a psychiatric facility, 44.4% of those who were hospitalized were discharged/transferred to a psychiatric facility.

The overall and sex-specific crude rates (per 100,000) of ED visits and inpatient hospitalizations are shown in Figures 8 and 9, respectively. Although the rates of both types of visits increased over time among both sexes, these increases were proportionally greater among females.

The method of self-inflicted injury was examined for both ED visit and inpatient hospitalization cases. As depicted by Figure 9, poisoning was the leading method of non-fatal self-inflicted injury for ED visits among youth aged 10-17 years (71.0%), followed by cut/pierce (23.0%). The method of injury for nearly all inpatient hospitalizations among youth aged 10-17 during 2011-2014 related to self-inflicted injury were by poisoning (94%), with small proportions being by cutting/piercing (2.0%), suffocation (2.0%) or an unspecified method. Poisoning was most often accomplished by the use of salicylates (ICD-code 965.1, which includes generic drugs such as aspirin and magnesium salicylate), aromatic analgesics (ICD-9 code 965.4, which includes generic drug such as acetaminophen), propionic acid derivatives (ICD-9 code 965.61, which includes generic drug such as ibuprofen), and other antidepressants (ICD-9 code 969.09, which includes drugs such as oxypertine).

Suicidal Ideation

During 2011 to 2015, there were 8,745 ED visits and 6,548 inpatient hospitalizations with suicidal ideation were recorded among Utah youth aged 10-17 years. An epi-curve was constructed to show the counts of youth with suicidal ideation who were seen in the ED or hospitalized (Figure 10). Like the self-inflicted injuries, the number of ED and hospital visits among youth with suicidal ideation has steadily increased over time from 2011 to 2015 (Figure 11). The crude rate of ED visits with suicidal ideation indicated among Utah youth aged 10-17 increased from 272.7 per 100,000 in 2011 to 634.6 per 100,000 in 2015 (APC=22.0; p<0.001) (Table 9). Similarly, the crude rate of inpatient hospitalizations with suicidal ideation indicated among Utah youth aged 10-17 increased from

207.2 per 100,000 in 2011 to 535.4 per 100,000 in 2015 (APC=22.6; p<0.001) (Figure 12). As indicated by Table 10, a greater proportion of females than males had suicidal ideation for both visit types (61.1% of ED and 62.0% of inpatient hospitalizations with suicidal ideation were females). Similarly, suicidal ideation was also common in those aged 15-17 years (59.5% for ED and 60.0% for inpatient hospitalizations), and in white, non-Hispanic race/ethnicity (53.6% for ED and 58.2% for inpatient hospitalizations). Whereas 27.6% of youth who visited the ED for suicidal ideation were discharged or transferred to a psychiatric facility, 12.1% of those who were hospitalized were discharged/transferred to a psychiatric facility.

Tables 11 and 12, presents the data on the combined 2011-2014 suicidal ideation and self-inflicted injuries that categorized cases into three mutually exclusive groups: 1) suicidal Ideation, no self-inflicted injury; 2) self-inflicted injury, no ideation; and 3) ideation and self-inflicted injury. The majority of cases with self-inflicted injury and suicidal ideation in the ED were female (ED=71.6%) aged 15-17 (ED=64.5%), and white, non-Hispanic (ED=65.9%).

Disposition from the ED to a psychiatric facility

The ED is often the first point of contact for medical and mental health care for patients with suicidal behaviors.[49] Therefore, the ED is an important point within the healthcare system for access to mental health services as part of a suicide prevention effort.[50] As part of this investigation, the Epi-Aid team wanted to understand some of the characteristics of ED visitors with self-inflicted injuries and/or suicidal ideation that were associated with being discharged/transferred into a psychiatric facility. Two limitations to this analyses need to be noted. First, if a hospital with ED had a psychiatric unit onsite, it is likely the patient may have received the psychiatric care needed at the hospital and subsequently discharged home without being discharged/transferred to another psychiatric facility. Second, there might have been patients who were discharged home but had a referral to visit a psychiatric facility at a later date. These two pieces of information were not available from the data, therefore, were not accounted for during the analyses.

Disposition was assessed among all ED patients with self-inflicted injury or suicidal ideation using the 2011-2014 combined ED data. Approximately 28.0%, 15.7%, and 26.6% of youth aged 10-17 years who visited the ED with suicidal ideation only (without self-inflicted injury), self-inflicted injury only (without suicidal ideation), and both suicidal ideation and self-inflicted injuries respectively, were discharged to a psychiatric facility (Table 11). Bivariate and multivariate logistic regression analyses were used to examine patient characteristics associated with being transferred from the ED to a psychiatric facility. In the multivariate model[a], among youth who were seen in the ED, visits were more likely to be transferred to a psychiatric facility if suicidal ideation only or both suicidal ideation and self-inflicted injuries were present [aOR[b]= 2.10 (95% CI= 1.84-2.39) and aOR=2.08 (95% CI=1.68-2.57) respectively] compared to visits with only self-inflicted injuries (Table 12). Transfer to psychiatric care from the ED was less likely if the patient was non-white, non-Hispanic (aOR=0.78; 95% CI=0.65-0.92) or Hispanic (aOR=0.45, 95% CI=0.39-0.53) compared to white, non-Hispanic patients (Table 13).

Mapping

Trends in the geographic distribution of youth who were seen in the ED or hospital with self-inflicted injury or suicidal ideation were assessed by examining the rates of each across the local public health districts in Utah. Total rates from 2011-2014 were examined. As shown by Figure 13, the rates of suicidal ideation in ED visitors were highest (500 or more per 100,000) in Tooele, Davis, and Weber-Morgan health districts. The rate of suicidal ideation among youth aged 10-17 years who were hospitalized during 2011-2015 in Utah was highest (500 or more per 100,000) in the Central, Southeast, and Southwest health districts (Figure 14). Three health districts had the highest rate (240 or more per 100,000) of self-inflicted injuries seen in the ED; Tooele, Salt Lake, and Central (Figure 15). For inpatient hospitalizations for self-inflicted injuries, the rate was highest (55 or more per 100,000) in Weber-Morgan, Salt Lake, and Southwest health districts (Figure 16).

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[a] Model adjusted for other covariates in the model other than the variable being estimated (sex, age group, race/ethnicity, and suicidal behaviors).
[b] Adjusted odds ratio

Objective 2: Identify risk and protective factors for fatal and non-fatal suicidal behaviors among Utah youth aged 10-17 years.

Data Sources: Utah's Prevention Needs Assessment (PNA).

Findings

Demographic Characteristics of Respondents

Across the full sample (N=27,329), the majority of participants were male (53.0%), aged 15-17 years (52.0%), in the 8th grade (48.3%), white (80.8%), reported attending religious services or activities at least monthly (66.5%), primarily affiliated with the LDS (61.8%), had at least one parent with a college degree (61.3%), and lived in the Salt Lake public health district (26.8%). Results examining the prevalence of suicidal ideation and suicide attempt by demographic characteristics are presented in Table 13. Among youth aged 10-17 in 8-10 grades, 19.0% reported experiencing suicidal ideation whereas 8.6% reported attempting suicide in the previous 12 months. Suicidal ideation was more common among females, those aged 15-17, 10th graders, non-white, less religious, those with other religious preference, students with parents' not completing high school, and students residing in Tri-County local public health district. Suicidal attempts were more common among females, those aged 15-17, 10th graders, non-white, less religious, those with other religious preference, students with parents' not completing high school, and respondents residing in Tri-County local public health district. Results from bivariate analyses examining the risk and protective factors for suicidal ideation and suicide attempts are presented in Tables 15 -23. Due to the large number of variables involved in this portion of the report, results are presented in bullet form to make it easy to highlight the important findings[a].

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[a] In the 2015 Utah PNA report,[21] the prevalence of seriously considered attempting suicide, made a plan about how to attempt suicide and attempted suicide were 16.6%, 13.5%, and 7.6% respectively which are lower than the 19.0% prevalence of suicidal ideation and 8.6% prevalence of suicide attempts in this report. Two reasons account for these discrepancies; 1) seriously considered attempting suicide and made a plan about how to attempt suicide variables were combined into one variable, known as suicidal ideation and 2) respondents older than 17 years were also excluded from the analyses in this report.

Demographic factors associated with self-reports of suicidal behaviors

- Females were more likely than males to consider and attempt suicide.

- Older youth (15-17 years) were more likely to consider suicide than younger youth (10-14 years).

- Compared to 8th graders, 10th graders were more likely to consider and attempt suicide and 12th graders were less likely to attempt suicide.

- Non-white youth were more likely than white youth to consider and attempt suicide.

- Religious youth were less likely to consider and attempt suicide compared to less religious youth.

- LDS youth were less likely to consider and attempt suicide compared to youth of other religious preferences.

- Compared to the Salt Lake district, youth in the Summit and Wasatch districts were less likely to consider or attempt suicide, while residents in Tri-County were more likely to consider or attempt suicide. Compared to the Salt Lake district, youth in the Bear River and Southwest districts were less likely to seriously think about suicide, but there was not significant differences between the districts in the percentage of youth who attempted suicide (Table 14).

Mental health

Reporting depressive symptoms and psychological distress were each associated with reports of suicidal ideation and suicide attempts (Table 15). Each of the following measures was associated with both suicidal ideation and suicide attempt:

- Perceived low self-esteem

- Perceived failure

- Being depressed or sad in most days

- Moderate or serious psychological distress.

Substance use

Reported ever use of illegal and other substances or their use in the past 30 days were risk factors for suicidal ideation and suicide attempts among Utah youth aged 10-17 (Table 16). Utah youth who reported ever using the following illegal drugs or using them in the past 30 days were more likely than their counterparts who did not, to report having had suicidal ideation or suicide attempts during the past 12 months:

- Marijuana or hashish

- Cigarette, even just on puff

- More than one sip or two of beer, wine, or hard liquor

- Began drinking alcoholic beverages regularly, that is, at least once or twice a month

- Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays

- LSD or other hallucinogens

- Cocaine

- Methamphetamines

- Prescription stimulants or amphetamines

- Prescription sedatives

- Prescription tranquilizers

- Narcotic prescription drugs and heroin

- Any substance use ever.

School-related factors

Perceptions of opportunities and rewards for involvement in school activities were protective against reporting both suicidal ideation and suicide attempts during the past 12 months among students aged 10-17 years (Table 17). Specifically,

- Having lots of chances to help decide things like class activities and rules in school

- Having teachers that ask students to work on special projects

- Having teachers notice when students do a good job

- Having chances to get involved in activities outside of class

- Having lots of chances to talk with a teacher one on one

- Feeling safe at school

- Having the school let parents know when students do something well

- Having teachers praise students for working hard

- Having good grades

- Having lots of chances to engage in class discussions and activities

- Participating in extracurricular activities

- Doing extra work on their own

- Volunteering to do community service.

Was each protective against suicidal ideation and suicide attempt.

Low commitment to school, academic failure, and experiencing school violence or bullying were risk factors for suicidal ideation and suicide attempt (Table 18).

- Not enjoying being in school in the past year

- Hating being in school the past year

- Not trying to do their best work in school

- Not feeling the school work being assigned is meaningful and important

- Receiving Cs, Ds, or Fs in the past year

- Feeling that the things they are learning in school are not connected to things later in life

- Feeling like their courses are not interesting

- Missing at least one school day in the last month because he or she skipped or cut

- Missing school at least once in the last month because he or she felt unsafe

- Being bullied on school property in the last year

- Being electronically bullied in the last year.

Was each associated with increased odds for suicidal ideation and suicide attempts among Utah youth aged 10-17.

Family-related factors

Having clear family rules and expectations were protective against suicidal ideation and suicide attempt among Utah youth aged 10-17 (Table 19).

- Having parents that expect them to eat dinner at home with their family
- Having parents with clear rules and expectations about not drinking any alcohol

However, family conflicts were a risk factor for suicidal ideation and suicide attempts (Table 19).

- Having people in their family who often insult or yell at each other
- Feeling like their family argues about the same things
- Feeling like people in their family have serious arguments.

Social behaviors and environments

Reporting ever involvement in anti-social behaviors or in the past year were risk factors for suicidal ideation and suicide attempts (Table 20).

- Suspended from school *(both ever and previous year)*
- Arrested *(both ever and previous year)*
- Carried a handgun *(both ever and previous year)*
- Attacked someone with the idea of hurting them *(both ever and previous year)*
- Belonging to a gang *(both ever and previous year)*
- Sold illegal drugs *(previous year)*
- Stolen or tried to steal a vehicle *(previous year)*

- Been drunk or high at school *(previous year)*

- Taken a handgun to school *(previous year).*

Prosocial behaviors and supportive social environments were protective against suicidal ideation and suicide attempts (Table 21).

- Prosocial behaviors, positive community level social environments, positive school social environments, supportive peer social environments, and supportive family social environments were associated with lower odds of suicide ideation and suicide attempt.

Adjusted Models

Given the large number of variables that were significant in the bivariate models, the team selected a subset of those variables to test in a multivariate model. The variables were selected based on the common precipitating circumstances identified in the 150 decedents in Utah aged 10-17 who died by suicide during 2011-2015 and previous work by an employee of UDOH on positive social environments on adolescent depression and health behaviors.[44]

The following variables were included in the multivariate models that examined the risk factors for non-fatal suicidal behaviors – bullying, substance use, and mental health (psychological distress). Substance use was included because almost one in five suicide decedents in Utah aged 10-17 during 2011-2015 had one or more of the following substance in their system at the time of death - alcohol, cocaine, amphetamine, marijuana and/or opiates (Table 5). Bullying was also included because some decedents had experienced bullying prior to death (numbers too small to present). Finally, mental health (psychological distress) was included because mental health problems and depressed mood were common precipitating circumstances among suicide decedents in Utah aged 10-17 during 2011-2015 (Table 5).

For the multivariable model examining protective factors for non-fatal suicidal behaviors, the social environmental factors were included because previous work by Uphold (2013)[44] indicated that positive social

environments in Utah youth were protective against depression, a common risk factor for suicidal behaviors in youth.

In both the risk and protective multivariate models, each model adjusted for all the other variables in the model (Tables 22 and 23), also controlling for the socio-demographic variables[a].

Risk factors associated with suicidal ideation included:

- Being bullied on school property

- Being electronically bullied

- Any substance use in the previous month

- Any tobacco use in the previous month

- Moderate and serious psychological distress

- High perceived availability of drugs

- High perceived availability of guns.

Risk factors associated with suicide attempt included:

- Being bullied on school property

- Being electronically bullied

- Any substance use in the previous month

- Any tobacco use in the previous month

- Moderate and serious psychological distress.

After adjusting for demographic factors[a], the following variables were protective factors against suicidal ideation and suicide attempts.

- Positive community level social environments

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[a] Adjusted for sex, age, race, religious preference, and parent education level.

- Supportive peer social environments

- Supportive family social environments

Geographic Differences in Suicidal Behaviors

Figures 17 and 18 present the distribution of suicidal ideation and suicide attempts across local public health districts in Utah. Figure 17 demonstrates that, the prevalence of suicidal ideation was 20.0% or greater for five local health districts - Salt Lake, Tooele, TriCounty, Utah, and Weber-Morgan. The prevalence of suicide attempts among youth was 9.0% or greater in three districts – Tooele and TriCounty and San Juan (Figure 18).

Objective 3: Map the three most utilized suicide prevention initiatives in Utah by school district (QPR, Hope Squad and Hope for Tomorrow) and compare components of these programs to evidence-based suicide prevention initiatives and national recommendations for suicide prevention.

Data Sources: Program documentation for QPR, Hope Squad, and Hope for Tomorrow.

Inclusion Criteria

The UDOH identified suicide prevention programs that were reviewed for this investigation. They included Question, Persuade, and Refer (QPR); Hope Squad; and Hope for Tomorrow programs. These programs were selected by the UDOH because they were the three most implemented suicide prevention initiatives in schools across the state. The documentation of each program was provided to the Epi-Aid team and content analyses were conducted. Examples of program documentation that were reviewed included protocol and procedures for implementation, sample presentations for trainers, and additional materials for trainers.

The team also cross-walked the components of the three suicide prevention programs against the CDC's suicide technical package document '*Preventing Suicide: A Technical Package of Policy, Programs, and Practices*'[38] to check for alignment with the strategies and approaches in the technical package. The technical package to prevent suicide features a select group of strategies to help states and communities take advantage of the best available evidence in preventing suicide or risk and protective factors for suicide. The technical package includes strategies to prevent the risk of suicide in the first place as well as strategies to lessen the immediate and long-term harms of suicidal behavior. It is intended as a resource to help communities and states focus their suicide prevention efforts on the strategies that have the greatest potential for broad public health impacts as well as strategies that reduce or buffer against specific risks for suicide in relationship to peers, partners, families, schools and communities.

These programs were also examined to see whether they had evidence supporting their efficacy in relation to the programs and policies listed as 'Programs with Evidence of Effectiveness' from the Suicide Prevention Resource Center (SPRC) Programs and Policies database. Programs and policies listed in the SPRC database are identified through the SAMHSA's National Registry of Evidence-Based Programs and Practices (NREPP).

Question, Persuade and Refer (QPR)

The QPR program is a 1-2 hour gatekeeper and educational training program that provides training on warning signs for suicide crisis and how to respond. The main objectives of the program are to train participants to: (1) recognize someone at risk for suicide; (2) intervene with those at risk; and (3) refer them to appropriate care. In the context of suicide prevention among Utah youth, the program has been implemented mostly in school settings to train school staff to recognize students at risk for suicide and intervene accordingly.

QPR is an example of a gatekeeper training program which aligns with the strategy 'Identify and support people at risk' in the suicide technical package.

The QPR program met the minimum requirements for review and has been independently assessed and rated for quality of research and readiness for dissemination by SAMHSA and included in the National Registry of Evidence-Based Program and Practices (NREPP).[51] It has been listed in the Suicide Prevention Resource Center (SPRC) Programs and Practices database.[52] At the national level, QPR has been evaluated, and experts suggest it is a promising practice gatekeeper program that may improve knowledge about suicide, gatekeeper self-efficacy, gatekeeper skills, diffusion of gatekeeper training information, and knowledge of suicide prevention resources.[52] Although, QPR aligns with some approaches in the technical package and has been included in the NREPP and SPRC, the evidence of its effectiveness in preventing suicide or key risk factors for suicide is limited.

Hope Squad

Hope Squad is a peer-to-peer training program that trains students to recognize warning signs in depressed and suicidal peers and empower them to report those signs to an adult.[53] The Hope Squad program is part of the larger Circles4Hope program, which seeks to address suicide from three angles: the school environment, community connections, and mental health partnerships.[53] The Hope Squad represents the school component. This assessment focuses only on the Hope Squad and did not review the documentation for the other two programs (community connections and the mental health partnerships) or how the programs are connected. In recent years, Hope Squad has included QPR as part of its training curriculum to train students and staff to identify and refer peers who may be having suicidal thoughts.

The Hope Squad program works with school advisors to train students who have been identified by their classmates as trustworthy to serve as Hope Squad members. The program has six objectives –

1. Train students and staff to recognize suicide-warning signs and intervene.

2. Train students and staff to identify youth with undetected, untreated and emerging mental illness.

3. Promote connectedness among peers and faculty in school and help normalize help-seeking behaviors.

4. Build relationship with local mental health agencies and communities.

5. Help change school culture regarding suicide by reducing stigmas about suicide and mental health.

6. Create awareness about suicide and tools available to prevent suicide.

Based on the six program objectives and training materials reviewed, the Hope Squad program aligns with the strategy in the suicide technical package focused on promoting connectedness, in particular the approach focused on changing peer norms (i.e., leveraging the leadership qualities and social influence of peers to normalize protective factors such as resiliency, belonging, help-seeking, and positive social and behavioral change). Ensuring that students and staff are properly trained to identify and effectively respond to students who may be at risk of suicide with formal gatekeeper training (e.g., the QPR component) also aligns with the technical package. However, a rigorous evaluation has not yet been conducted for Hope Squad, therefore, the evidence of its effectiveness is largely unclear and has neither been included in the SAMSHA's NREPP database

or the SPRC Programs and Practice database. A pre and post-test of Hope Squad members during 2014-2015 school year, however, found that Hope Squad members were very active in providing help, support and assistance to fellow peers in their schools.[54] Additional research is needed to determine whether the program has beneficial effects on risk for suicidal behavior.

Hope for Tomorrow

Hope for Tomorrow is a school-based mental health education program that provides an opportunity for adolescents with undiagnosed, under-treated, or untreated mental illness to learn when and how to seek appropriate professional help. It also provides information to teachers, parents and other members of the community on the signs and symptoms of mental illness and resources available in the community to address them.[55] The program has three main objectives:

1. Raise awareness of mental health issues
2. Erase the stigma of mental illness
3. Foster hope among students and their families.

The program topical training areas include mood disorders, substance use disorders, eating disorders, and suicide. The Hope for Tomorrow program has not been included in the SAMSHA's NREPP database or the SPRC Programs and Practice Database because of limited evidence of its effectiveness in preventing suicide or risk factors for suicidal behaviors. The program was evaluated in 2006 by matching Hope for Tomorrow schools to non-Hope for Tomorrow schools, and using pre- and post-test to assess four constructs – 1) knowledge and awareness, 2) stigma, 3) recognition of signs and symptoms, and 4) help-seeking behaviors for mental health. The results showed improvement in knowledge about and recognition of signs and symptoms of mental illness.[55] Additional research is needed to understand the effects of the program on risk for suicide. Programs such as this that focus on raising awareness about suicide risk factors, can be a useful complement to other strategies and approaches focused on changing skills and behaviors, such as those in the suicide technical package.

Review Limitation

Although program materials were comprehensively reviewed, the project team was unable to examine the actual implementation of these strategies and approaches. Determination of program components' alignment with strategies and approaches in the technical package was based solely on the documentation the Epi-Aid team was provided and authors could not determine whether programs were being implemented with fidelity according to the protocol or the documentation reviewed. This review focused only on the three most widely implemented programs in Utah. As described below, there are many other opportunities for addressing risks for youth suicide, including relationship problems, school problems, challenges at home, etc. The suicide prevention technical packages includes programs, policies, and practices that can complement the existing programs and enhance early prevention of suicide.

Program Evaluation

None of the three most commonly implemented suicide prevention programs to address suicidal behaviors in Utah youth have been rigorously evaluated for effects on suicidal behavior or suicide risk factors, although findings from less rigorous evaluations have shown some preliminary positive results on other outcomes. Of these three programs only QPR has been designated as an evidence-based gatekeeper program by the NREPP and the SPRC, although, this is based on changes to gatekeeper knowledge, skills, and self-efficacy rather than changes in youth suicidal behavior. The Hope Squad and the Hope for Tomorrow programs have limited evaluation results and were each found to improve knowledge related to program objectives. However, no evidence was found for their effectiveness in preventing suicidal behaviors or addressing key risk and protective factors for suicide. Given that both the Hope Squad and the Hope for Tomorrow programs are being expanded across the state, it is suggested that both programs be rigorously evaluated for their effectiveness. Rigorous scientific evaluation of programs can provide confidence in the program's intended outcomes and ensure that a

program does not produce unintended harmful or negative effects on its target population. The state and suicide prevention stakeholders may also consider rigorously evaluating other suicide prevention programs that are being implemented in schools across the state for their effectiveness. Multiple resources are available to help suicide prevention stakeholders to learn about program evaluation.[56-58] Resources to help identify and implement evidence-based suicide prevention programs are also available to communities from sources such as the CDC's suicide technical package,[38] SAMHSA's NREPP,[51] and SPRC's Program and Policies database.[57]

Programs Alignment with Risks and Protective Factors among Utah Youth

Suicide is a public health problem with multiple risk and protective factors. No one single program is expected to address all the risk and protective factors for suicide prevention. Communities can benefit from a comprehensive and coordinated effort, with multiple strategies and approaches that address the relevant risk and/or protective factors for suicide.

During this investigation, the precipitating circumstances for fatal suicidal behaviors included mental health problems, recent crises, history of suicidal ideation or suicide attempt, and relationship problems. For non-fatal suicidal behaviors, risk factors included mental health problems; substance use; low commitment to school, academic failure, and experiencing violence or bullying in school; and involvement in anti-social behaviors. Protective factors for non-fatal suicidal behaviors identified in this population included having opportunities and rewards for prosocial involvement in school activities; having a clear family rules; prosocial behaviors; and positive community level social environments, supportive peer social environments, and supportive family social environments. A number of the precipitating circumstances and risk and protective factors identified during this investigation do not appear to be directly addressed by any of the programs based on the program documentation. Two of the three programs are gatekeeper programs and the third is a mental health education program. The school districts are focusing on a few potential ways to address suicidal behavior. Based on the findings of this investigation and the focus of these three programs, several key risk factors for suicidal behaviors identified during this investigation such as building a strong social environment (community-level social

environments and family social environments), preventing violence (bullying), and treatment for mental health problems are not being addressed. There is much more that could be considered, particularly with regard to primary prevention and focusing on the many influences that contribute to risk of suicidal behavior among youth (e.g., relationship problems, mental health problems, school problems, challenges at home, etc.). There is also more that could be done to create protective environments for youth where they learn, live, and play. There are potential programs, practices and policies that have rigorous evidence of effectiveness, so current efforts could be complemented with some of these programs and finds ways to do more evaluation with the existing programs that are being utilized. The gaps identified should be considered in choosing evidence-based programs for future suicide prevention efforts.

Mapping

Program implementation by local public health district for the Hope Squad program in the high schools were mapped using ArcGIS. Maps were not created for the QPR or Hope for Tomorrow programs because information on program implementation locations were unavailable to the Epi-Aid team. The purpose of the mapping was to identify school districts and the proportion of secondary schools in the district that have implemented these programs. Of the 41 school districts in Utah, varying proportion of secondary schools in 22 districts had implemented Hope Squad as of 2015/2016 academic year as indicated by Figure 19. The following school districts had 100% of high schools implementing Hope Squad during 2016/2017 academic year – Beaver, Box Elder, Davis, Nebo, North Sanpete, Provo, Tintic, Tooele, and Uintah.

Synthesis of the evidence and recommendations

In Utah between 2011 and 2015, the rate of suicide increased significantly among youth aged 10-17 years at an average of 22.8% per year. This is compared to an average 6.0% increase per year among U.S. youth aged 10-17 during the same time period. The burden of suicidal behaviors in this population was not only limited to mortality but morbidity as well. During this period, the number of visits to the emergency department and inpatient hospitalizations due to self-inflicted injuries significantly increased at an average of 15.3% and 20.6% per year respectively. The rate of suicidal ideation among youth who visited the emergency department or who were hospitalized also increased significantly at an average of 22.0% and 28.6% per year respectively. Similarly, the proportion of youth who reported seriously considering attempting suicide during the previous 12 months, also increased from 9.4% in 2011 to 14.4% in 2015.[40] Put together, the overall burden of both fatal and non-fatal suicidal behaviors among Utah youth aged 10-17 years significantly increased during 2011 and 2015.

Consistent with previous studies and youth suicide investigations, multiple circumstances precipitated the fatal suicidal behaviors observed in the majority of decedents.[3, 10, 39] The most common precipitating circumstances included mental health problems, history of suicidal ideation or suicide attempt, relationship problems, recent crisis, and cutting behaviors. Multiple risk and protective factors were also identified in Utah youth who reported non-fatal suicidal behaviors. Some of the risk factors included mental health problems, substance use, low commitment to school, academic failure, experiencing violence or bullying in school, and involvement in anti-social behaviors. Protective factors included prosocial behaviors, positive community environment, positive school environment, positive peer environment, positive family environment, and having clear family rules. These findings are consistent with factors identified by previous investigations and research on youth suicide.[3, 10, 59-60]

Given the complexity and multifactorial nature of the precipitating circumstances in fatal suicidal behaviors and the risk and protective factors for non-fatal suicidal behaviors, Utah youth are likely to benefit from suicide prevention efforts that are multifaceted, coordinated, and comprehensive, and that target and address multiple

risk and protective factors simultaneously. The CDC's technical package to prevent suicide,[38] a resource to help states and communities to identify strategies and approaches with the best available evidence to prevent suicide, may be a good starting point for suicide prevention stakeholders to identify evidence-based strategies and approaches that may address some of the factors identified during this investigation. The document identifies seven strategies to address suicide and risk and protective factors for suicide – strengthen economic supports, strengthen access and delivery of suicide care, create protective environments, promote connectedness, teach coping and problem solving skills, identify and support people at risk, and lessen harms and prevent future risk. Based on the findings from the current investigation and the strategies outlined in the technical package, we make the following recommendations for Utah to consider in an effort to comprehensively address both fatal and non-fatal suicidal behaviors among youth aged 10-17 years across the state.

Mental Health Care

Untreated mental health problems are an important risk factor for youth suicide.[39, 61-62] Approximately 35.2% of suicide decedents aged 10-17 years with information on mental health had diagnosed mental health problems and 31.0% were in a depressed mood at or near the time of death. In addition, 22.7% of youth in grades 6-12 reported feeling so sad or hopeless for two weeks or more in a row that they stopped doing some usual activities during the past 12 months.[3] The logistic regression analyses also found that individuals who felt sad or hopeless two weeks or more in a row were 16 times more likely to have suicidal ideation and almost 20 times more likely to attempt suicide (Table 17). The results from the 2015 PNA also suggest that 15.0% of Utah youth in grades 6-12 had high mental health treatment needs with additional 24.5% needing moderate mental health treatment[a].[3]

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[a]Mental Health Treatment Needs was estimated using the K6 Scale that was developed with support from the National Center for Health Statistics for use in the National Health Interview Survey. The tool screens for psychological distress by asking students during the past 30 days, how often did you: feel nervous? Feel hopeless? Feel restless or fidgety? Feel so depressed that nothing could cheer you up? Feel that everything was an effort? Feel worthless? Answers to each question was scored based on responses: None of the time (0 points), a little of the time (1 point), some of the time (2 points), most of

This evidence suggests that mental health problems were common in Utah youth and played a significant role in suicidal behaviors among this population. Therefore, youth in Utah may benefit from suicide prevention programs that improve access to evidence-based mental health care.[63] Examples of evidence-based clinical interventions for mental health have been outlined in a recent review by Zalsman and colleagues that could be used to guide mental health services in Utah.[64]

Suicide prevention stakeholders in Utah may also benefit from a consideration of implementing mental health services in the school environment to complement those in the community. The school environment presents a convenient opportunity to reach many youth at a time and also helps to ensure that students with mental health problems who have not been identified already by community services are identified, treated, and connected to resources.[65-66] School-based mental health services may also help overcome some of the barriers to mental health treatment in this population.[67-68] In a previous psychological autopsy study among Utah youth who died by suicide, a number of barriers to mental health treatment were identified, including stigma, belief that help seeking is a sign of weakness, reluctance to admit having mental health problems and the belief that nothing can help.[68] Evidence exists that school-based programs may reduce some of the barriers associated with traditional mental health treatment since many youth already receive school based services for non-mental health issues in the school environment.[45, 69] In addition, the school environment presents an opportunity to screen for major depressive disorders in this population as recommended by the U.S. Preventive Services Task Force.[70]

The investigation findings also indicated that 84.0% of decedents who had been diagnosed with mental health problems were receiving treatment at or near the time of death. This proportion was higher than the findings from a recent youth suicide investigation which found that about two thirds (64.1%) of decedents with mental health diagnosis were in treatment at the time of death.[10] While information about the type of mental health treatment that decedents received prior to death was unavailable, these findings illustrate important concerns

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the time (3 points), and all of the time (4 points). Students with a total score of 13 or more points were determined to have high mental health treatment needs, 7-12 points moderate mental health treatment needs, and score of 0-6 points being low mental health treatment needs.

echoed in the literature about the effectiveness or timeliness of mental health treatments that are generally available in the community mental health system.[71-72] Suicide prevention stakeholders, including mental health professionals in various communities across the state, are encouraged to examine their mental health treatment approaches to ensure that they are consistent with the current best treatment evidence.[64]

The 84.0% of decedents with mental health problems who were receiving treatment (Table 5) at or near the time of death had also come into contact with the healthcare systems, particularly, the general practitioner. Similar patterns of suicide decedents coming into contact with the healthcare systems prior to dying by suicide have been documented in other communities.[73] Youth in Utah may benefit from training of primary care physicians and other general practitioners to identify and treat mental health problems. The education of general practitioners to identify and treat mental health was associated with increase in antidepressant use and a decrease in suicide rates.[64] It may also be helpful to provide training to physicians to identify individuals who have been diagnosed with depression and at the brink of being suicidal.

Strengthening Family Relationships

Strong family relations, are associated with decreased suicide risk in youth.[10, 74-75] The current investigation found that 31.7% of decedents (n=45) experienced family relationship problems. Of these, 31 decedents with information experienced these problems within two weeks of death. This is consistent with previous youth suicide investigations and research noting that family relationship problems were a frequent precipitating factor for youth suicide.[10, 76] The findings from the PNA indicated that positive family environment was protective against suicidal ideation and suicide attempts among youth, whereas family conflicts were risk factors for suicidal ideation and suicide attempts. In the adjusted model for example, among youth who experienced a supportive family environment, the odds of seriously considering or make plans about attempting were 24.0% lower and odds of suicide attempts were also 24.0% lower compared to those with a less supportive family environment (Table 23). On the contrary, youth who reported feeling like people in their family argues about the

same thing, often insult or yell at each other or have serious arguments were significantly more likely to experience suicidal ideation or attempt suicide (Table 21).

Youth who attempt or die by suicide generally have a number of underlying suicide risk factors that may be triggered by a life event or other precipitating circumstance.[77] During this life stage, family support is often important for building resilience and decreasing stress,[78] therefore, a disruption to this connection and support system can have a devastating effect on an already vulnerable population, especially, those at risk for suicide. Utah may benefit from consideration of evidence-based programs that help strengthen parenting skills and family-youth and parent-youth relationships, as part of a comprehensive and coordinated suicide prevention effort. These approaches are part of the "Teach coping and problem-solving Skills" in the technical package which can help address suicidal behaviors as well as risk and protective factors for suicide. Evidence-based programs for strengthening family relationships, improving protective factors, and reducing risk factors for youth suicide exist. An example is the Incredible Years (IY) program, an evidence-based comprehensive group training program for parents, teachers, and children to help regulate social-emotional problems by improving protective factors such as responsive and positive parent-teacher-child interactions and relationships, emotional self-regulation, and social competence.[79-80] Other programs include Strengthening Families,[81] and Multisystemic Therapy.[82]

Promote Connectedness

Connectedness refers to the extent to which an individual or group of individuals are socially close, related, or share resources.[38] It involves both social integration and experience of belonging, caring, trust and respect.[83-84] It has been suggested the lack of social connections contributes to suicide risk.[38] Connectedness is important to build resilience and social support, factors that are also important for suicide prevention in youth. Connectedness at various levels including peers, school, religion, and community have all been associated with lower levels of suicidal ideation and suicide attempts in youth.[29, 38, 74, 85-87] Previous studies in youth found

significant inverse relationship between connectedness and suicidal ideation and suicide attempts.[74, 88-89]

Consistent with the previous research, this investigation found positive peer social environment, positive school environment, religiosity/religious affiliation, and positive community social environments to be protective against suicidal ideation and suicide attempt in this population. Students who were connected to their school or peers through extracurricular activities or those who reported opportunities and rewards for extracurricular involvements were also less likely to have suicidal ideation and suicide attempts. On the other hand, experiencing violence such as bullying, feeling unsafe in the school environment, and low commitment to school were risk factors for suicidal ideation and suicide attempt among Utah youth. Utah youth may therefore benefit from suicide prevention programs that promote connectedness in various settings as part of a comprehensive and coordinated suicide prevention effort. Sources of Strength program can help promote connectedness in Utah youth. An evaluation found the Sources of Strength program to improve suicide adaptive norms improve connectedness to adults, and help students stay engaged to school.[90]

School connectedness is one important protective factor for youth suicide and is especially important given schools are ideally situated to provide interventions to numerous youth simultaneously.[91] Feeling close to other people, happiness at school, engagement with teachers, and peers in the school environment were inversely associated with suicidal ideation and suicide attempt in youth[92-93]. During a typical semester, school-enrolled youth spend a significant amount of their time and experience most of their social contact within the school environment. Therefore, strengthening school connections and maintaining positive school environment may be helpful to addressing suicide among youth in Utah. Prevention programs in school settings can help promote protective factors while addressing some of the risk factors found in the school environment. The state and suicide prevention stakeholders can utilize the resources made available by the CDC to help communities promote and increase youth connectedness to the school.[46] Some of the strategies in this resource included – creating a decision-making process that facilitate student, family, and community engagement and providing students with academic, emotional, and social skills necessary for staying active in school.[46]

In addition to connectedness in the school environment, several studies have observed an association between religiosity/religious affiliation and suicidal behaviors or some risk factors for suicidal behaviors such as depression.[25-29] It has been suggested that the sense of belonging in religion and the network of relationships and ties among members of certain religious communities are protective against suicide.[25] Religion may improve connectedness by providing youth a trusted community of people with shared values and beliefs to count on during difficult and stressful times. Consistent with the literature, the results from the PNA found that youth who reported being religious (defined as attending religious services 1-2 times a month or more often) were 49% less likely to report suicidal ideation and 58% less likely to have attempted suicide during the 12 months prior to the survey (Table 14).

Approximately 12.6% of decedents experienced family conflicts as a result of or that resulted in technology use restriction prior to death. Additional research is needed to understand the implications of this finding, including the extent to which this represents interruption to social support networks, social isolation, distress over losing access to the device, distraught over punishment involving taking technology away, confounding with the reason for punishment or the conflict (e.g., poor grades), or other factors.

It needs to be mentioned that suicide is rarely the result of only one problem, rather, a combination and/or accumulation of multiple problems, for which technology-related limitations may represent just one of them. Therefore, importance of prevention efforts that promote connectedness, social cohesion, and coping skills in this population cannot be overemphasized.[38]

Identify and Support Youth At-risk of Suicidal Behaviors

Among Utah youth aged 10-17 years who died by suicide during 2011-2015, 23.9% disclosed their intent to die by suicide and 29.6% had suicidal ideation or had made previous suicide attempt. Among those with known information about who intent was disclosed to, disclosure was mostly made to family and/or friends. Disclosure of the intention suggests an opportunity to intervene to prevent the suicide. Families need to treat intent

disclosure as a serious problem for suicide and seek professional support immediately for youth experiencing suicidal behaviors.

Approximately, 21.4% of decedents had a history of cutting or had been cutting near the time of death. While cutting is considered a non-suicidal self-harm behaviors used to cope with stress, depression and anger, especially in youth,[94] it frequently occurs in adolescents who have contemplated or attempted suicide,[94] with some previous studies finding a significant association between non-suicidal self-harm behaviors such as cutting and suicidal behaviors among youth.[95-96] Furthermore, in this investigation, over a fifth of suicide decedents aged 10-17 years had been cutting prior to death. Given the relationship between self-harm behaviors and suicidal behaviors in the current and previous studies, cutting should be considered as a serious, risky behaviors, which may be an indicator for other negative health outcomes such as depression and suicidal ideation. As such, it should be taken seriously, and it is important for parents, guardians, and gatekeepers aware of cutting behavior to seek expert advice. The evidence from the narratives suggests that several of the parents of decedents who had been cutting were unaware of the cutting behaviors of their children due to the wounds being covered with long pants and sleeves. Based on these findings, it is believed that youth in Utah may benefit from suicide prevention programs that help identify at-risk individuals and connect them with appropriate support. Prevention programs such as evidence-based gatekeeper training and crisis intervention programs would need to be part of a coordinated and comprehensive prevention strategy to address suicidal behaviors in Utah youth.

Gatekeeper programs have been used to identify individuals at risk of suicide so they can be referred to the appropriate resources. Gatekeeper programs train community members such as faculty and staff, emergency responders, clergy, primary, and urgent care providers to identify individuals who may be at risk of suicide and connect them to appropriate services.[97] There is evidence that identifying at-risk individuals and providing treatment and support can reduce suicidal behaviors and associated risk factors.[38, 97-98] Some evidence-based gatekeeper training include the Applied Suicide Prevention Skills Training (ASIST) and Garret Lee Smith (GLS)

Suicide Prevention Program.[99-100] ASIST is a program that trains hotline counselors to identify and connect at-risk individuals to care. An evaluation of ASIST found significant benefits among callers who spoke with counselors trained in ASIST, including feeling less depressed, less suicidal, less overwhelmed, and more hopeful by the end of their call, compared to callers who spoke to non-ASIST trained counselors.[99] The evaluation of GLS also found that it reduces suicide rates and nonfatal suicidal behaviors among young people aged 10–24 in counties implementing GLS trainings compared to counties that did not implement GLS.[100] Secondary schools in Utah are mandated to implement a suicide prevention program.[101] At the time of this investigation, one of the three commonly implemented programs was a gatekeeper programs – QPR. Suicide prevention stakeholders in Utah can use the CDC technical package to consider strategies and approaches that are based on the best available evidence as well as the need to continue to build the evidence base by rigorously evaluating other promising approaches.

Suicide prevention hotlines are also ways to provide crisis intervention to youth who may be in distress. An evaluation of some of these interventions have indicated their effectiveness. For example, a significant decline in psychological pain, hopelessness, and intent to die was reported during a follow-up of suicidal individuals who had called the National Suicide Prevention Lifeline.[102] In recent years, given the changes in trends of communication methods, especially among young people, some geographic locations have also added crisis text hotline to allow youth in distress to reach out for help. Bringing awareness about these resource and encouraging youth to reach out when they are distressed will be an important component of a comprehensive and coordinated suicide prevention strategy in Utah.

Emergency department visits were also common for both suicidal ideation and self-inflicted injuries among Utah youth. In this investigation, we found that during 2011-2014/2015, emergency department visits for suicidal ideation and self-inflicted injuries significantly increased, with suicidal ideation increasing approximately 15.8% per year while self-inflicted injuries also increased by 25.3% per year. Hospital emergency departments are areas that youth at risk for suicide can potentially be identified and connected to care as needed. Besides those who

visit emergency department due to suicidal ideation or self-inflicted injuries, some high volume emergency department may consider implementing suicide screening programs and linking individuals identified as having suicidal risk tendencies or behaviors to care as necessary.

Prevent Other Forms of Violence

Exposure to violence in general has been associated with suicidal ideation, suicide attempts, and other risk factors for suicide such as depression and other mental health problems.[103-104] For instance, it has been demonstrated that youth who experience physical violence, sexual violence, emotional abuse, childhood abuse, or who are bullied are significantly more likely to have suicidal behaviors.[43, 105-107] Consistent with the findings from previous youth suicide investigations and research, risk factors observed among Utah youth with non-fatal suicidal behaviors included bullying and missing school due to feeling unsafe. Results from the PNA indicated that youth who experienced bullying on school property had almost two times the odds of suicidal ideation and over two times the odds of attempting suicide in the past 12 months compared to their counterparts who were not bullied on school property (Table 24). Similarly, youth reporting electronic bullying in the past 12 months were also at increased odds of both suicidal ideation and suicide attempts in the past 12 months (Table 24). Suicide and other forms of violence have shared risk and protective factors, therefore, preventing other forms of violence and promoting other shared protective factors, such as connectedness and family cohesion among youth, may also be beneficial in preventing suicide among this population.[108-111] For example, among youth who died by suicide, some had experienced sexual abuse, bullying and other forms of abuses (numbers too small to report) prior to dying by suicide. Suicide prevention stakeholders in Utah may consider suicide prevention programs that address multiple forms of violence. CDC has developed technical packages for child abuse & neglect, youth violence, sexual violence, and intimate partner violence that may be useful resources to consider.[112-113]

In this investigation, information on sexual orientation of youth who died by suicide was generally unavailable. However, among decedents with information on sexual orientation, six were sexual minority youth (for example identifying as gay, lesbian or bisexual). Previous research has demonstrated significantly greater risk for suicidal behaviors among sexual minority youth compared to their heterosexual counterparts due to the experience of discriminatory behaviors and other forms of violence.[18-19] Creating supportive environments and inclusive policies has been found to reduce suicidal behaviors among sexual minority youth.[114] Therefore, as part of a comprehensive effort to address suicidal behaviors in youth, it is important for suicide prevention stakeholders to consider the needs of sexual minority youth, especially, the creation of an environment that 'supports safety and inclusion comprehensively' through policies that are inclusive of and friendly to sexual minority youth.[115]

Reduce Access to Lethal Means among Youth at Risk for Suicide

Over 92% of Utah youth who died by suicide during 2011-2015 used either suffocation[a] or firearms. These two methods are highly fatal and generally provide very little window of opportunity to intervene once they have been used.[38] Evidence exists that the time between deciding to act and attempting suicide could often be less than 5-10 minutes and that individuals who attempt suicide generally do not seek out a lethal means if a highly lethal means is not readily available or easily accessible.[116-117] Therefore, making it difficult for individuals at-risk for suicide to access lethal means may buy time between the decision and the attempt. As part of the comprehensive and coordinated suicide prevention strategy, suicide prevention stakeholders in Utah may want to consider education and other prevention measures to help reduce access to lethal means among at-risk youth such as safe storage of firearm. The CDC's technical package to prevent suicide includes evidence-based strategies that suicide prevention stakeholders in Utah can implement in various communities to reduce access to lethal means among at-risk youth.[38] One approach is education and counselling on storage of medications and

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[a] Includes hanging and strangulation. Deaths involving deprivation of oxygen due to inhalation of asphyxiant gases such as helium, nitrogen, propane, argon, butane are also included

firearms to make them less accessible to vulnerable youth.[38] For example, an education program targeted to parents of youth visiting the emergency department for suicidal behaviors was found to increase the percentage of parents reporting that all medications in the home were locked up and the percentage of gun owners who reported that the gun was locked up. [118-119]

Teach Coping and Problem-solving Skills

Youth who attempt or die by suicide generally have underlying risk factors that can be exacerbated by other precipitating circumstances. Teaching coping and problem solving skills can help youth to better handle challenges, overcome adversity, and adapt to stress. Individuals who attempted suicide were characterized by inadequate abilities to employ coping strategies in response to immediate stressors and identify solutions to problems.[120] During this investigation, it was found that the majority of decedents experienced multiple crises such as relationship problems, technology-related family conflicts, and the experience of tragedy such as the death of a loved one. Therefore, programs that teach coping and problem-solving skills can be an important part of a comprehensive and coordinated suicide prevention strategy. The technical package for preventing suicide provides strategies and example programs to strengthen social emotional skills in youth and resolve problems in relationships, schools, and with peers and help youth address other negative influences associated with suicide (e.g., substance use).[38] An example evidence-based youth program to help build coping skills is the Youth Aware of Mental Health (YAM), a school-based program that has been demonstrated to reduce suicide attempt and severe suicidal ideation among youth.[121]

Selection and Implementation of Evidence-based Programs

In this investigation, it was observed that the majority of decedents experienced multiple precipitating circumstances prior to death. Similarly, several risk and protective factors were observed in youth who experienced non-fatal suicidal behaviors. As part of strategic planning to address suicidal behaviors among Utah youth, suicide prevention stakeholder in Utah can use the factors identified in this report as a starting point to help guide the selection and implementation of evidence-based comprehensive and coordinated suicide prevention programs. Based on the review of the three most commonly implemented suicide prevention programs targeting youth, the current strategies have a relatively narrow focus. It is important that suicide prevention stakeholders consider the range of potential strategies to prevent suicide, particularly, primary prevention strategies. It is also important to evaluate existing strategies that have not been rigorously evaluated to determine whether they are having the intended effects. Suicide prevention stakeholders are encouraged to consider the risk and protective factors identified during this investigation and to make use of the best available evidence when making choices about which prevention strategies to implement as part of a comprehensive approach.

In Utah, the three most widely implemented suicide prevention programs in the schools are QPR (gatekeeper program), Hope Squad (peer-to-peer program), and Hope for Tomorrow (a mental health educational program). But rigorous evaluation of these programs are limited. Suicide prevention stakeholders are encouraged to partner with universities and other institutions with program evaluation experience to rigorously evaluate the effectiveness of these programs among youth in Utah and develop plans for ongoing monitoring to ensure that programs are effective in addressing suicidal behaviors among youth over time. Stakeholder are also encouraged to carry out similar evaluation for other programs that have been implemented in the school environment or elsewhere.

The risk and protective factors associated with suicidal behaviors in this population, span multiple levels of the socio-ecologic model; therefore, prevention efforts need to take a similarly multicomponent and comprehensive

approach. There is no one-size fits all approach to preventing suicide. Multiple factors are involved, therefore, multi-component, comprehensive and coordinated suicide prevention efforts that target and address multiple risk and protective factors will likely be the most effective.

Several resources to help communities to address suicide using evidence-based programs are available. These include the CDC's Suicide technical package for preventing suicide, which describes a wide range of strategies and approaches, including primary prevention approaches based on the best available evidence. Others include the SAMHSA's National Registry of Evidence-based Programs and Practices,[51] and Office of Juvenile and Delinquency Prevention's Model Programs Guide.[122] Addressing other types of violence may also be helpful to addressing suicidal behaviors in youth because they have shared risk and protective factors with suicide.[112] Communities may be able to address other forms of violence using resources from the CDC's technical packages. Technical packages focused on preventing child abuse and neglect, youth violence, intimate partner violence, and sexual violence are also available for communities to use.[112, 123-125]

A comprehensive effort to address suicide across the state can also benefit from taking a collaborative approach, involving partners from across multiple agencies and sectors, including but not limited to, the health department, education, universities, other research institutions, hospital systems, healthcare providers, social services, justice, business/labor and not-for profit groups. Public health agencies can facilitate this effort by mobilizing their colleagues from other sectors in addressing youth suicide. As observed, the risk and protective factors span across individual, interpersonal, and community risk and protective factors, therefore, a collaborative approach will ensure that prevention programs touch on all the necessary sectors and/levels.

Conduct an Ongoing Comprehensive Evaluation of Suicide Prevention Programs

There is also the need for continuous suicide prevention program monitoring and evaluation at all levels of the program implementation cycle. This will help the state and suicide prevention stakeholders to ensure that

programs are meeting their intended goals. It will also help track progress, achievements, and areas for improvement over time. Monitoring and evaluation are an important part of program implementation and should be established early in the program implementation cycle. State and community suicide prevention stakeholders are encouraged to use independent bodies, outside of those directly involved in the program development and implementation process, for program evaluation. This approach would ensure objective program evaluation and generation of valid recommendation to improve program processes and outcomes.

Finally, the epidemiology of suicide has changed over time and will continue to do so. Utah and suicide prevention stakeholders may benefit from ongoing and robust surveillance to detect changes in the epidemiology and associated risk factors in order to be able to respond appropriately. Also, given that data were not available to fully examine risk for suicidal behavior among sexual minority youth in Utah, future epidemiological work on youth suicide will benefit from surveillance systems that collect data on sexual minority populations.

Conclusion

Suicide is a major public health problem with significant morbidity and mortality burden in Utah. During 2011-2015, 150 youth aged 10-17 in Utah died by suicide. The rate of suicide more than doubled during this period. Like mortality, the morbidity burden due to non-fatal suicidal behaviors among Utah youth significantly increased during 2011-14/2015. During 2011-2014/2015, both the rate of ED visits and hospitalizations for intentional self-inflicted injuries and suicidal ideation more than doubled among Utah youth aged 10-17 years. Similarly, the proportion of youth who reported seriously considering attempting suicide during the previous 12 months increased from 9.4% in 2011 to 14.4% in 2015.

Given the multiple precipitating circumstances observed among those who died by suicide as well as multiple risk and protective factors in those experiencing non-fatal suicidal behaviors, a comprehensive approach to

suicide prevention that addresses a range of precipitating circumstances and contributing factors simultaneously will likely be most useful in preventing suicide among youth in Utah. The existing suicide prevention strategies in Utah could be complemented by other programs, policies, and practices that focus on primary prevention. Multiple resources are available through the CDC and other agencies to guide suicide prevention program selection and implementation in order to address suicidal behaviors among youth in Utah. Many of these strategies work upstream to reduce risk and enhance protective factors for youth suicide. Ongoing monitoring and evaluation of suicide prevention programs in Utah is important for ensuring that the programs are reaching the intended audiences and having the desired effects.

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Tables

Table 1. Crude suicide[*] rate per 100,000 among youth aged 10-17 years, Utah (N=150) vs. U.S. (N=6,265), CDC WONDER, 2011-2015.

Year	Utah Rate			US Rate			Rate Ratios
	Count	Rate	95% CI	Count	Rate	95% CI	
2011	17	4.7	2.7-7.5	1,124	3.4	3.2-3.6	1.4
2012	22	5.9	3.7-8.9	1,165	3.5	3.3-3.9	1.7
2013	32	8.4	5.7-11.8	1,240	3.7	3.5-3.9	2.3
2014	35	9.0	6.3-12.5	1,341	4.0	3.8-4.3	2.3
2015	44	11.1	8.0-14.8	1,395	4.2	4.0-4.4	2.6
Average	150	7.9	6.6-9.1	6,265	3.8	3.7-3.9	2.1

[*]ICD-10 underlying cause of death codes X60-X84.

Table 2. Crude suicide[*] rate per 100,000 among youth aged 10-17 years, by gender, age, race and urbanization[‡], Utah (N=150) vs. U.S. (N=6265), CDC WONDER, 2011-2015.

	Utah			United States		
	Count	Rate	95% CI	Count	Rate	95% CI
Overall rate (2011-2015)		7.9	6.6-9.1	6,265	3.8	3.7-3.9
Gender						
Male	116	11.8	9.7-14.0	4,434	5.2	5.1-5.4
Female	34	3.7	2.5-5.1	1,831	2.3	2.1-2.4
Age Category						
10-14yrs	37	3.0	2.1-4.2	1,808	1.7	1.7-1.8
15-17yrs	113	16.5	13.4-19.5	4,457	7.1	6.9-7.3
Race						
White, Non-Hispanic	122	8.3	6.8-9.7	4,351	4.7	4.5-4.8
Other*	28	6.5	4.1-8.9	1,914	2.6	2.5-2.7
Urbanization						
Large Central Metro[§]	48	7.4	5.4-9.8	1,360	2.8	2.6-2.9
Large Fringe Metro[§§]	--	--	--	1,449	3.3	3.2-3.5
Medium Metro[§§§]	66	7.9	6.1-10.1	1,429	4.1	3.9-4.3
Small Metro[§§§§]	13	7.7	4.1-13.2	726	5.0	4.6-5.3
Micropolitan (non-metro)[§§§§§]	--	--	--	742	5.3	4.9-5.7
NonCore (non-metro)[§§§§§§]	10	¥	¥	559	5.7	5.2-6.2

[*]ICD-10 underlying cause of death codes X60-X84.

[‡]Urbanization were based on the 2013 National Center for Health Statistics urban classification scheme.

*Other race regardless of ethnicity, including Hispanics.

-- Suppressed because cell size <10.

¥Rate is deemed unreliable (RSE>30), therefore not reported.

[§]Counties in MSA of 1 million population that: 1) contain the entire population of the largest principal city of the MSA, or 2) are completely contained within the largest principal city of the MSA, or 3) contain at least 250,000 residents of any principal city in the MSA.

[§§]Counties in MSA of 1 million or more population that do not qualify as large central.

[§§§]Counties in MSA of 250,000-999,999 population.

[§§§§]Counties in MSAs of less than 250,000 population.

[§§§§§]Counties in micropolitan statistical area.

[§§§§§§]Counties not in micropolitan statistical areas.

Table 3. Demographic characteristics of Utah suicide[*] decedents aged 10-17 years (N=150), CDC WONDER, 2011-2015.

Characteristics		
	n	%
Age category		
10-14 years	37	24.6
15-17 years	113	75.4
Sex		
Male	116	77.4
Female	34	22.6
Race		
White, non-Hispanic	122	81.3
Other[**]	28	18.7

[*]ICD-10 underlying cause of death codes X60-X84.
[**]Included American Indian, Asian or Pacific Islander, Black or African American, and Hispanic.

Table 4. Characteristics of Utah suicide[*] decedents aged 10-17 years (N=150), 2011-2015.

	n	%
Mechanism[§]		
Suffocation[†]	69	46.0
Firearm	68	45.3
Other[††]	13	8.6
Location of Injury[¶]		
Home[¥]	124	83.7
Other[¥¥]	24	16.2

[*]ICD-10 underlying cause of death codes X60-X84.

[§]Data came from the CDC WONDER

[†]Includes hanging and strangulation. Deaths involving deprivation of oxygen due to inhalation of asphyxiant gases such as helium, nitrogen, propane, argon, butane are also included.

[††]Includes poisoning, fall, drowning and other transport vehicles such as train.

[¶]Data came from the UTVDRS.

[¥]House, apartment, rooming house, including driveway, porch, yard, and garage.

[¥¥]Included farm, natural area, motor vehicle, railroad tracks, office building, park/playground, and street/road.

Table 5. Precipitating circumstances for suicide[*] decedents in Utah aged 10-17 years (N=142[**]), UTVDRS, 2011-2015.

	n	%
Mental Health Diagnosis[‡]	50	35.2
Mental Health Treatment among those with diagnosis[¥]	42	84.0
Current Depressed Mood	44	31.0
History of Suicidal Thoughts/Plans or Suicide Attempt[¥¥]	42	29.6
Suicidal Thoughts	26	18.3
Suicide Attempts	23	16.2
Family relationship problems[¥¥¥]	45	31.7
Dating partner problems[¥¥¥¥]	22	15.7
Recent Crisis[† ¶]	83	55.3
Family relationship problems[††]	31	21.4
Dating partner problems[††]	15	10.6
School problem, suicide of friend/family, criminal legal problems[††]	19	13.4
Crisis not associated with a circumstance[††]	32	22.5
Disclosed intent	34	23.9
To friend[§§ ‡‡]	14	41.2
Parent/guardian[‡‡]	11	32.4
Left a suicide note	67	47.2
Experienced 2+ precipitating factors[§§§§]	97	68.3

[*]ICD-10 underlying cause of death codes X60-X84.

[**]Unless otherwise noted, N=142. The N=142 refers to decedents with the precipitating circumstance.

[‡]Disorders included diagnoses such as major depression, schizophrenia, and generalized anxiety disorder, as well as neurodevelopmental disorders (such as intellectual disability, autism, attention-deficit /hyperactivity disorder), eating disorders, personality disorders, and organic mental disorders.

[¥]Denominator included only individuals with diagnosed mental health problems (n=50).

[¥¥]Ideation and attempt were not mutually exclusive.

[¥¥¥]Situations in which a victim had relationship issues with a family member that appear to have contributed to the suicide.

[¥¥¥¥]Situations whereby a relationship with current or former dating partner appeared to have contributed to the suicide.

[†]Refers to a current/acute event (within 2 weeks of death) that is indicated in one of the source documents to have contributed to the death.

[¶]The denominator was 150.

[††]Crises were not mutually exclusive – a decedent may have experienced multiple crises, therefore percentage do not add up to 100%

[§§]Included a friend, classmate, boy/girlfriend, ex-boy/girlfriend.

[‡‡]Percentage do not add up to 100% because decedent may have disclosed intent to multiple individuals. Information about who intent was disclosed to was available for only 22 of the 34 decedents who disclosed their intent.

[§§§§] Estimated using the following circumstance information – Mental health diagnosis, current depressed mood, history of suicidal thoughts or plans, history of suicide attempts, family relationship problems, dating partner problems, recent crisis, and disclosed intent to die by suicide.

Table 6. Religiosity and other precipitating circumstances among Utah youth aged 10-17 who died by suicide[*] (N=146), from the additional data[¥] collected, Utah, 2011-2015.

Variable	n	%
Religiosity		
Decedents religiosity/religious affiliation[¶]	59	40.4
LDS affiliation	48	81.4
Non-LDS affiliation	11	18.6
Decedents family religiosity/ religious affiliation[¶¶]	84	57.5
LDS affiliation	71	84.5
Non-LDS affiliation	13	15.5
Family conflicts related to technology restriction[¥]	18	12.6
Ever Disclosed Intent[§]	69	47.3
Friend, boy/girlfriend, or ex-boy/girlfriend	47	68.1
Parent/guardian	29	42.0
Cutting behavior[§§]	30	20.5

[*]ICD-10 underlying cause of death codes X60-X84.

[¥]Additional information collected from medical examiner, law enforcement, autopsy, and toxicology reports, as well as obituary and online news articles.

[¶]Evidence existed that decedent attended religious services, was part of a religious body or served in the church.

[¶¶]Evidence existed that family belonged to a religious group, attended church, or conducted the decedent's funeral within a particular religious denomination.

[¥]Limitations in the use of technological devices that resulted in family conflict or other family conflicts that resulted in restriction to the use of technological devices such as mobile phones, tablets, gaming systems or laptops within seven days prior to dying by suicide. Denominator was 143.

[§]Victim disclosed to another person their thoughts and /or plans to commit suicide based on evidence from one of the source documents regardless of when that intent was disclosed. The communication could be verbal, written or electronic.

[§§]Denominator was 140.

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Table 7. Crude rate (per 100,000) of Emergency Department (ED) visits and inpatient hospitalizations for self-inflicted injury[¥] among youth in Utah aged 10-17 years during 2011-2014[§].

Year	ED visits* (n = 3,005)			Inpatient Hospitalizations[†] (n = 690)		
	N	Rate	SE	N	Rate	SE
2011	493	135.1	6.1	105	28.8	2.8
2012	612	164.4	6.7	173	46.5	3.5
2013	891	233.4	7.8	192	50.3	3.6
2014	1009	258.9	8.2	220	56.4	3.8

[¥]ICD-9 external codes (E-codes) in the range 950-959.9 from the principal diagnostic fields (the primary reason for the visit).

[§]Only data from 2011 to 2014 were included in the self-inflicted injuries. Although data from 2015 were available, it was excluded due to the challenges in identifying ICD-10 cases using the STIPDA standards (U.S. transitioned from ICD-9 to ICD-10 on October 1,2015).

* For ED visits: total annual percentage change (APC) was 25.3% (p<0.001).

[†] For inpatient hospitalizations: total annual percentage change (APC) was 20.6% (p=0.10).

Used ICD-9 external codes (E-codes) in the range 950-959.9.

Table 8. Characteristics of youth in Utah aged 10-17 years who were seen in the Emergency Department (ED) or were hospitalized for self-inflicted injury[¥] during 2011-2014.

Characteristics	ED visits* (N = 3,005)		Inpatient Hospitalizations[†] (N = 690)	
	n	%	n	%
Sex				
Male	828	27.6	197	28.6
Female	2177	72.5	493	71.5
Age Group				
10-17 years	999	33.2	198	28.7
15-17 years	2006	66.8	492	71.3
Race/Ethnicity				
White, non-Hispanic	1991	69.2	527	77.3
Non-white, non-Hispanic	237	8.2	80	11.7
Hispanic	588	20.4	29	4.3
Unknown	63	2.2	46	6.7
Disposition				
Discharged/transferred to a psychiatric facility	542	18	306	44.4
Discharge to home or self-care, routine discharge	1954	65	248	35.9
Discharge/transferred to another short-term general hospital	95	3.2	8	1.2
Discharged/transferred to another type of institution, cancer or pediatric hospital	196	6.5	94	13.6
Expired	--	--	--	--
Other	209	7.0	28	4.1

[¥]ICD-9 external codes (E-codes) in the range 950-959.9 from the principal diagnostic fields (the primary reason for the visit).

-- Suppressed because cell size <10.

Table 9. Crude rates (per 100,000) of ED visits and inpatient hospitalizations with suicidal ideation[¥] indicated among youth in Utah aged 10-17 years, 2011-2015.

	ED visits* (n = 8,745)			Inpatient Hospitalizations[†] (n = 6,548)		
Year	N	Rate	SE	N	Rate	SE
2011	995	272.7	8.7	756	207.2	7.5
2012	1344	361.1	9.9	893	239.9	8.0
2013	1805	472.9	11.1	1148	300.7	8.9
2014	2074	532.1	11.7	1619	415.4	10.3
2015	2527	634.6	12.6	2132	535.4	11.6

[¥]ICD-9 code v62.84 (Jan 01, 2011- Sept 30, 2015) and ICD-10 code R45.851 (Oct 1, 2015-Dec 31, 2015) occurring in any diagnostic field (DX1-DX9).
* For ED visits: total annual percentage change (APC) was 22.0% (p<0.001).
[†] For inpatient hospitalizations: total annual percentage change (APC) was 28.6% (p<0.001).

Table 10. Characteristics of youth in Utah aged 10-17 years who visited the ED or were hospitalized with suicidal ideation¥ indicated during 2011-2015.

Characteristics	ED visits* (N = 8,745)		Inpatient Hospitalizations† (N = 6,548)	
	n	%	n	%
Sex				
Male	3401	38.9	2436	38.0
Female	5345	61.1	3983	62.0
Age Group				
10-17 years	3540	40.5	2565	40.0
15-17 years	5206	59.5	3854	60.0
Race/Ethnicity				
White, non-Hispanic	4576	53.6	3724	58.2
Non-white, non-Hispanic	935	11.0	840	13.1
Hispanic	1093	12.8	295	4.6
Unknown	1938	22.7	1537	24.0
Disposition				
Discharged/transferred to a psychiatric facility	2413	27.6	774	12.1
Discharge to home or self-care, routine discharge	4950	56.6	4903	76.4
Discharge/transferred to another short-term general hospital	219	2.5	101	1.6
Discharged/transferred to another type of institution, cancer or pediatric hospital	253	2.9	213	3.3
Expired	0	0.0	0	0.0
Other	911	10.4	428	6.7

¥ICD-9 code v62.84 (Jan 01, 2011- Sept 30, 2015) and ICD-10 code R45.851 (Oct 1, 2015-Dec 31, 2015) occurring in any diagnostic field (DX1-DX9).

* For ED visits: total annual percentage change (APC) was 22.0% (p<0.001).

† For inpatient hospitalizations: total annual percentage change (APC) was 28.6% (p<0.001).

Table 11. Characteristics of youth in Utah aged 10-17 years who were seen in the Emergency Department (ED) with suicidal ideation[¥] or self-inflicted injury[§] during 2011-2014.

Characteristic	Total (n = 8,533)		Suicidal Ideation no self-inflicted injury (n = 5,528)		Self-inflicted injury no ideation (n = 2,366)		Ideation and self-inflicted injury (n = 639)	
	n	%	n	%	n	%	n	%
Sex								
Male	3129	36.7	2301	41.6	645	27.3	183	28.6
Female	5404	63.3	3227	58.4	1721	72.7	456	71.6
Age group								
10-14 years	3275	38.4	2276	41.2	772	32.6	227	35.5
15-17 years	5258	61.6	3252	58.8	1594	67.4	412	64.5
Race/Ethnicity								
White, Non-Hispanic	5759	70	3768	70.5	1584	70.1	407	65.9
Non-white, Non-Hispanic	831	10.1	594	11.1	181	8.0	56	9.1
Hispanic	1467	17.8	879	16.5	443	19.6	145	23.5
Unknown	167	2	104	2.0	53	2.3	10	1.6
Disposition								
Discharged/transferred to a psychiatric facility	2091	24.5	1549	28.0	372	15.7	170	26.6
Discharge to home or self-care, routine discharge	5146	60.3	3192	57.7	1626	68.7	328	51.3
Discharge/transferred to another short-term general hospital	197	2.3	102	1.9	73	3.1	22	3.4
Discharged/transferred to another type of institution, cancer or pediatric hospital	363	4.3	167	2	161	6.8	35	5.5
Expired	--	--	--	--	--	--	--	--
Other	727	8.5	518	9.4	125	5.3	84	13.2

[¥]ICD-9 code v62.84 (Jan 01, 2011- Dec 31, 2014) occurring in any diagnostic field (DX1-DX9).

[§]ICD-9 external codes (E-codes) in the range 950-959.9 from the principal diagnostic fields (the primary reason for the visit).

-- Suppressed because cell size <10.

Table 12. Bivariate and multivariate logistic regression of the likelihood of being transferred to a psychiatric unit among youth in Utah aged 10-17 years who were seen in the ED with suicidal ideation[¥] or self-inflicted injury[§] during 2011-2014.

Variable	OR	95% CI	aOR[+]	95% CI
Sex				
Male	1.12	1.01-1.24	1.05	0.94-1.17
Female	Ref		Ref	
Age group				
10-14 years	Ref		Ref	
15-17 years	0.91	0.82-1.00	0.95	0.86-1.06
Race/Ethnicity				
White, Non-Hispanic	Ref		Ref	
Non-white, Non-Hispanic	0.81	0.68-0.96.	0.78	0.65-0.92
Hispanic	0.45	0.38-0.52	0.45	0.39-0.53
Unknown	0.66	0.45-0.98	0.68	0.46-1.00
Suicidal behaviors[§]				
Self-inflicted injury only	Ref		Ref	
Suicidal ideation only	2.09	1.84-2.37	2.10	1.84-2.39
Both	1.94	1.58-2.39	2.08	1.68-2.57

Abbreviations: OR=odds ratio; aOR = adjusted odds ratio; CI = confidence interval.

* Odds ratios are associations between each characteristic variable and whether the patient was discharged to a psychiatric facility, versus discharged elsewhere, for example, to home or another type of healthcare facility.

[+] Multivariable models controlled for all of the variables in the table above in one model.

[¥] ICD-9 code V62.84 in any diagnostic field.

[§] ICD-9 E-codes 950-959.9 from the principal diagnostic field only.

Table 13. Overall prevalence of demographic characteristics by suicidal ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015

Characteristic	Total n with sample characteristic	Total % with sample characteristic	Prevalence, % (95% CI)	
			Suicidal ideation	Suicidal attempt
Sex				
Male	12706	46.7	13.7 (12.6, 14.9)	5.0 (4.4, 5.6)
Female	14507	53.3	25.5 (24.1, 27.0)	11.4 (10.5, 12.4)
Age group (years)				
10-14	13111	48.0	17.0 (15.9, 18.2)	7.9 (7.1, 8.7)
15-17	14218	52.0	21.4 (20.0, 22.9)	8.4 (7.6, 9.3)
Grade level				
8th	13206	48.3	17.1 (15.9, 18.3)	7.9 (7.1, 8.8)
10th	10616	38.9	22.6 (20.8, 24.6)	9.4 (8.3, 10.7)
12th	350	12.8	18.5 (16.7, 20.6)	5.8 (4.8, 7.1)
Race				
White	21988	80.8	18.7 (17.6, 19.9)	7.2 (6.6, 7.9)
Non-White	5208	19.2	23.4 (21.7, 25.2)	12.3 (11.2, 13.4)
Religious attendance				
Religious	17479	66.5	16.1 (15.2, 17.1)	5.9 (5.3, 6.5)
Less religious[a]	8792	33.5	27.4 (25.9, 29.1)	13.0 (11.9, 14.2)
Religious preference				
LDS (Mormon)	9982	61.8	15.3 (14.4, 16.4)	5.1 (4.6, 5.7)
Other religious preference	16120	38.2	27.1 (25.5, 28.7)	13.0 (11.9, 14.2)
Parent education level				
Less than HS	1561	6.5	27.6 (24.4, 31.1)	15.6 (13.2, 18.3)
HS graduate or some college	7707	32.2	23.4 (21.9, 25.0)	10.3 (9.2, 11.4)
College graduate	14649	61.3	16.9 (15.8, 18.1)	6.0 (5.4, 6.7)
Local public health district				
Bear River	3610	13.2	16.1 (14.4, 18.0)	6.7 (5.7, 7.8)
Central	1496	5.5	17.3 (14.5, 18.0)	7.5 (5.2, 10.6)
Davis	2545	9.3	18.1 (15.5, 21.1)	7.1 (5.5, 9.2)
Salt Lake	7325	26.8	20.9 (18.7, 23.2)	8.2 (7.1, 9.4)
San Juan	192	0.7	17.7 (13.3, 23.0)	9.7 (5.4, 16.8)
Southeast	836	3.1	17.5 (13.0, 23.1)	8.6 (5.9, 12.3)
Southwest	2450	9.0	17.9 (16.3, 19.5)	7.7 (6.5, 9.0)
Summit	826	3.0	15.1 (12.9, 17.5)	4.8 (3.6, 6.4)
Tooele	1877	6.9	21.3 (17.6, 25.7)	10.7 (8.2, 14.0)
Tri-County	439	1.6	26.1 (24.8, 27.5)	12.3 (11.6, 13.0)
Utah County	3426	12.5	20.1 (18.0, 22.4)	9.0 (7.6, 10.5)
Wasatch	671	2.5	13.3 (9.6, 18.1)	4.4 (3.7, 5.2)
Weber-Morgan	1636	6.0	21.6 (18.8, 24.7)	9.0 (7.5, 10.8)

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. [a]Based on a question asking "How often do you attend religious service or activities. Responses of never and rarely were categorized as less religious and attends 1-2 times per month and about once a week or more were categorized as religious. Abbreviations: OR, odds ratio; CI, confidence interval; Ref., Reference group; LDS, Latter Day Saints; HS, high school. Boldface indicates statistical significance at a p-value <0.05.

Table 14. Associations between demographic characteristics and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	OR (95% CI) Suicidal ideation	Suicidal attempt
Sex			
Male	12706	Ref.	Ref.
Female	14507	**2.15 (1.96, 2.37)**	**2.46 (2.16, 2.79)**
Age group (years)			
10-14	13111	Ref.	Ref.
15-17	14218	**1.33 (1.18, 1.50)**	1.07 (0.91, 1.26)
Grade level			
8th	13206	Ref.	Ref.
10th	10616	**1.42 (1.24, 1.63)**	**1.21 (1.01, 1.45)**
12th	350	1.11 (0.95, 1.29)	**0.72 (0.57, 0.91)**
Race			
White	21988	Ref.	Ref.
Non-White	5208	**1.33 (1.19, 1.48)**	**1.79 (1.57, 2.04)**
Religious attendance			
Religious	17479	**0.51 (0.47, 0.55)**	**0.42 (0.36, 0.48)**
Less religious[a]	8792	Ref.	Ref.
Religious preference			
LDS (Mormon)	9982	**0.49 (0.45, 0.53)**	**0.36 (0.31, 0.42)**
Other religious preference	16120	Ref.	Ref.
Parent education level			
Less than HS	1561	**1.88 (1.55, 2.28)**	**2.89 (2.30, 3.63)**
HS graduate or some college	7707	**1.50 (1.35, 1.66)**	**1.78 (1.54, 2.07)**
College graduate	14649	Ref.	Ref.
Local public health district			
Bear River	3610	**0.73 (0.60, 0.88)**	0.80 (0.64, 1.00)
Central	1496	0.79 (0.62, 1.02)	0.90 (0.60, 1.36)
Davis	2545	0.84 (0.67, 1.06)	0.86 (0.62, 1.17)
Salt Lake	7325	Ref.	Ref.
San Juan	192	0.81 (0.57, 1.17)	1.20 (0.62, 2.30)
Southeast	836	0.80 (0.55, 1.17)	1.05 (0.68, 1.62)
Southwest	2450	**0.83 (0.69, 0.99)**	0.93 (0.73, 1.17)
Summit	826	**0.67 (0.54, 0.84)**	**0.56 (0.40, 0.79)**
Tooele	1877	1.03 (0.78, 1.36)	1.35 (0.96, 1.88)
Tri-County	439	**1.34 (1.15, 1.57)**	**1.57 (1.33, 1.85)**
Utah County	3426	0.95 (0.78, 1.16)	1.11 (0.88, 1.40)
Wasatch	671	**0.58 (0.39, 0.86)**	**0.52, 0.41, 0.65)**
Weber-Morgan	1636	1.04 (0.84, 1.31)	1.11 (0.87, 1.43)

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. [a]Based on a question asking "How often do you

attend religious service or activities. Responses of never and rarely were categorized as less religious and attends 1-2 times per month and about once a week or more were categorized as religious. Abbreviations: OR, odds ratio; CI, confidence interval; Ref., Reference group; LDS, Latter Day Saints; HS, high school. Boldface indicates statistical significance at a p-value <0.05.

Table 15. Associations between depressive symptoms and psychological distress and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Depression-related indicators (Ref: No[a])				
Perceived low self-esteem	9552	27113	**17.09 (15.26, 19.13)**	**17.54 (14.68, 20.97)**
Perceived failure	5789	27062	**14.97 (13.36, 16.77)**	**15.46 (12.74, 18.78)**
Depressed or sad in most days	9682	27113	**16.30 (14.36, 18.51)**	**19.54 (15.40, 24.79)**
Psychological distress (N=24664)				
No psychological distress	16778		Ref.	Ref.
Moderate psychological distress	3780		**9.46 (8.23, 10.87)**	**8.16 (6.57, 10.15)**
Serious psychological distress	4106		**40.01 (33.63, 47.60)**	**34.39 (27.43, 43.11)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

[a]Response option of NO!, no, yes, and YES! were dichotomized to no and yes; Reference group represents participants that responded no or NO! to each item.

Table 16. Associations between substance use and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Ever used the following substance (Ref: Never used)				
Marijuana or hashish (hash, hash oil)	3659	27235	3.31 (2.89, 3.78)	4.33 (3.71, 5.04)
Cigarette, even just a puff	3151	27221	4.29 (3.75, 4.91)	5.88 (5.15, 6.71)
Electronic cigarettes	5536	26111	3.26 (2.81, 3.77)	4.35 (3.62, 5.22)
Chewing tobacco	892	25954	2.12 (1.76, 2.55)	2.80 (2.18, 3.59)
More than one sip or two of beer, wine, or hard liquor	6812	27212	3.50 (3.16, 3.87)	4.58 (4.00, 5.25)
Began drinking alcoholic beverages regularly, that is, at least once or twice a month	1648	27218	3.70 (3.22, 4.25)	4.88 (4.07, 5.86)
Sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays	1392	27233	4.11 (3.48, 4.86)	5.57 (4.65, 6.68)
LSD or other hallucinogens	668	27252	4.76 (3.89, 5.81)	5.45 (4.26, 6.96)
Cocaine or crack	310	27251	4.38 (3.28, 5.87)	5.79 (4.23, 7.94)
Methamphetamines	182	27161	5.98 (4.08, 8.75)	8.31 (5.40, 12.78)
Prescription stimulants or amphetamines	842	27231	5.16 (4.19, 6.36)	7.09 (5.46, 9.20)
Prescription sedatives	1154	27239	6.05 (5.04, 7.25)	7.46 (6.31, 8.81)
Prescription tranquilizers	435	27219	6.69 (4.79, 9.35)	7.50 (5.84, 9.62)
Narcotic prescription drugs	559	27205	5.02 (3.93, 6.42)	5.16 (3.86, 6.90)
Heroin	143	26807	4.64 (2.97, 7.27)	5.78 (3.58, 9.34)
Any substance use ever	5069	27274	4.12 (3.67, 4.61)	5.59 (4.82, 6.48)
Used the following substances in the previous month (Ref: Did not use)				
Marijuana or hashish	1702	27019	3.53 (3.04, 4.11)	4.49 (3.70, 5.45)
Cigarettes	806	27176	6.55 (5.17, 8.30)	8.83 (6.98, 11.19)
Electronic cigarettes	2691	27172	3.47 (3.04, 3.97)	4.81 (4.06, 5.69)
Chewing tobacco	292	27169	2.63 (1.80, 3.84)	4.49 (3.07, 6.57)
Alcoholic beverages	2043	27096	3.83 (3.26, 4.51)	4.69 (3.96, 5.55)
Sniffed glue or other inhalants	414	27220	6.55 (4.96, 8.65)	8.59 (6.31, 11.69)
LSD or other hallucinogens	225	27199	4.00 (2.83, 5.66)	5.09 (3.50, 7.40)
Cocaine or crack	85	27213	5.81 (3.65, 9.26)	8.14 (5.16, 12.84)
Methamphetamines	44	27179	10.74 (5.08, 22.71)	10.20 (4.52, 23.04)
Prescription stimulants or amphetamines	292	27199	6.45 (4.63, 8.97)	8.98 (6.32, 12.74)
Prescription sedatives	425	27215	8.27 (6.38, 10.90)	9.03 (6.79, 11.99)
Prescription tranquilizers	140	27203	8.04 (4.94, 13.10)	10.03 (6.34, 15.87)
Narcotic prescription drugs	192	27214	6.14 (4.15, 9.09)	7.45 (4.66, 11.90)
Heroin	39	27197	4.12 (1.84, 9.24)	6.65 (2.86, 15.48)
Steroids or anabolic steroids	100	27199	4.08 (2.37, 7.01)	1.62 (0.89, 2.92)

MDMA	91	27172	**4.07 (2.36, 7.03)**	**6.27 (3.49, 11.27)**
Synthetic marijuana	397	27188	**5.59 (4.35, 7.18)**	**9.05 (7.15, 11.47)**
Synthetic drugs	102	27199	**5.39 (3.19, 9.09)**	**6.54 (3.92, 10.93)**
Any substance use in the previous month	2519	27235	**4.62 (4.07, 5.25)**	**6.07 (5.13, 7.17)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., reference group; LSD, lysergic acid diethylamide; MDMA, Methylenedioxymethamphetamine. Boldface indicates statistical significance at a *p*-value <0.05.

Table 17. Associations between school protective factors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation	Suicide attempt
			OR (95% CI)	
Opportunities and rewards for prosocial involvement (Ref: No[a])				
In my school, students have lots of chances to help decide things like class activities and rules.	16312	27185	**0.67 (0.61, 0.73)**	**0.73 (0.65, 0.81)**
Teachers ask me to work on special classroom projects.	14913	27147	**0.77 (0.71, 0.84)**	**0.80 (0.72, 0.90)**
My teachers notice when I am doing a good job and let me know about it.	18559	27120	**0.52 (0.48, 0.57)**	**0.57 (0.50, 0.66)**
There are lots of chances for students in my school to get involved in sports, clubs, and other school activities outside of class.	25063	27216	**0.63 (0.55, 0.72)**	**0.54 (0.44, 0.66)**
There are lots of chances for students in my school to talk with a teacher one-on-one.	22514	27191	**0.49 (0.45, 0.55)**	**0.47 (0.42, 0.54)**
I feel safe at my school.	23918	27092	**0.24 (0.22, 0.27)**	**0.21 (0.18, 0.24)**
The school lets my parents know when I have done something well.	10798	27125	**0.50 (0.45, 0.56)**	**0.52 (0.45, 0.60)**
My teachers praise me when I work hard in school.	13554	27130	**0.60 (0.55, 0.65)**	**0.56 (0.49, 0.65)**
My school grades are better than the grades of most students in my class.	18466	27075	**0.47 (0.42, 0.52)**	**0.44 (0.39, 0.50)**
I have lots of chances to be part of class discussions or activities.	23522	27082	**0.50 (0.45, 0.56)**	**0.38 (0.34, 0.44)**
Extracurricular involvement in past year (Ref: Never)				
Participated in clubs, organizations, or activities at school, at least once.	19771	27109	**0.87 (0.79, 0.97)**	**0.75 (0.66, 0.85)**
Done extra work on your own for school, at least once.	21716	27036	**0.77 (0.69, 0.85)**	**0.67 (0.59, 0.77)**
Volunteered to do community service, at least once.	17161	27096	**0.72 (0.66, 0.78)**	**0.63 (0.56, 0.70)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

^aResponse option of NO!, no, yes, and YES! were dichotomized to no and yes; Reference group represents participants that responded no or NO! to each item.

Table 18. Associations between school risk factors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Low commitment to school and academic failure				
I never or seldom enjoyed being in school in the past year. (Ref: Did enjoy)	4753	27186	**2.50 (2.26, 2.77)**	**2.68 (2.33, 3.08)**
I often or almost always hated being in school in the past year (Ref: Did not hate)	7776	27113	**2.46 (2.24, 2.71)**	**2.50 (2.20, 2.84)**
I never or seldom tried doing my best work in school in the past year (Ref: Did try)	596	27090	**2.20 (1.67, 2.90)**	**2.27 (1.71, 3.02)**
I never or seldom felt the school work I am assigned is meaningful and important (Ref: Did feel it was meaningful and important)	7483	27025	**2.03 (1.85, 2.22)**	**1.80 (1.61, 2.01)**
I received mostly Cs, Ds, or Fs last year (Ref: Mostly As and Bs)	4349	26713	**2.05 (1.85, 2.28)**	**2.56 (2.24, 2.92)**
The things I am learning in school are not at all important for me later in life (Ref: They are important)	776	27156	**2.17 (1.72, 2.74)**	**2.14 (1.67, 2.74)**
Most of my courses are not at all interesting (Ref: They are interesting)	1064	27159	**1.97 (1.68, 2.31)**	**2.16 (1.74, 2.70)**
During the last four weeks, I missed at least one whole school day because I skipped or cut (Ref: Missed 0 days)	7519	26931	**1.51 (1.36, 1.68)**	**1.78 (1.57, 2.01)**
School violence and bullying				
I missed school in the last month because I felt unsafe at school (Ref: Did not miss school because I felt unsafe)	2068	26903	**4.45 (3.88, 5.11)**	**5.81 (4.99, 6.77)**
I was bullied on school property in the last year (Ref: Not bullied)	8249	26881	**3.84 (3.49, 4.21)**	**4.43 (3.88, 5.04)**
I was electronically bullied in the last year (Ref: Not bullied)	7405	26919	**4.77 (4.38, 5.20)**	**6.40 (5.56, 7.36)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

Table 19. Associations between family environment factors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Family protective factors (Ref: No[a])				
My parents expect me to eat dinner at home with my family.	22122	27130	**0.47 (0.42, 0.52)**	**0.43 (0.38, 0.48)**
My parents have set clear rules and expectations with me about not drinking any alcohol.	23061	27096	**0.36 (0.32, 0.39)**	**0.58 (0.50, 0.67)**
Family risk factors (Ref: No[a])				
People in my family often insult or yell at each other.	8526	27099	**3.44 (3.15, 3.75)**	**3.55 (3.17, 3.99)**
We argue about the same things in my family over and over.	10119	27018	**3.30 (3.05, 3.57)**	**3.14 (2.79, 3.55)**
People in my family have serious arguments.	6844	27033	**3.72 (3.39, 4.09)**	**3.93 (3.53, 4.38)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

[a]Response option of NO!, no, yes, and YES! were dichotomized to no and yes; Reference group represents participants that responded no or NO! to each item.

Table 20. Associations between anti-social behaviors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015   (N=27,329)

Characteristic	Total n with sample characteristic	Total N	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Ever engaged in the following anti-social behaviors (Ref: Never engaged)				
Suspended from school	3537	27210	**2.01 (1.81, 2.24)**	**2.62 (2.29, 3.01)**
Arrested	867	27224	**2.98 (2.55, 3.50)**	**3.88 (3.22, 4.68)**
Carried a handgun	2851	27103	**1.47 (1.29, 1.68)**	**1.39 (1.19, 1.62)**
Attacked someone with the idea of seriously hurting them	2042	27162	**3.56 (3.12, 4.07)**	**4.04 (3.40, 4.80)**
Belonged to a gang	826	27068	**3.34 (2.72, 4.12)**	**4.32, (3.37, 5.54)**
Engaged in the following anti-social behaviors in previous year (Ref: Did not engage)				
Suspended from school	1807	**27165**	**1.96 (1.70, 2.26)**	**2.89 (2.42, 3.44)**
Arrested	630	27096	**2.94 (2.37, 3.64)**	**4.08 (3.22, 5.17)**
Carried a handgun	2462	27144	**1.48 (1.27, 1.73)**	**1.40 (1.18, 1.65)**
Attacked someone with the idea of seriously hurting them	1538	27144	**3.77 (3.24, 4.39)**	**4.83 (4.02, 5.81)**
Sold illegal drugs	786	26952	**3.28 (2.69, 4.01)**	**3.74 (3.00, 4.67)**
Stolen or tried to steal a motor vehicle	367	27120	**3.47 (2.52, 4.79)**	**4.63 (2.99, 7.16)**
Been drunk or high at school	1764	27088	**4.33 (3.76, 5.00)**	**6.18 (5.32, 7.18)**
Taken a handgun to school	88	27124	**2.77 (1.32, 5.81)**	**5.04 (2.92, 8.68)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

Table 21. Associations between prosocial behaviors and environments and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015

Characteristic	Total N	Overall mean	Suicidal ideation OR (95% CI)	Suicide attempt OR (95% CI)
Prosocial behaviors[a]	26,909	9.93	**0.97 (0.96, 0.98)**	**0.95 (0.94, 0.96)**
Positive community level social environment[b]	13,482	7.46	**0.82 (0.80, 0.83)**	**0.79 (0.76, 0.81)**
Positive school social environment[c]	26,728	14.15	**0.85 (0.83, 0.87)**	**0.85 (0.83, 0.87)**
Supportive peer social environment[d]	13,365	17.80	**0.93 (0.92, 0.94)**	**0.91 (0.90, 0.92)**
Supportive family social environment[e]	13,442	9.37	**0.72 (0.70, 0.74)**	**0.71 (0.68, 0.73)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. [a]For pro-social behaviors, a higher mean score indicates stronger pro-social behaviors, with a possible range of 1-24. [b]For positive community-level social environment, a higher mean score indicates stronger community-level social environments, with a possible range of 1-12. [c]For positive school social environment, a higher mean score indicates stronger school social environments, with a possible range of 1-20. [d]For supportive peer environment, a higher mean score indicates stronger peer environments, with a possible range of 1-25. [e]For supportive family social environment, a higher mean score indicates stronger family social environments, with a possible range of 1-12. *Abbreviations*: OR, odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

Table 22. Adjusted associations between selected risk factors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=9,978)

Characteristic	Suicidal ideation	Suicide attempt
	AOR (95% CI)	
Sex		
Male	Ref.	Ref.
Female	**1.66 (1.37, 2.01)**	**1.46 (1.05, 2.04)**
Age group (years)		
10-14	Ref.	Ref.
15-17	1.15 (0.92, 1.44)	0.96 (0.73, 1.27)
Race		
White	Ref.	Ref.
Non-White	1.00 (0.80, 1.26)	1.27 (0.96, 1.67)
Religious preference		
LDS (Mormon)	**0.73 (0.60, 0.90)**	**0.69 (0.53, 0.90)**
Other religious preference	Ref.	Ref.
Parent education level		
Less than HS	0.80 (0.53, 1.20)	1.27 (0.78, 2.09)
HS graduate or some college	0.84 (0.70, 1.02)	0.96 (0.74, 1.25)
College graduate	Ref.	Ref.
Risk factors		
I was bullied on school property in the last year (Ref: Not bullied)	**1.91 (1.53, 2.38)**	**2.02 (1.48, 2.75)**
I was electronically bullied in the last year (Ref: Not bullied)	**1.82 (1.47, 2.24)**	**1.73 (1.23, 2.43)**
Any substance use in the previous month (Ref: No use)	**1.84 (1.39, 2.44)**	**1.87 (1.31, 2.67)**
Any tobacco use in the previous month (Ref: No use)	**1.51 (1.11, 2.06)**	**1.82 (1.17, 2.83)**
Psychological distress		
No distress	Ref.	Ref.
Moderate distress	**6.18 (4.92, 7.77)**	**4.24 (2.76, 6.50)**
Serious distress	**20.16 (15.51, 26.21)**	**11.96 (8.06, 17.76)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. The risk factors for the model were selected based on the common precipitating circumstances found among the 150 youth suicide decedents. Adjusted model includes demographic characteristics and all risk factors simultaneously (in a single model). *Abbreviations*: AOR, adjusted odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

Table 23. Adjusted associations between selected protective factors and suicide ideation and attempts among Utah youth* – Utah, Prevention Needs Assessment 2015 (N=10,579)

Characteristic	Suicidal ideation AOR (95% CI)	Suicide attempt AOR (95% CI)
Sex		
Male	Ref.	Ref.
Female	**2.40 (2.00, 2.87)**	**2.25 (1.75, 2.89)**
Age group (years)		
10-14	Ref.	Ref.
15-17	1.04 (0.86, 1.25)	0.85 (0.64, 1.12)
Race		
White	Ref.	Ref.
Non-White	0.87 (0.71, 1.07)	0.97 (0.74, 1.26)
Religious preference		
LDS (Mormon)	**0.72 (0.61, 0.83)**	**0.64 (0.48, 0.86)**
Other religious preference	Ref.	Ref.
Parent education level		
Less than HS	0.85 (0.60, 1.21)	1.05 (0.71, 1.56)
HS graduate or some college	0.89 (0.76, 1.05)	0.95 (0.74, 1.21)
College graduate	Ref.	Ref.
Protective factors		
Prosocial behaviors[a]	1.02 (1.00, 1.04)	1.01 (0.98, 1.03)
Positive community level social environment[b]	**0.94 (0.91, 0.97)**	**0.93 (0.88, 0.98)**
Positive school social environment[c]	0.96 (0.93, 1.00)	0.99 (0.94, 1.05)
Supportive peer social environment[d]	**0.97 (0.96, 0.99)**	**0.96 (0.94, 0.98)**
Supportive family social environment[e]	**0.76 (0.73, 0.78)**	**0.76 (0.73, 0.80)**

Note: *Utah youth represents Utah Prevention Needs Assessment (2015) survey participants between 8th and 12th grades and between the ages of 10 and 17 years. The protective factors were selected for the model based on UDOH prior work. Model includes demographic characteristics and protective factors simultaneously. [a]For pro-social behaviors, a higher mean score indicates stronger pro-social behaviors, with a possible range of 1-24. [b]For positive community-level social environment, a higher mean score indicates stronger community-level social environments, with a possible range of 1-12. [c]For positive school social environment, a higher mean score indicates stronger school social environments, with a possible range of 1-20. [d]For supportive peer environment, a higher mean score indicates stronger peer environments, with a possible range of 1-25. [e]For supportive family social environment, a higher mean score indicates stronger family social environments, with a possible range of 1-12. *Abbreviations*: AOR, adjusted odds ratio; CI, confidence interval; Ref., Reference group. Boldface indicates statistical significance at a *p*-value <0.05.

Figures

Figure 1. Map of Utah's 13 local health districts.
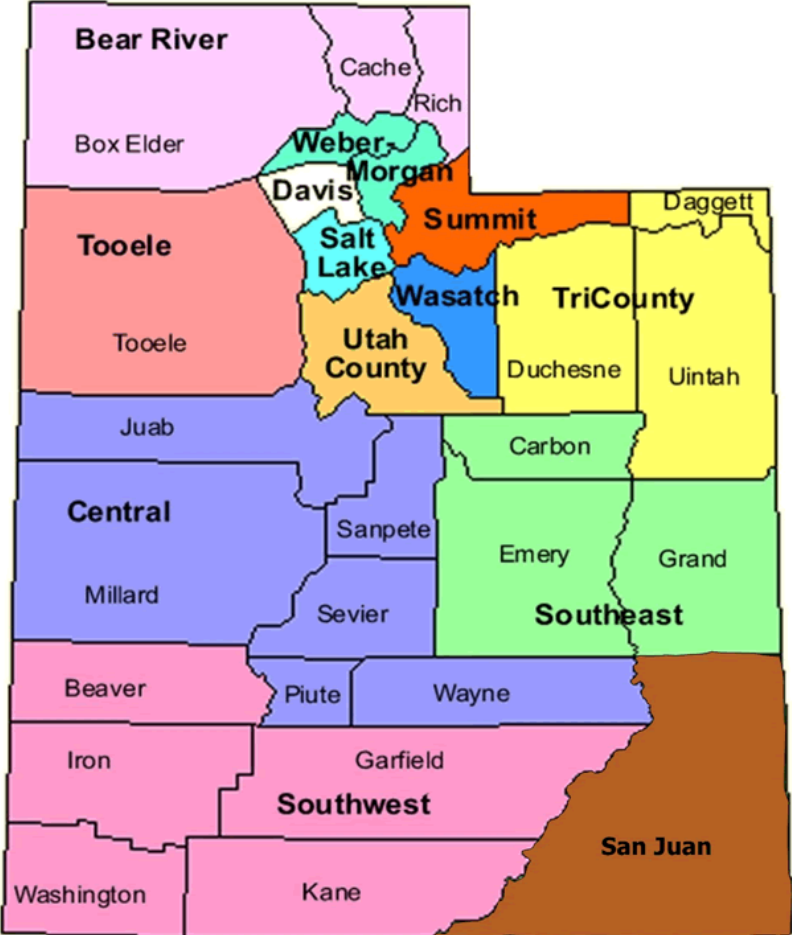
Source: Utah's Public Health Indicator Based Information System (IBIS)

Figure 2. Prevention Needs Assessment Survey Sample Selection
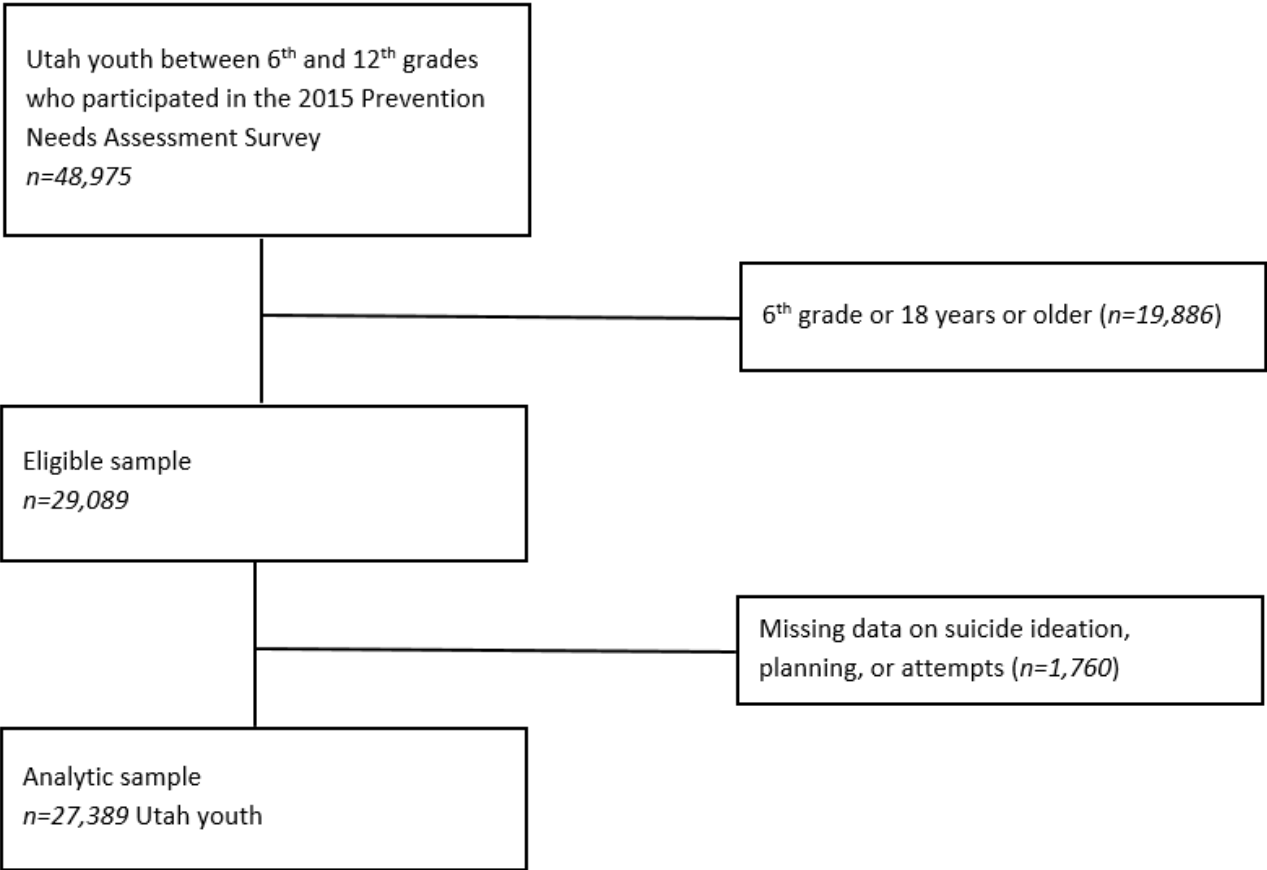
Figure 3. Crude suicide rate per 100,000 among youth aged 10-17 years during 2011-2015, Utah vs. U.S., CDC WONDER, 2011-2015.
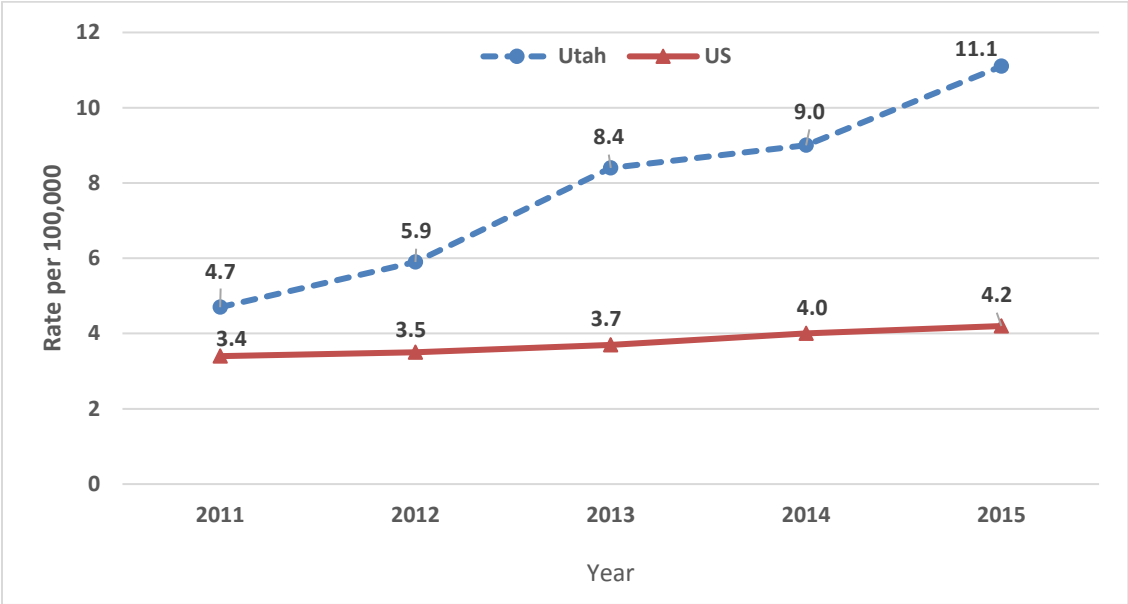
APC for Utah youth aged 10-17 who died by suicide during 2011-2015 = 22.8 (p<0.001).
APC for US youth aged 10-17 who died by suicide during 2011-2015=6.0 (p<0.001).

Figure 4. Trends in crude suicide rate among Utah youth aged 10-17 years using joinpoint, by sex, UTVDRS, 2011-2015.
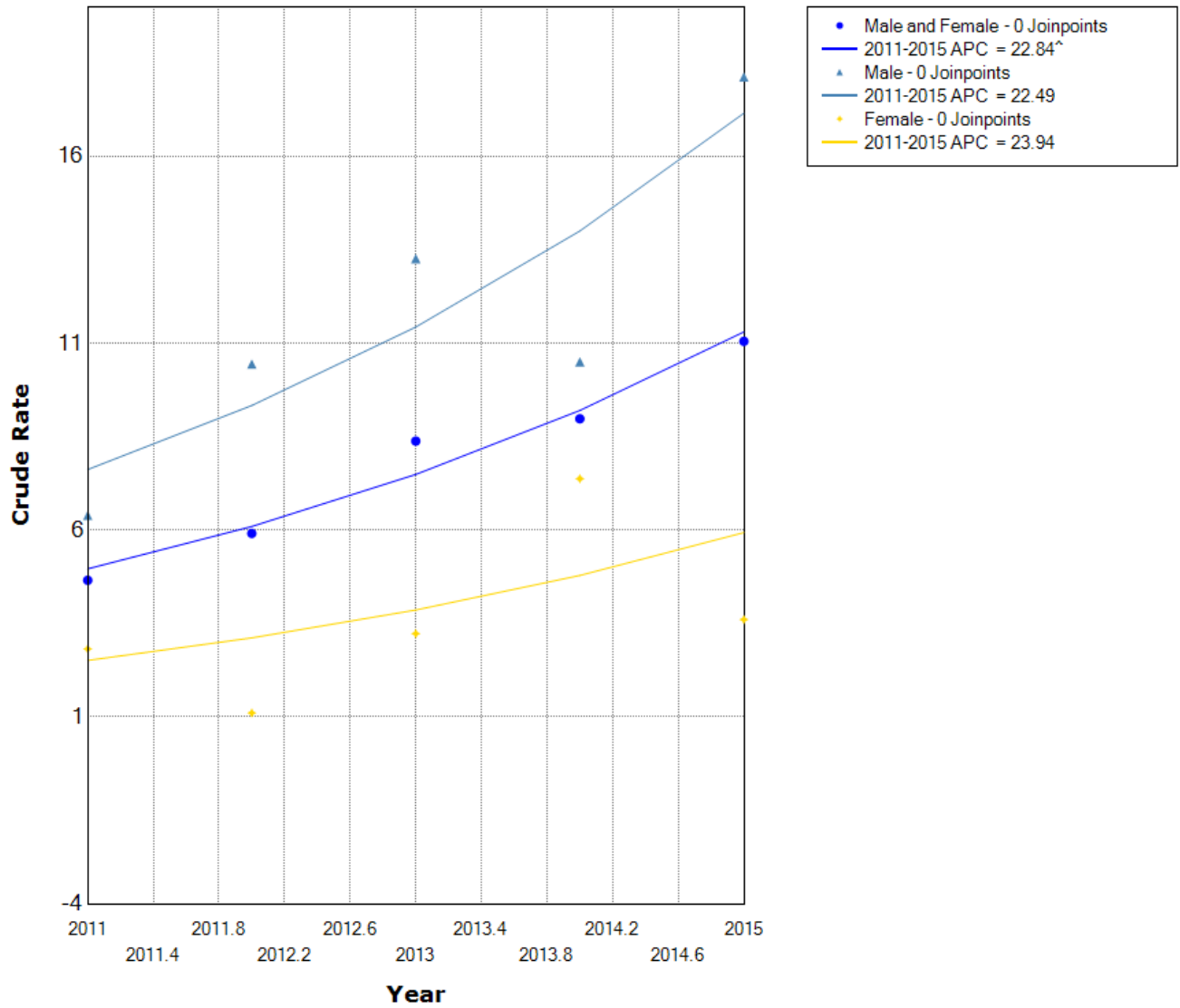
Figure 5. Suicide among Utah youth aged 10-17 years, by quarter of the year, UTVDRS, 2011-2015.
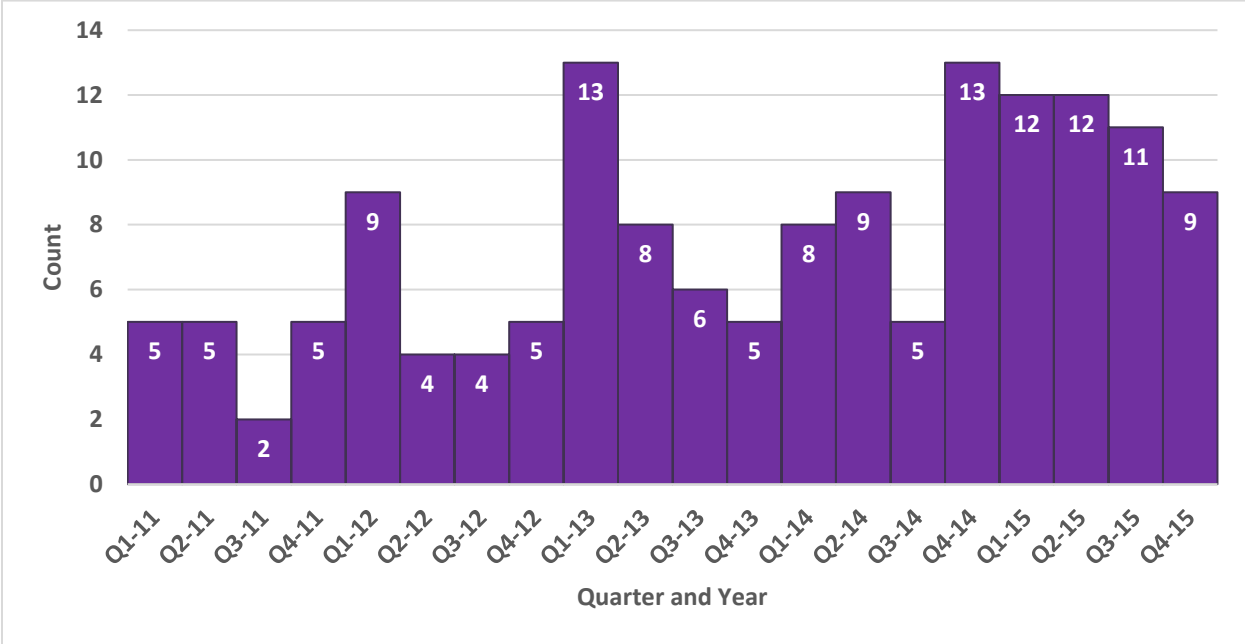
Figure 6. Count of youth in Utah aged 10-17 years with Emergency Department (ED) visits and inpatient hospitalizations for self-inflicted injury, by quarter of the year, Utah, 2011-2014.
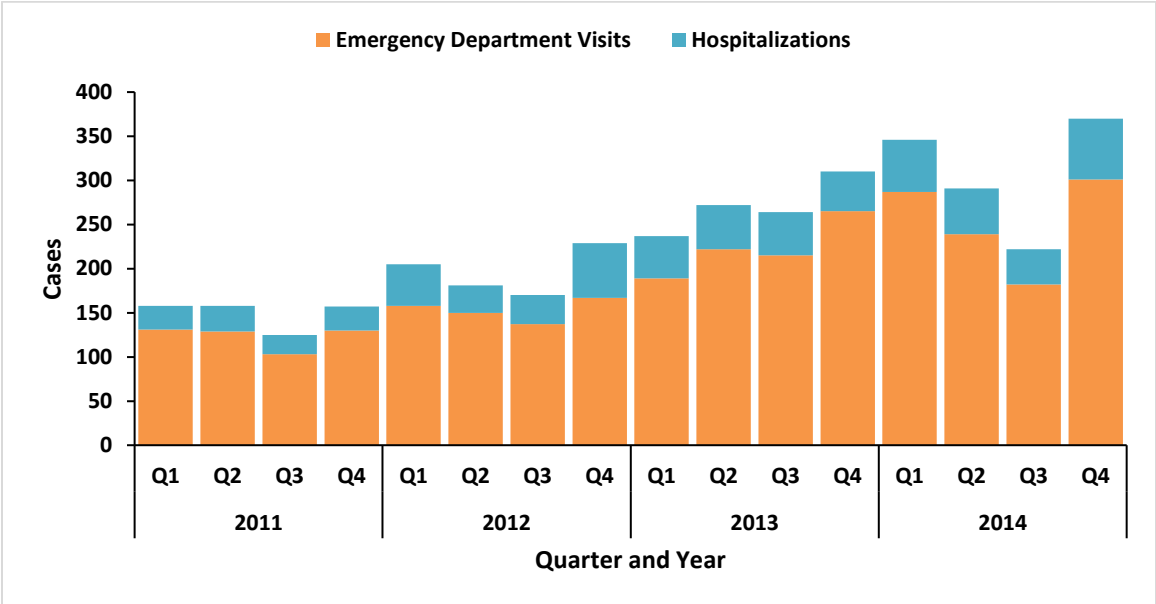
Figure 7. Crude rate (per 100,000) of Emergency Department visits for self-inflicted injuries among youth aged 10-17 years, by Sex, Utah, 2011-2014.
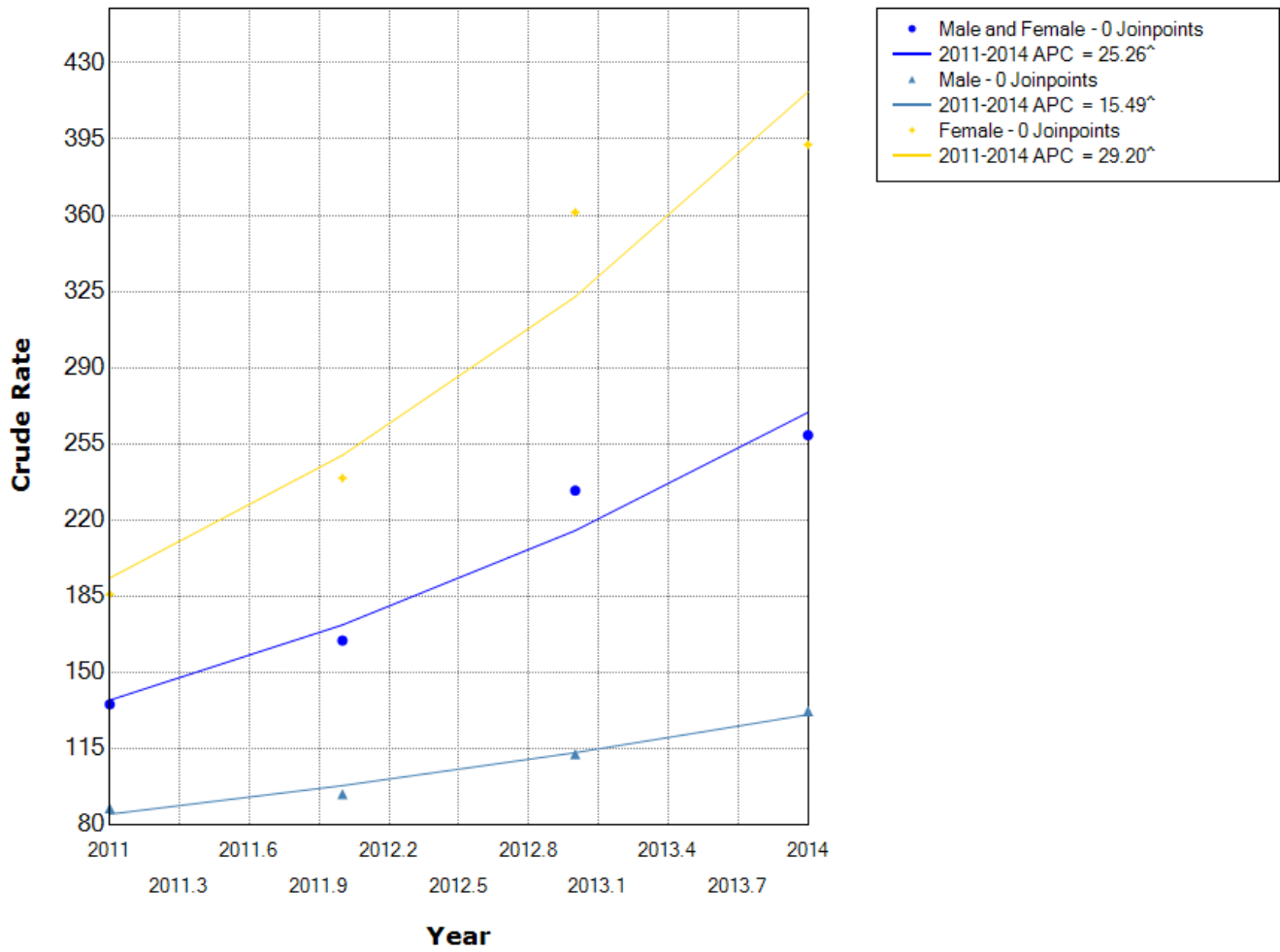
Figure 8. Crude rate (per 100,000) of inpatient hospitalizations for self-inflicted injury among youth aged 10-17 years, by sex, Utah, 2011-2014.
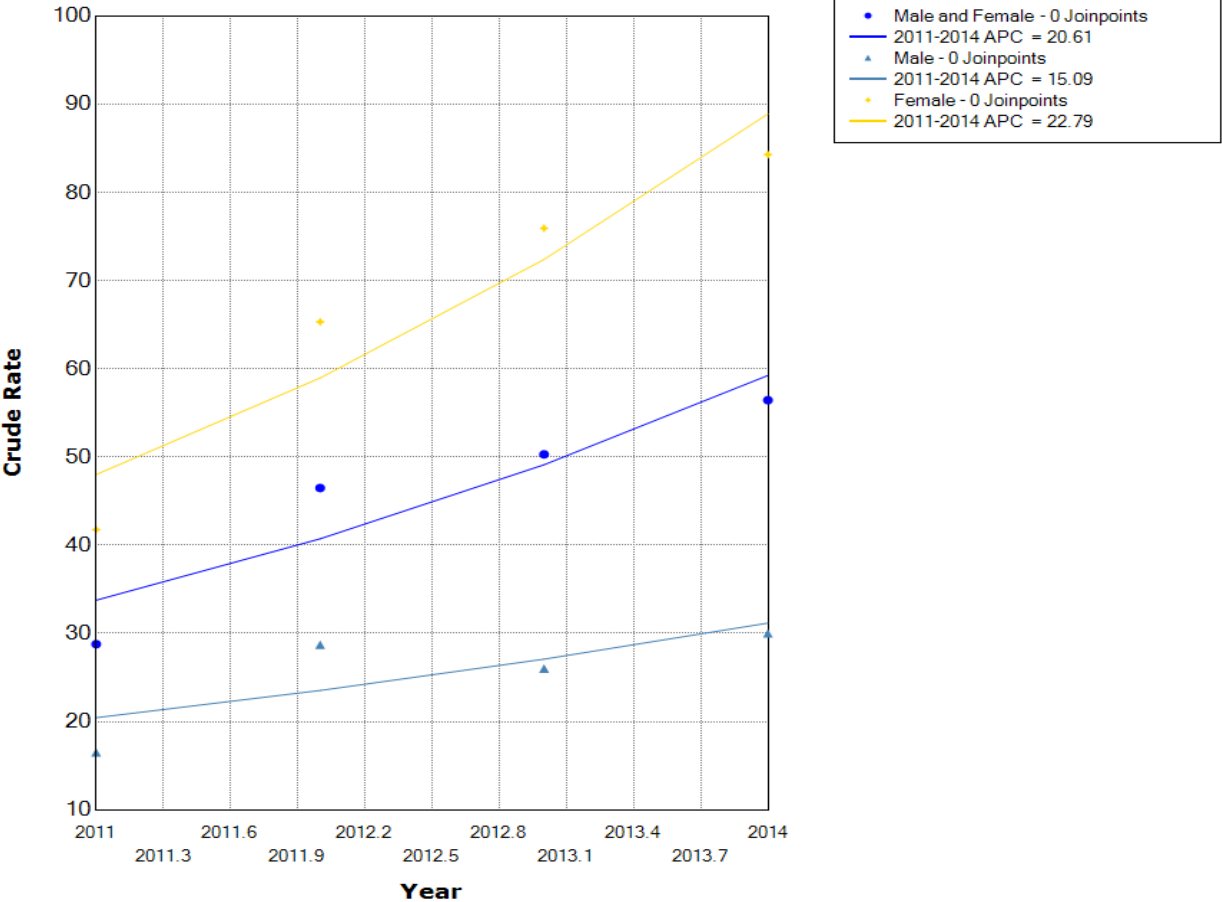
Figure 9. Method of injury for Emergency Department (ED) visits and inpatient hospitalizations for self-inflicted injury among youth aged 10-17 years, Utah, 2011-2014.
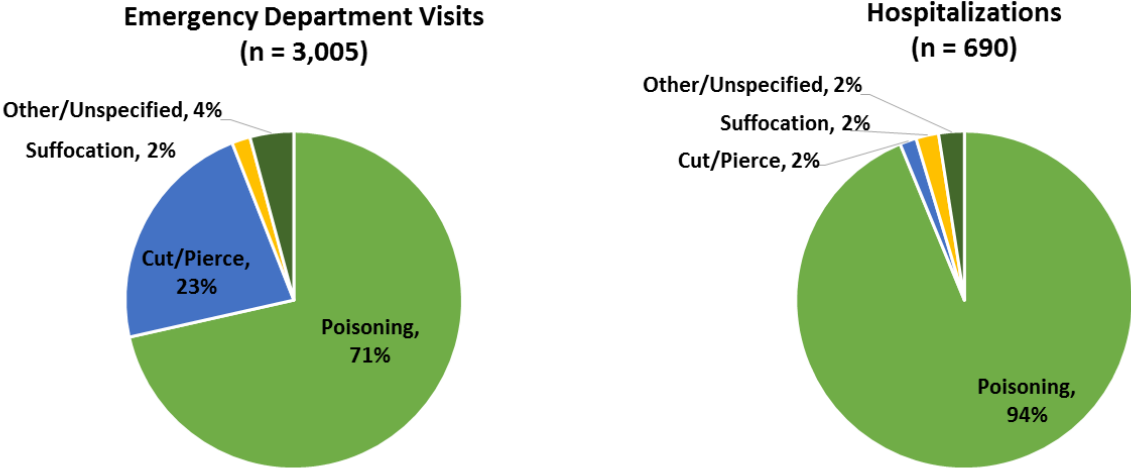
Figure 10. Count of youth aged 10-17 years who were seen in the Emergency Department (ED) or had Inpatient Hospitalizations with suicidal ideation, by quarter of the year, Utah, 2011-2015.
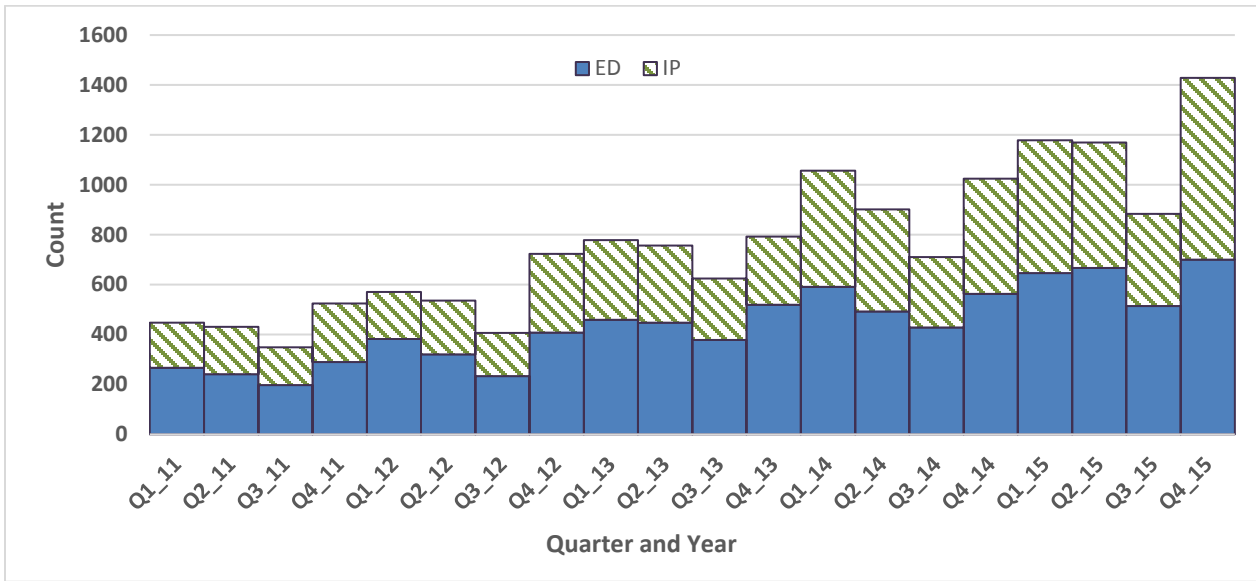
ED – Emergency Department; IP – Inpatient Hospitalization

Figure 11. Crude rate (per 100,000) of suicidal Ideation among youth aged 10-17 years who were seen in the Emergency Department, by sex, Utah, 2011-2015.
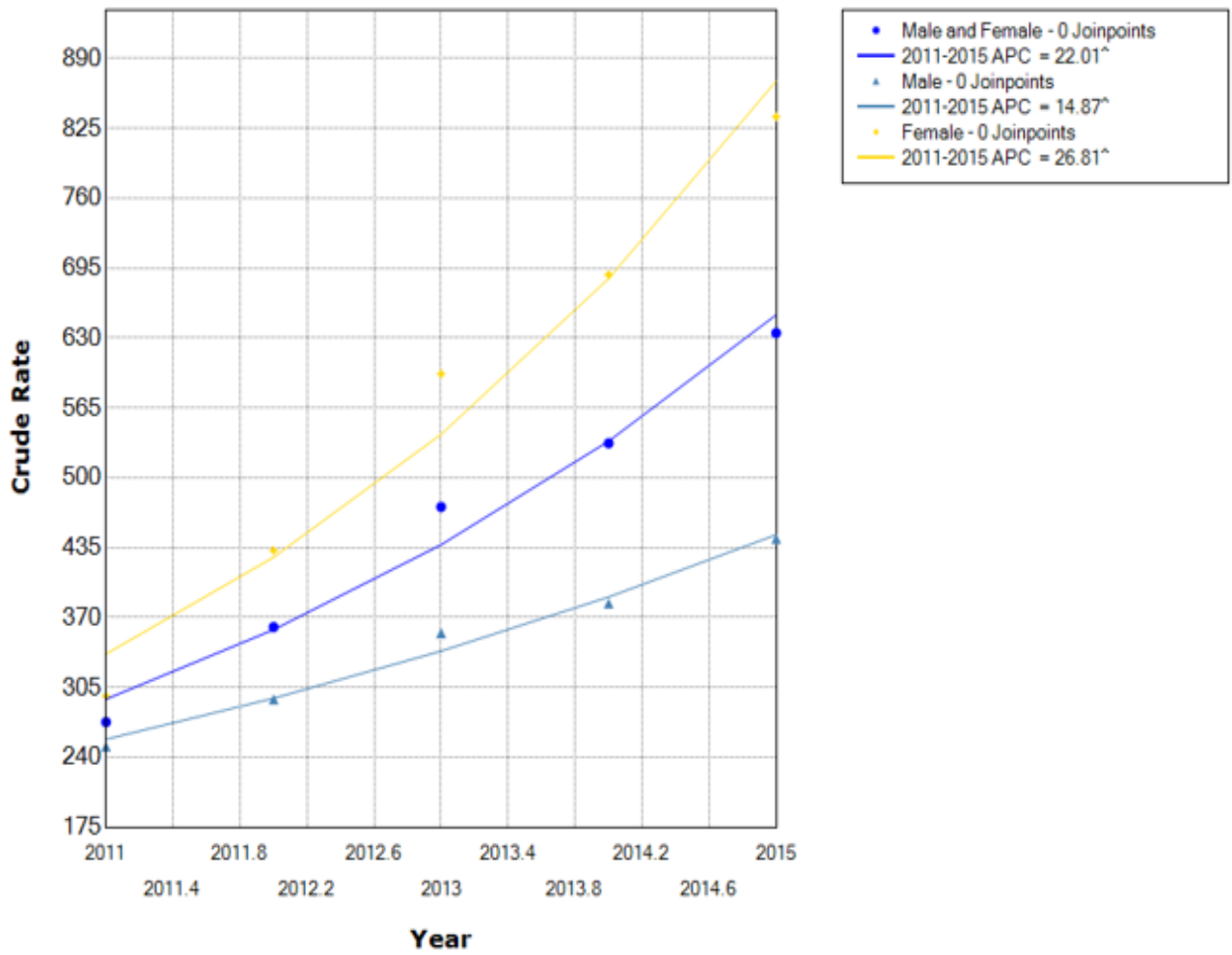
Figure 12. Crude rate (per 100,000) of suicidal Ideation among youth aged 10-17 years who were hospitalized with suicidal ideation, by sex, Utah, 2011-2015.
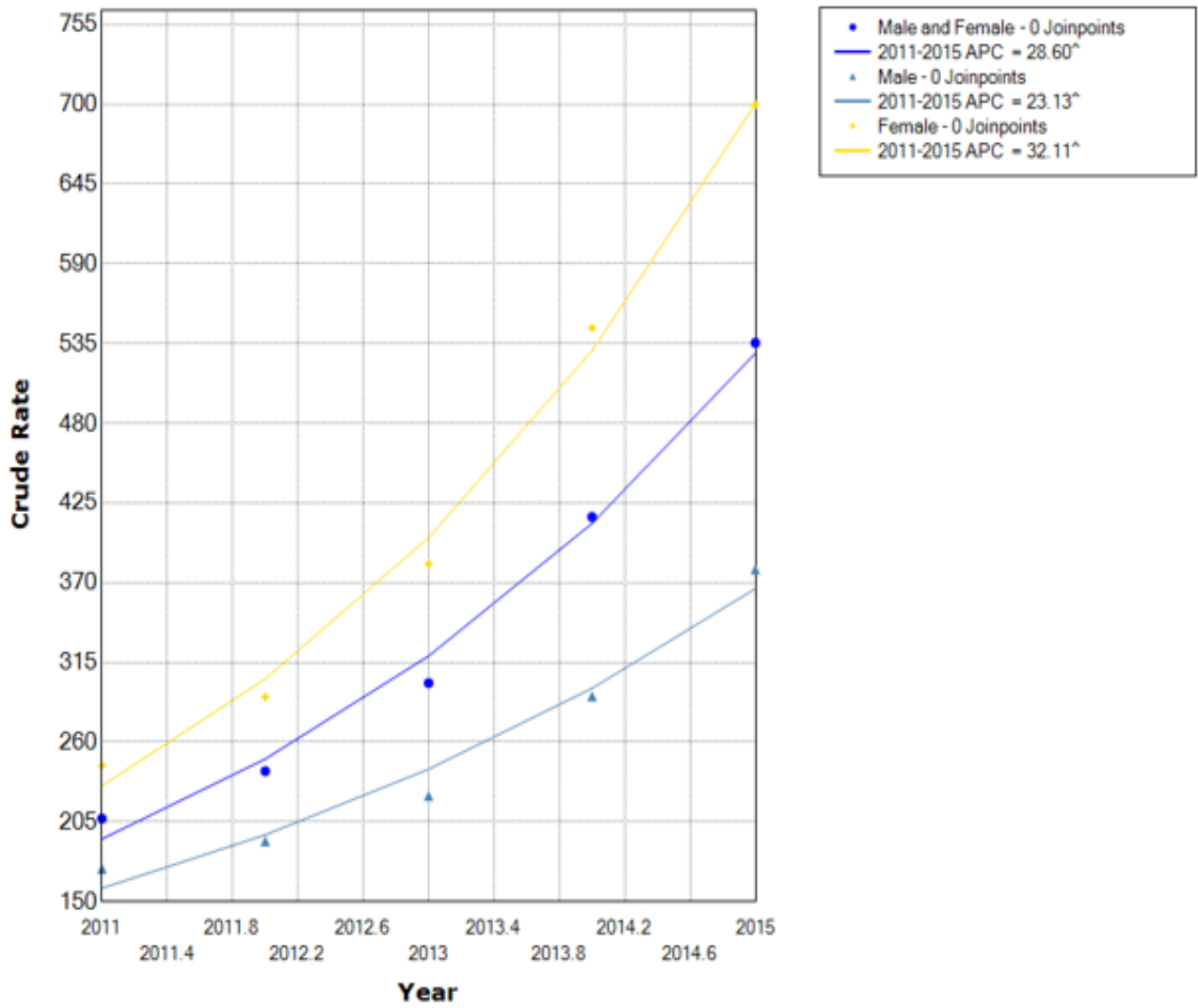
Figure 13. Rates of suicidal Ideation among youth aged 10-17 years who were seen in the Emergency Department by local public health district, Utah, 2011-2015.
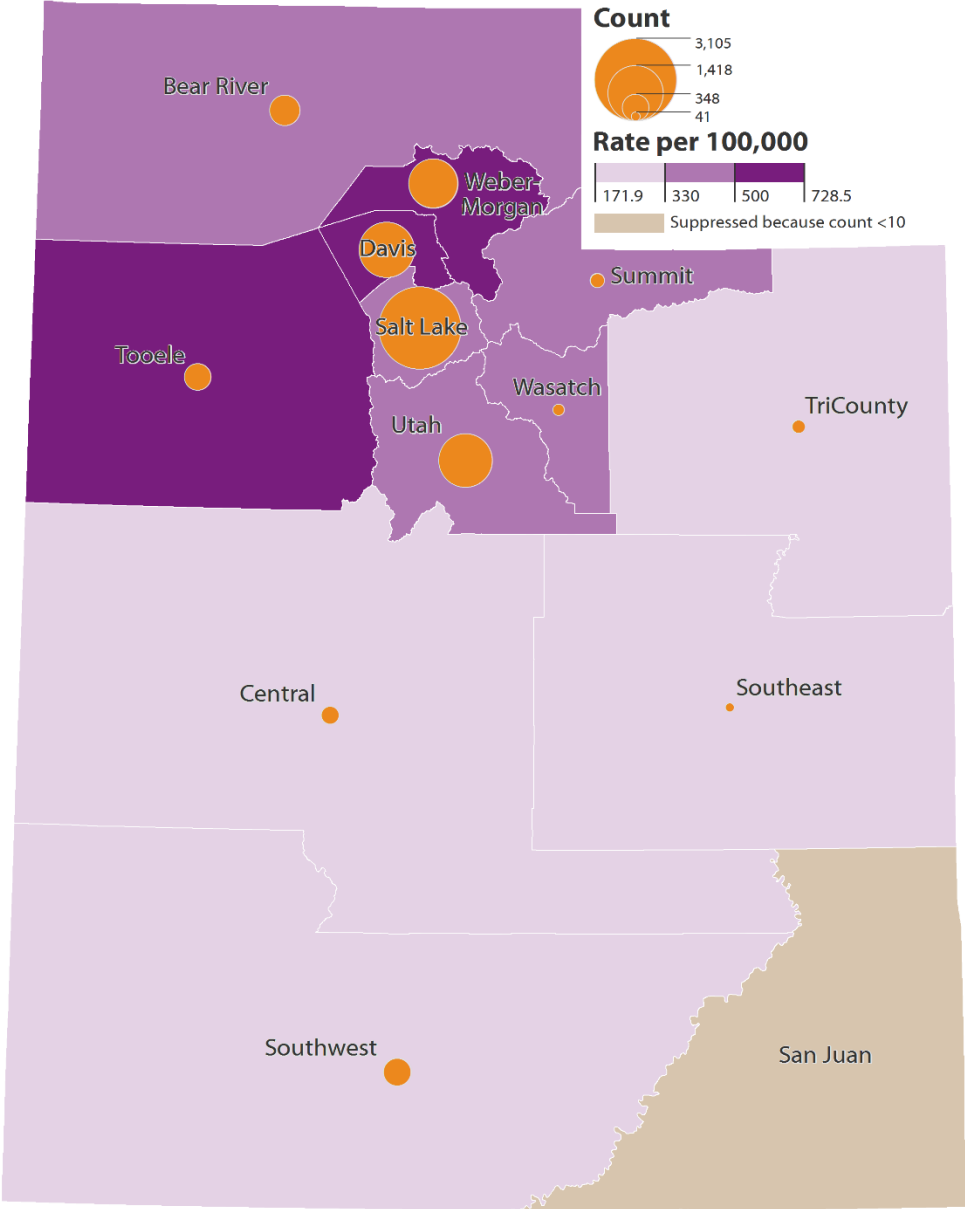
Figure 14. Rates of suicidal Ideation among youth aged 10-17 years who were hospitalized with suicidal ideation by local public health district, Utah, 2011-2015.
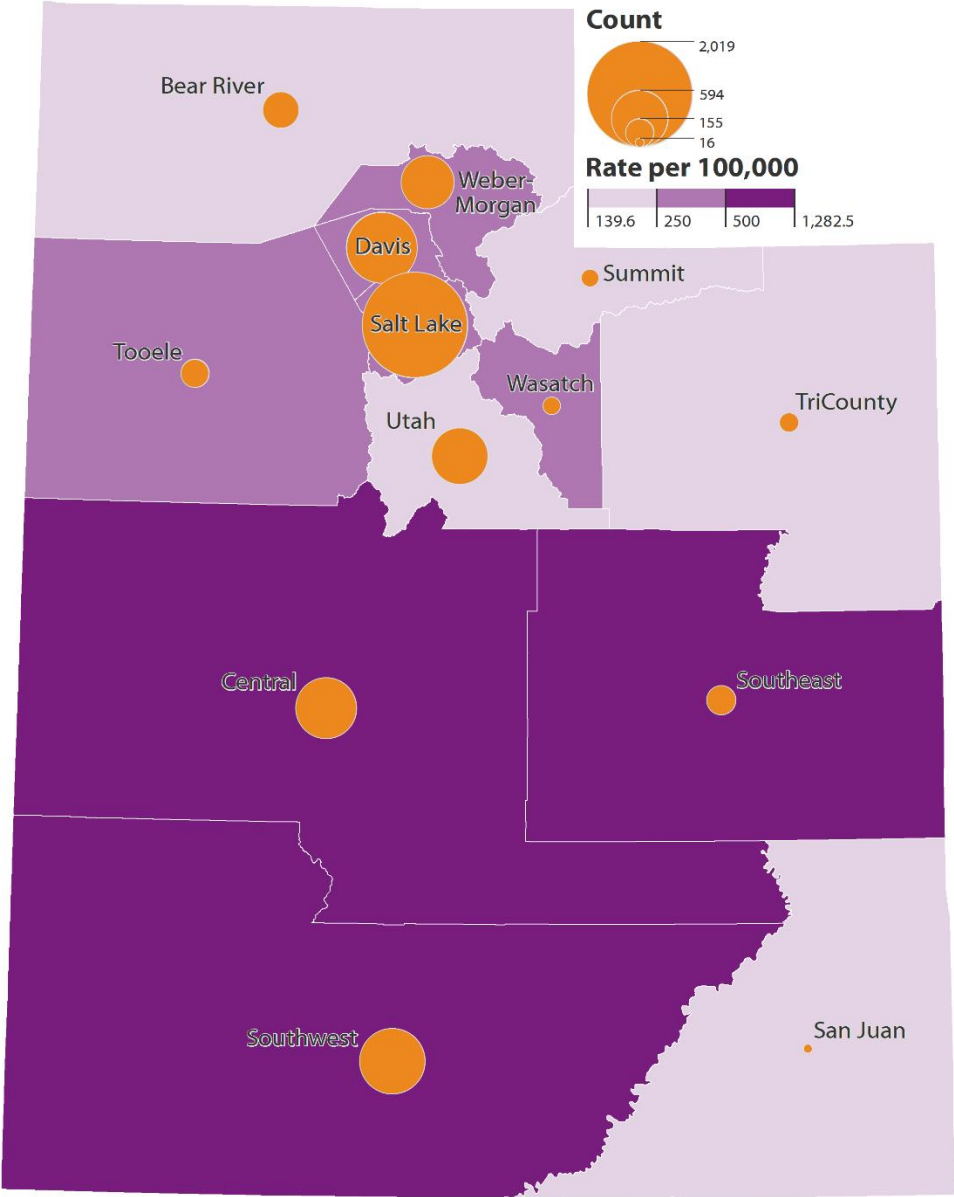
Figure 15. Rates of Emergency Department visits for self-inflicted injury among youth aged 10-17 years by local public health district, Utah, 2011-2014.
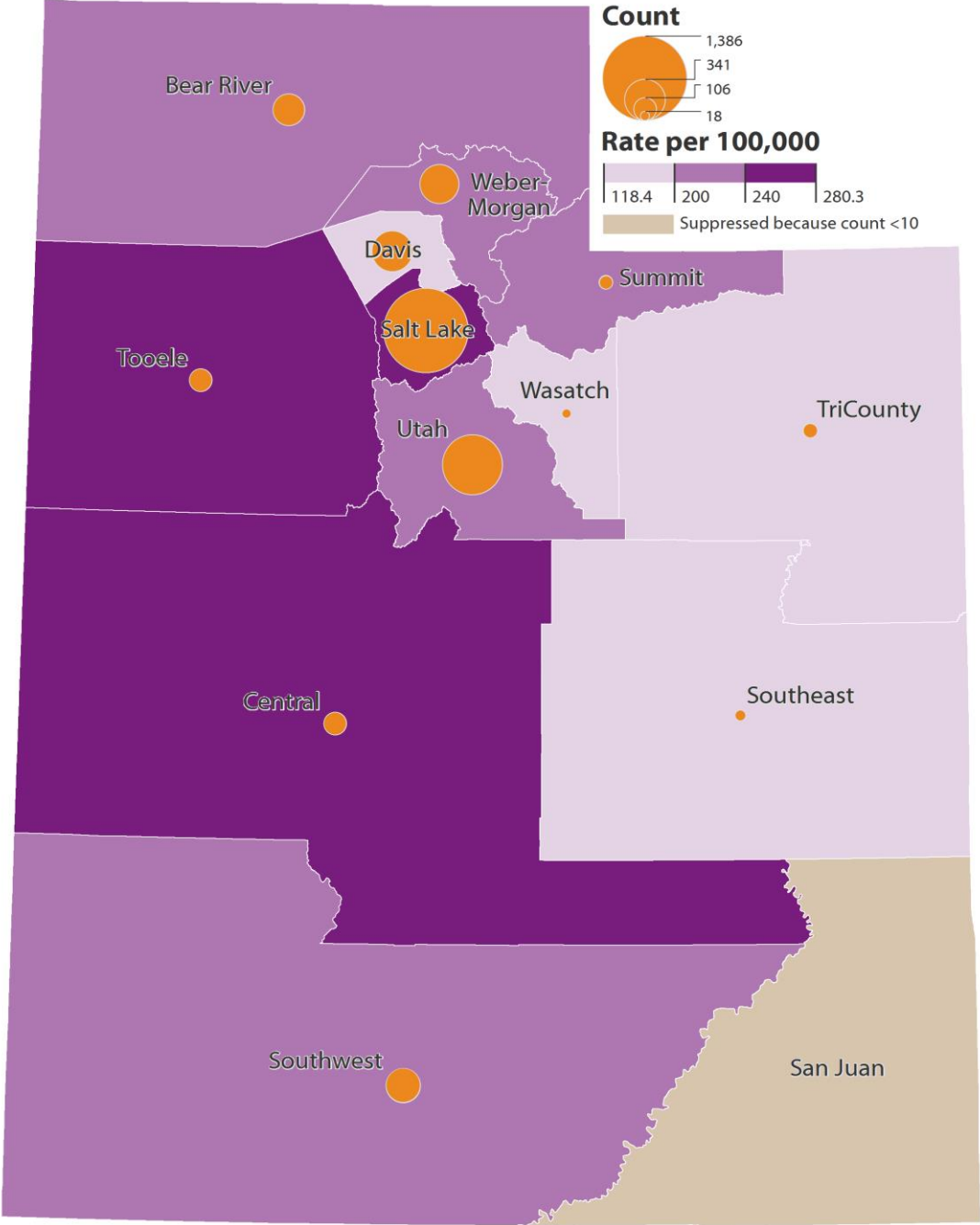
Figure 16. Rates of inpatient hospitalization for self-inflicted injury among youth aged 10-17 years by local public health district, Utah, 2011-2014.
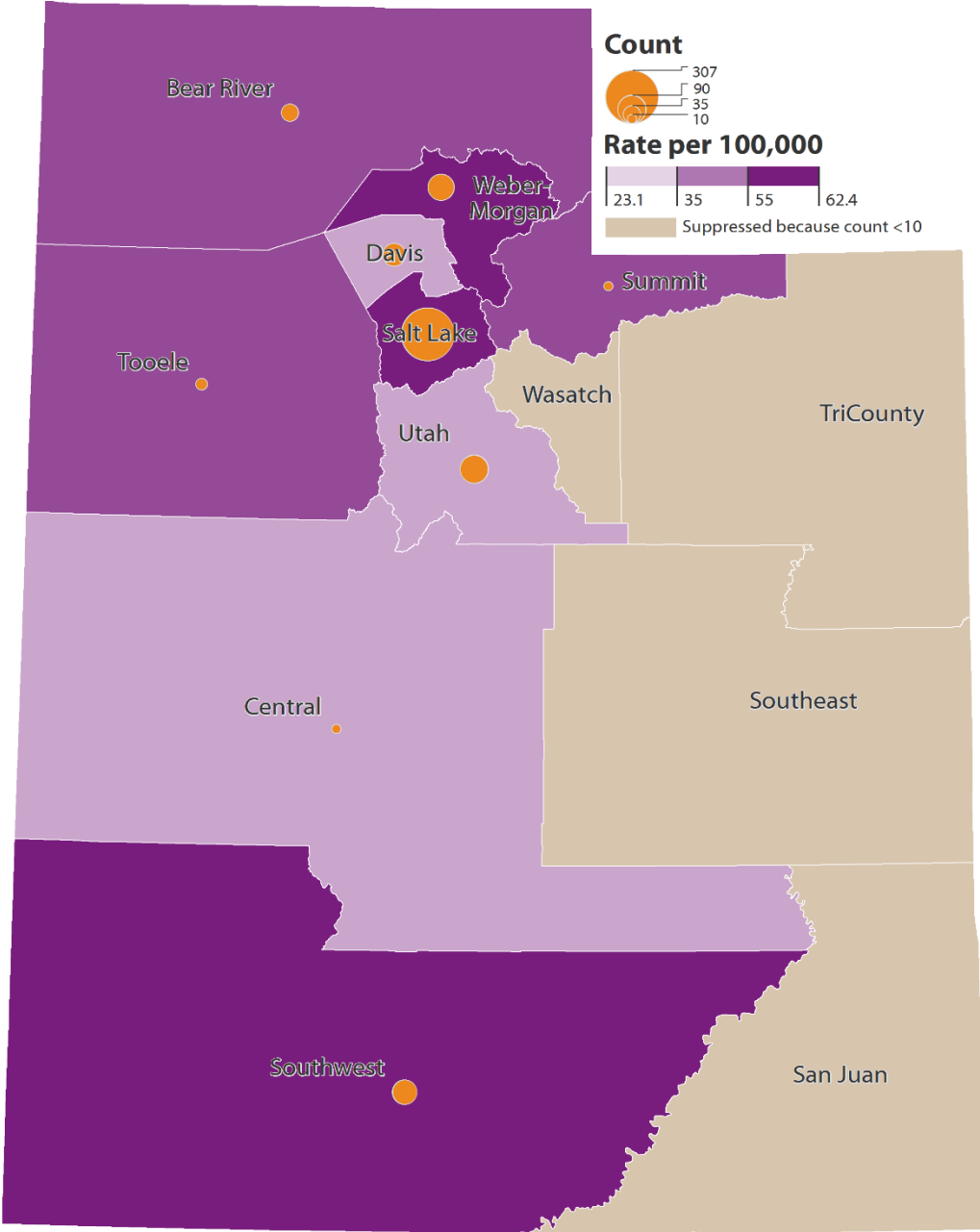
Figure 17. **Percentage of Utah youth who considered suicide, by local public health district – Utah, Prevention Needs Assessment, 2015**
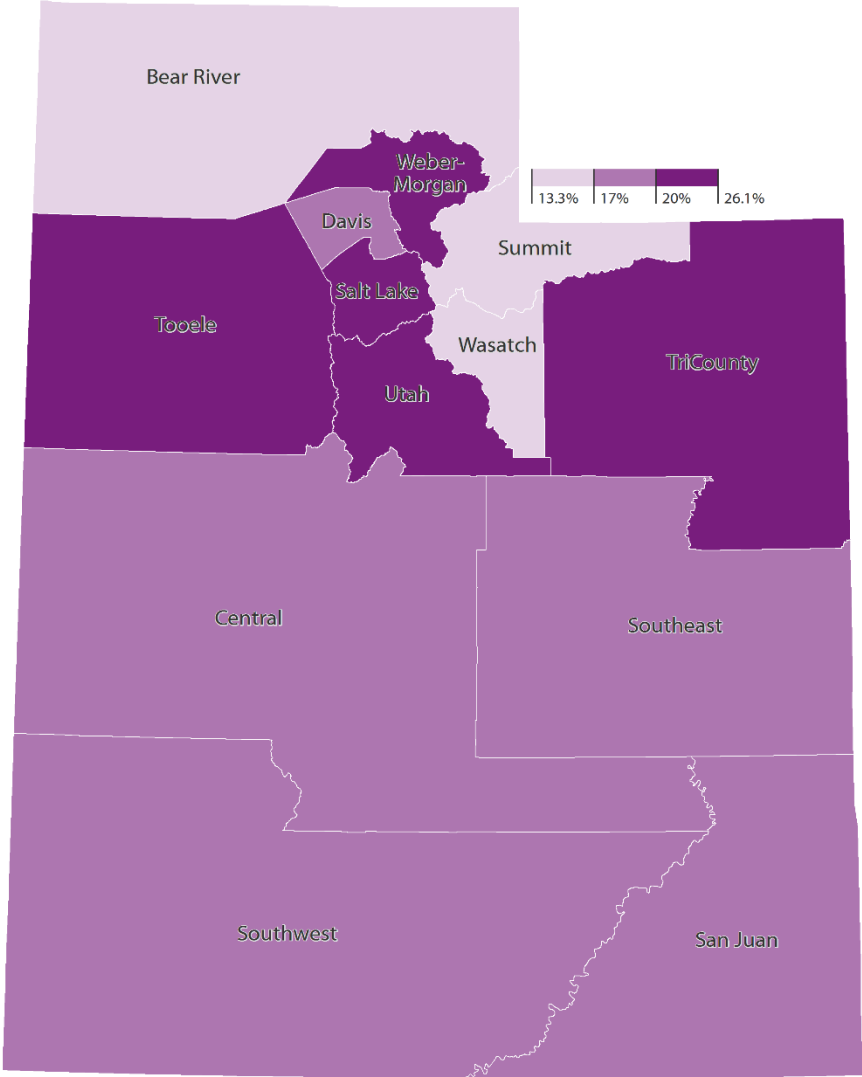
Figure 18. **Percentage of Utah youth who planned suicide, by local public health district – Utah, Prevention Needs Assessment, 2015**
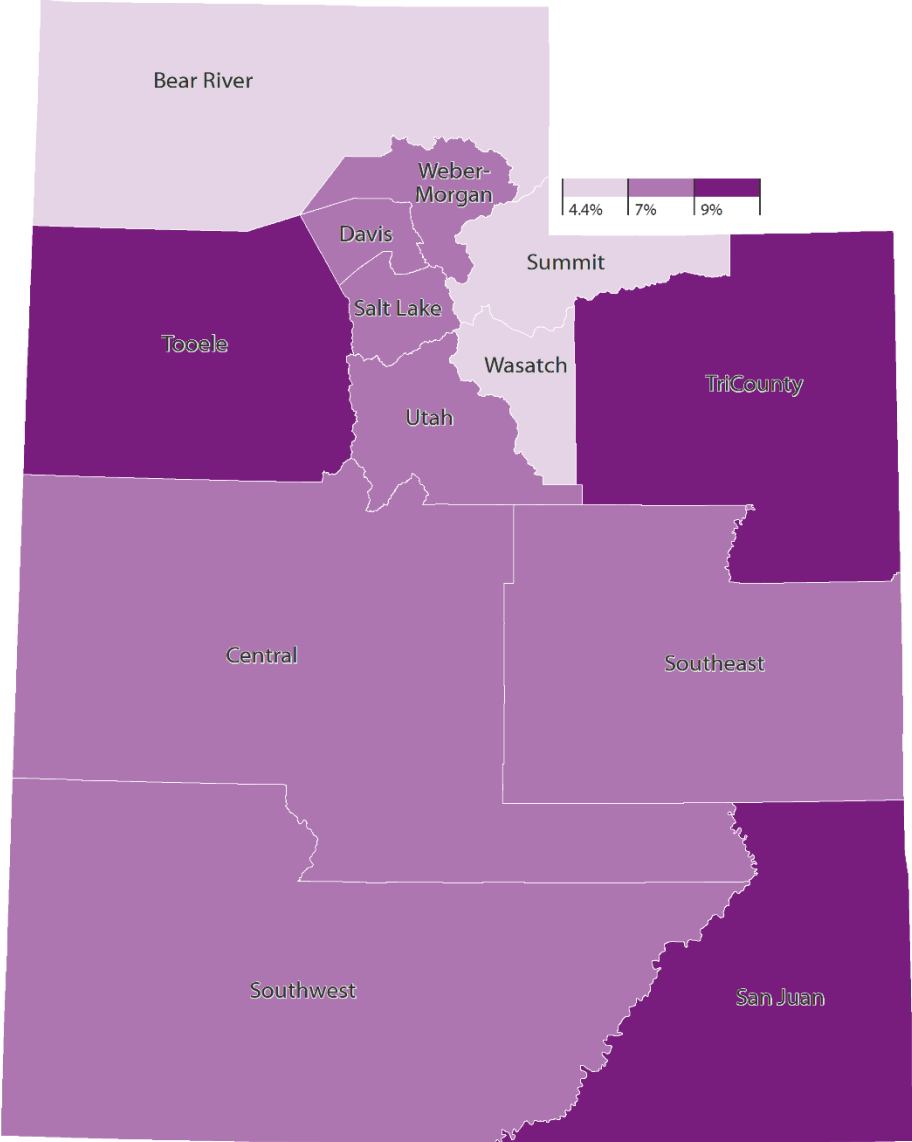
Figure 19.
Percentage of Utah youth who attempted suicide, by local public health district – Utah, Prevention Needs Assessment, 2015
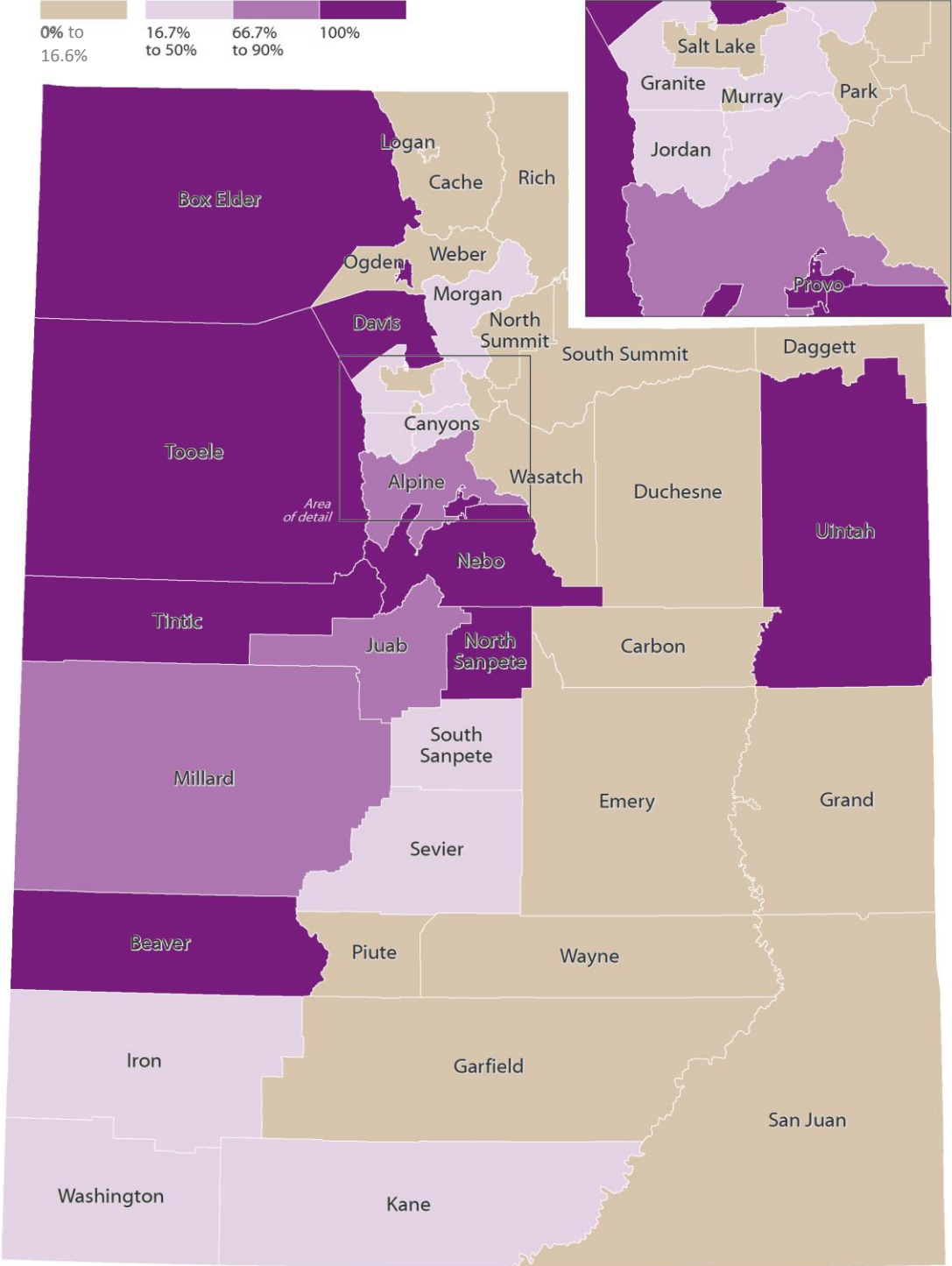
Appendix 1. Selected Survey Items from the 2015 Utah Prevention Needs Assessment Survey

Construct	Survey Item	Response Options
Suicide ideation	− During the past 12 months, did you ever seriously consider attempting suicide? − During the past 12 months, did you make a plan about how you would attempt suicide?	− No − Yes
Suicide attempt	− During the past 12 months, how many times did you actually attempt suicide?	− 0 times − 1 time − 2 to 3 times − 4 to 5 times − 6 or more times
Sex	− Are you:	− Male − Female
Age	− How old are you?	− 10 or younger − 11 − 12 − 13 − 14 − 15 − 16 − 17 − 18 − 19 or older
Grade	− What grade are you in?	− 6th − 7th − 8th − 9th − 10th − 11th − 12th
Race	− What is your race? (Select one or more)	− American Indian or Alaska Native − Asian − Black or African American − Hispanic or Latino − Native Hawaiian or Other Pacific Islander − White
Religious attendance	− How often do you attend religious services or activities?	− Never − Rarely − 1-2 times a month − About once a week or more
Religious preference	− Which is your religious preference (choose the ONE religion with which you identify the most)?	− Catholic − Jewish − LDS (Mormon)

		− Protestant (such as Baptists, Presbyterians, or Lutherans) − Another religion − No religious preference
Parental education level	− Think of the adults you live with. What is the highest level of schooling any of them completed?	− Completed grade school or less − Some high school − Completed high school − Some college − Completed college − Graduate or professional school after college − Don't know − Does not apply
Opportunities and rewards for prosocial involvement in school	− In my school, students have lots of chances to help decide things like class activities and rules. − Teachers ask me to work on special classroom projects. − My teachers notice when I am doing a good job and let me know about it. − There are lots of chances for students in my school to get involved in sports, clubs, and other school activities outside of class. − There are lots of chances for students in my school to talk with a teacher one-on-one. − I feel safe at my school. − The school lets my parents know when I have done something well. − My teachers praise me when I work hard in school. − Are your grades better than the grades of most students in your class? − I have lots of chances to be part of class discussions or activities.	− No! − no − yes − YES!
Extracurricular involvement	− How many times in the past year (12 months) have you participated in clubs, organizations, or activities at school? − How many times in the past year (12 months) have you done extra work on your own for school? − How many times in the past year (12 months) have you volunteered to do community service?	− Never − 1 to 2 times − 3 to 5 times − 6 to 9 times − 10 to 19 times − 20 to 29 times − 30 to 39 times − 40+ times
Low commitment to school and academic failure	− Now thinking back over the past year in school, how often did you enjoy being in school?	− Never − Seldom

	− Now thinking back over the past year in school, how often did you hate being in school?	− Sometimes − Often − Almost always
	− Now thinking back over the past year in school, how often did you try to do your best work in school?	
	− How often do you feel that the school work you are assigned is meaningful and important?	
	− Putting them all together, what were your grades like last year?	− Mostly F's − Mostly D's − Mostly C's − Mostly B's − Mostly A's
	− How important do you think the things you are learning in school are going to be for your later life?	− Very important − Quite important − Fairly important − Slightly important − Not at all important
	− How interesting are most of your courses to you?	− Very interesting and stimulating − Quite interesting − Fairly interesting − Slightly interesting − Not at all interesting
	− During the LAST FOUR WEEKS, how many whole days of school have you missed because you skipped or 'cut'?	− None − 1 day − 2 days − 3 days − 4-5 days − 6-10 days − 11 or more days
School violence and bullying	− During the past 30 days, on how many days did you NOT go to school because you felt you would be unsafe at school or on your way to or from school?	− 0 days − 1 day − 2 or 3 days − 4 or 5 days − 6 or more days
	− During the past 12 months, how often have you been picked on or bullied by a student ON SCHOOL PROPERTY?	
	− How often have you been threatened or harassed over the internet, by email, or by someone using a cell phone?	− 0 times − 1 time − 2 or 3 times − 4 or 5 times − 6 or more times
Substance use – ever	− How old were you when you first used marijuana (grass, pot) or hashish (hash, hash oil)?	− Never − 10 or younger − 11

	− How old were you when you first smoked a cigarette, even just a puff?	− 12 − 13 − 14 − 15 − 16 − 17 or older
	− How old were you when you first had more than a sip or two of beer, wine, or hard liquor (for example, vodka, whiskey, or gin)?	
	− How old were you when you first began drinking alcoholic beverages regularly, that is, at least once or twice a month?	
	− How old were you when you first sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays, in order to get high?	
	− How old were you when you first used LSD (acid) or other hallucinogens (like PCP, mescaline, peyote, "shrooms" or psilocybin)?	
	− How old were you when you first used cocaine (like cocaine powder) or "crack" (cocaine in chunk or rock form)?	
	− How old were you when you first used phenoxydine (pox, px, breeze)?	
	− How old were you when you first used methamphetamines (meth, speed, crank, crystal meth)?	
	− How old were you when you first used prescription stimulants or amphetamines (such as Adderall, Ritaline, or Dexedrine) without a doctor telling you to take them?	
	− How old were you when you first used prescription sedatives including barbiturates or sleeping pills (such as phenobarbital, Tuinal, Seconal, Ambien, Lunesta, or Sonata) without a doctor telling you to take them?	
	− How old were you when you first used prescription tranquilizers (such as Librium, Valium, Xanax, Ativan, Soma, or Klonopin) without a doctor telling you to take them?	
	− How old were you when you first used narcotic prescription drugs (such as OxyContin, methadone, morphine, codeine,	

	Demerol, Vicodin, Percocet) without a doctor telling you to take them?	
	− How old were you when you first used heroin?	
Substance use – in previous month	− On how many occasions (if any) have you had beer, wine, or hard liquor to drink during the past 30 days?	− 0 occasions − 1-2 occasions − 3-5 occasions − 6-9 occasions
	− On how many occasions (if any) have you used marijuana (grass, pot) or hashish (hash, hash oil) during the past 30 days?	− 10-19 occasions − 20-39 occasions − 40+ occasions
	− On how many occasions (if any) have you used LSD (acid) or other hallucinogens (like PCP, mescaline, peyote, "shrooms" or psilocybin) during the past 30 days?	
	− On how many occasions (if any) have you used cocaine (like cocaine powder) or "crack" (cocaine in chunk or rock form) during the past 30 days?	
	− On how many occasions (if any) have you sniffed glue, breathed the contents of an aerosol spray can, or inhaled other gases or sprays, in order to get high during the past 30 days?	
	− On how many occasions (if any) have you used phenoxydine (pox, px, breeze) during the past 30 days?	
	− On how many occasions (if any) have you used methamphetamines (meth, speed, crank, crystal meth) during the past 30 days?	
	− On how many occasions (if any) have you used prescription stimulants or amphetamines (such as Adderall, Ritalin, or Dexedrine) with a doctor telling you to take them during the past 30 days?	
	− On how many occasions (if any) have you used prescription sedatives including barbiturates or sleeping pills (such as phenobarbital, Tuinal, Seconal, Ambien, Lunesta, or Sonata) without a doctor telling you to take them during the past 30 days?	

	− On how many occasions (if any) have you used prescription tranquilizers (such as Librium, Valium, Xanax, Ativan, Soma, or Konopin) without a doctor telling you to take them during the past 30 days?	
	− On how many occasions (if any) have you used narcotic prescription drugs (such as OxyContin, methadone, morphine, codeine, Demerol, Vicodin, Percocet) during the past 30 days?	
	− On how many occasions (if any) have you used heroin during the past 30 days?	
	− On how many occasions (if any) have you used steroids or anabolic steroids (such as Anadrol, Oxandrin, Durabolin, Equipoise or Depotesterone) during the past 30 days?	
	− On how many occasions (if any) have you used MDMA (X, E, or ecstasy) during the past 30 days?	
	− On how many occasions (if any) have you used synthetic marijuana or herbal incense products (such as K2, Spice, or Gold) during the past 30 days?	
	− On how many occasions (if any) have you used other synthetic drugs (such as Bath Salts like Ivory Wave or White Lightening) during the past 30 days?	
Tobacco use – ever	− Have you ever tried cigarettes, even just one puff?	− No − Yes
	− Have you ever tried cigars, cigarillos, or little cigars, even a puff?	
	− Have you ever tried tobacco in a hookah or water pipe?	
	− Have you ever tried electronic cigarettes, e-cigarettes, vape pens, or e-hookahs?	

	− Have you ever tried chewing tobacco, snuff, or dip?	
	− Have you ever tried snus (moist smokeless tobacco usually sold in small pouches)?	
Tobacco use – in previous month	− During the past 30 days, on how many days did you smoke cigarettes?	− 0 days
	− During the past 30 days, on how many days did you smoke cigars, cigarillos, or little cigars?	− 1 or 2 days − 3 to 5 days − 6 to 9 days
	− During the past 30 days, on how many days did you smoke tobacco in a hookah or waterpipe?	− 10 to 19 days − 20 to 29 days − All 30 days
	− During the past 30 days, on how many days did you use electronic cigarettes, e-cigarettes, vape pens, or e-hookahs?	
	− During the past 30 days, on how many days did you use chewing tobacco, snuff, or dip?	
	− During the past 30 days, on how many days did you use snus (moist smokeless tobacco usually sold in small pouches)?	
Engagement in anti-social behaviors – ever	− How old were you when you first got suspended from school?	− Never − 10 or younger
	− How old were you when you first got arrested?	− 11 − 12
	− How old were you when you first carried a handgun?	− 13 − 14
	− How old were you when you first attacked someone with the idea of seriously hurting them?	− 15 − 16 − 17 or older
	− Have you ever belonged to a gang?	− No − No, but would like to − Yes, in the past − Yes, belong now − Yes, but would like to get out
Engagement in anti-social behaviors in previous year	− How many times in the past year (12 months) have you been suspended from school?	− Never − 1 to 2 times − 3 to 5 times − 6 to 9 times
	− How many times in the past year (12 months) have you carried a handgun?	− 10 to 19 times − 20 to 29 times − 30 to 39 times − 40+ times
	− How many times in the past year (12 months) have you stolen or tried to steal a motor vehicle such as a car or motorcycle?	

	− How many times in the past year (12 months) have you been drunk or high at school?	
	− How many times in the past year (12 months) have you taken a handgun to school?	
Family protective factors	− My parents expect me to eat dinner at home with my family.	− NO! − no − yes − YES!
	− My parents have set clear rules and expectations with me about NOT drinking ANY alcohol.	
Family risk factors	− People in my family often insult or yell at each other.	− NO! − no − yes − YES!
	− We argue about the same things in my family over and over.	
	− People in my family have serious arguments.	
Depression-related indicators	− At times, I think I am no good at all.	− NO! − no − yes − YES!
	− All in all, I am inclined to think that I am a failure.	
	− In the past year, have you felt depressed or sad MOST days, even if you felt okay sometimes?	
Psychological distress	− During the past 30 days, how often did you feel nervous?	− All of the time − Most of the time − Some of the time − A little of the time − None of the time
	− During the past 30 days, how often did you feel hopeless?	
	− During the past 30 days, how often did you feel restless or fidgety?	
	− During the past 30 days, how often did you feel so depressed that nothing could cheer you up?	
	− During the past 30 days, how often did you feel that everything was an effort?	
	− During the past 30 days, how often did you feel worthless?	
Prosocial behaviors	− How many times in the past year (12 months) have you participated in clubs, organizations, or activities at school?	− Never − 1 to 2 times − 3 to 5 times − 6 to 9 times − 10 to 19 times − 20 to 29 times − 30 to 39 times − 40 or more times
	− How many times in the past year (12 months) have you done extra work on your own for school?	
	− How many times in the past year (12 months) have you volunteered to do community service?	
Positive community level	− My neighbors notice when I am doing a good job and let me know about it.	− NO!

social environment	− There are people in my neighborhood who are proud of me when I do something well. − There are people in my neighborhood who encourage me to do my best.	− no − yes − YES!
Positive school social environment	− In my school, students have lots of chances to help decide things like class activities and rules. − There are lots of chances for students in my school to talk with a teacher one-on-one. − My teachers notice when I am doing a good job and let me know about it. − I have lots of chances to be part of class discussions or activities. − Teachers ask me to work on special classroom projects.	− NO! − no − yes − YES!
Supportive peer social environment	− Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have participated in clubs, organizations, or activities at school? − Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have made a commitment to stay drug-free? − Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have tried to do well in school? − Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have liked school? − Think of your four best friends (the friends you feel closest to). In the past year (12 months), how many of your best friends have regularly attended religious services?	− 0 − 1 − 2 − 3 − 4
Supportive family social environment	− My parents ask me what I think before most family decisions affecting me are made. − If I had a personal problem, I could ask my mom or dad for help. − My parents give me lots of chances to do fun things with them.	− NO! − no − yes − YES!