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DESCRIPTIVE STATISTIC CHARACTERISTICS STUDY
FOR LEVEL 4 FRONTIER HIGH SCHOOLS IN MONTANA

By

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Dissertation

presented in partial fulfillment of the requirements
for the degree of

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in Educational Leadership)

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Frontier Schools in Montana

Chairperson: Dr. Patty Kero

ABSTRACT

Frontier high schools in Montana have a degree of isolation that presents unique challenges setting them apart from their rural, and especially their urban, counterparts. Unfortunately, a one-size-fits-all approach hinders their voices being heard in professional development and policy decision making. This dissertation provides a profile of these high schools and their communities using four social determinants of health: education, access to health care, economics, and behavioral risk factors through mixed methods approach with descriptive statistics and high school principal survey responses. The results of this approach revealed frontier high schools have small class sizes and low teacher-student ratios, but they are challenged by a shortage of students, recruitment and retaining staff, and sources of funding through a limited economic base in the community. The remoteness also affected access to needed health care, especially student mental health care. On the other hand, frontier high school student achievement was demonstrated by attendance and graduation rates, along with extracurricular activity participation. Frontier students are deserving of equal representation whenever educational decisions are being made that affect their survival.

ACKNOWLEDGMENTS

I want to give my heartfelt appreciation to the educational influences in my life. First, my parents, Louis and Ella May Gorshe, who instilled the love of learning and the pursuit of education from childhood to adulthood, I am indebted to you both for all that I am. Second, my husband, Pudge, who gave his support of this project in equal amounts of enthusiasm, frustration, and patience - you were a good combination of cheerleader and coach. Third, the support of family and friends, such as Juli Zook and Merle Farrier, who encouraged me not to give up. I also want to recognize the wise counsel from my committee: Dr. John Matt, Dr. Bill McCaw, Dr. Dan Lee, and Dr. Doug Resig whose multiple perspectives helped shape and refine this research project. Finally, I want to thank my dissertation chair, Dr. Patty Kero, for providing consistent guidance throughout this long journey while demonstrating the gold standard of educational leadership. Your patience and encouragement were greatly appreciated.

Psalm 121:1-2

PREFACE

This dissertation reflects my concern for small schools and community survival. I was born and raised in North Idaho and graduated from Mullan High School, which is the same school my father graduated from in 1939. My mother attended a one-room elementary school in rural Minnesota. People accuse small schools of needing to “put away the lettermen’s jackets” when school rivalry and consolidation issues are discussed. The debate rarely gives the smaller class-size and teacher-to-student ratio the recognition and credit due, as the merits of expanded programs and “bigger is better” is promoted. I believe local control as taxpayers should make that decision, not a neighboring district or state agency, but their voices are not always heard.

I initially became interested in frontier schools and health care when I worked to establish a health care clinic in my hometown of Mullan, Idaho. Isolation and lack of access to health care made the most susceptible — the children and the elderly — even more vulnerable. As my dissertation topic was being developed, it became apparent the overall topic needed to be expanded to include four of the social determinants of health - education, health care, economics, and social and community context as described by behavior risk factors — in order to provide a more thorough profile of a frontier school and its community.

While I have no animosity toward larger schools, I do not feel they have more to offer if a student is inclined to rigorously pursue education and its benefits. Both my parents instilled the value of education (my mother was an elementary teacher for over 30 years), and a high bar was set as to their expectations. I have a Bachelor of Science in Finance from the University of Idaho, a Master’s in Business Administration from the

University of Notre Dame, and a Bachelor of Science in Business Education from Central Washington University. I also passed the Certified Public Accountant (CPA) exam. The quest for my dissertation has integrated each of these past achievements, and I am genuinely appreciative of the lessons learned at each step.

I hope this doctorate research and dissertation gives the small schools the voice, the respect, and recognition they deserve.

Jacki Gorshe

St. Regis, MT, December 2020

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Chapter One: Introduction to the Study

People in these (frontier) regions have always had to adapt to weather and terrain, but the counties of the contemporary frontier have made a further adaptation to their unique paucity of people. Healthcare, education, religion, politics, law and order, transportation, communication, sense of community, sense of self, even the act of finding a mate – virtually every human institution and activity demonstrates the impact of few people and long miles. (Duncan, 1993, pp. 17-18)

The term “frontier” does not have an exact or accepted definition, but it is generally based on population, location, and accessibility. Rural Health Information Hub (n.d.) stated, “Frontier counties are defined as counties with six or fewer persons per square mile”, but can also include population density or distance (time and miles) to a population center (Health and Healthcare in Frontier Areas, para. 5). For a state the size of Montana, frontier designation can be applied to large parts of the state. According to the U.S. Census Bureau (2010), Montana is the 4th largest state of 145,546 square miles (QuickFacts, Montana, Geography section). It is 50th in population density with approximately 6.8 people per square mile (U.S. Census Bureau, 2010, Montana Resident Population Data Section). As a result, frontier counties encompass over 80% of the total area of the entire state (National Center for Frontier Communities, 2010).

This great expanse of remote land has a limited number of inhabitants, including the school-age children. According to Morton and Harmon (2011):

A Montana frontier school is defined as a school located in a district with 200 or fewer students and its attendant community located in a county with five or fewer people per square mile. In Montana, 42 of the 56 counties have fewer than five people per square mile. A review of 2008 student enrollment data from the Montana Office of Public Instruction and the list of school districts in the five Montana Regional Service areas revealed 141 districts enrolled 200 or fewer students in the 42 counties. (p. viii)

Students in frontier locations have a unique existence in regards to their overall education, not to mention health care access, local economy, and inherent behavioral risk factors. These, in turn, may have altered their academic achievement.

The remote lifestyle of frontier students and their families mean they endured health care barriers such as distance, weather, road conditions and lack of public transportation (MDPHHS, 2016), along with actually seeing a provider. Primary care physicians were most often the first stop in health care options for rural areas. However, access to these physicians was hindered by the shrinking number of doctors who chose to practice in rural areas. For example, according to the National Rural Health Association (n.d.), “The provider-patient ratio in rural areas was only 39.8 per 100,000 people, compared to 53.3 physicians per 100,000 in urban areas. This uneven distribution of physicians has an impact on the health of the population” (Workforce section, para. 1). The Montana Department of Public Health and Human Services (2017) added, “Nearly one-quarter of rural residents (27%) reported not having a usual health care provider. . . .”(Montana State Health Assessment, p. 14). Hence, frontier

remote living challenges regarding access to health care included both availability of an actual health care provider and transportation.

Health care access concerns were further impacted by the types of jobs available within the economy of frontier areas. These occupations were frequently labor-intensive and inherently dangerous. The local economy of a frontier community could often be resource-based such as logging, mining, oil drilling/refining, farming, ranching, or hunting/fishing outfitting. When the market was good, these industry types were profitable. Unfortunately, they were usually boom or bust, as recently seen in the Bakken oil fields of Montana and North Dakota. Employment opportunities abounded for the residents during a boom, but unfortunately unemployment rates and poverty levels increased during a bust. Communities faced accepting other industry sources they would not have otherwise considered. Ciarlo and Zelarney (2000) wrote, “. . . distance from metropolitan centers and low population density have made frontier areas attractive for practice bombing ranges, missile sites, and nuclear waste dumps” (p. 8). A survivalist, or fatalist, mentality regarding future economic opportunities in their community could have influenced some high school students’ attitudes toward future job prospects and motivation towards academic achievement.

Residents of these communities were aware of and accepted the economic cycles and dangers of a “live hard, play hard” lifestyle. Making a living and providing for their families given the type of jobs available put them at greater risk for not only physical accidents and injuries, but also mental health concerns. Ciarlo and Zelarney (2000), reported, “. . . rural areas in general tend to be economically unstable and that this may have an impact on the mental health of its residents. *This is even more true*

for the frontier” (p. 7). In spite of, or because of, the hardships, though, people in small frontier towns accept their challenges and hardships to create a network of caring and support for each other and the community, oftentimes with the school as the social focal point. As Tieken (2014) wrote, “The school cultivates a sense of mutual dependence within the community, both social and economic, a sense that one’s well-being is tied to the well-being of others (p. 127).

Problem Statement

Ciarlo and Zelarney (2000) wrote, “Isolation is considered to be its [frontier’s] greatest defining characteristic” (p. 7). This remoteness reflected many of Montana’s schools. According to *Why Rural Matters 2018-2019*, “Three out of four of Montana’s high schools are located in a rural area, and Montana’s 48,000 rural students attend high schools in districts that encompass vast land areas with few students” (Showalter, Hartman, Johnson & Klein, p. 119). While both rural and frontier communities and high schools were small and miles from a larger populated area, frontier was not necessarily the same as rural. Frontier communities were unique in terms of even smaller populations and the degree of isolation where they were located. For many in Montana, the combination was the reality of daily life. The Rural Health Information Hub data revealed 54 out of the 192 (29%) of Montana high schools were located in communities having the USDA designation of Frontier and Remote Area (FAR) Level 4, which “more closely coincides with [a] much higher degree of remoteness” (USDA Economic Research Service, n.d., Frontier & Remote Area Codes section, para. 2). According to Howley (1997), “Rural places in the contemporary world may suffer more than other places from the lack of such research and from the misguided effort to build up widely

applicable and reliable procedures for school improvement” (p. 132). The sheer number of students affected by this is significant. Hill (2014) reported, “More children -- nearly 6.5 million -- attend school in remote rural areas and small towns than in the 20 largest urban school districts combined” (p. 25). Nonetheless, frontier high school students were often overlooked or ignored and rarely singled out for research purposes. “While literature regarding educational outcomes for rural youth is available, frontier youth are not identified and described specifically within the literature” (Urruty, 2011, p. 15). While previous studies have been conducted on rural and urban high schools, research on frontier high schools was limited. As a result, nearly a third (29%) of Montana’s high schools may have been underrepresented in research or educational studies.

Standardized tests or classroom textbooks were another area where rural students are disadvantaged. For example, the Smarter Balanced Assessment Consortium (SBAC) test required by U. S. Department of Education was a measurement of student achievement. Unless test questions reflected more than urban settings and characteristics, frontier students faced a potential shortcoming through lack of background information (Theobald & Wood, 2010, p. 27).

School administrators may not be knowledgeable as to the particular aspects of rural schools. Instead, their training could have emphasized a “one-size-fits-all” approach that was more urban-based and lacked comprehension of and concern for rural considerations (Smith, 2002, p. 55). Consequently, if frontier high schools were misrepresented with incomplete or incorrect information, their students may have had needs that were misunderstood or, worse, unmet.

Purpose Statement

In Why Rural Schools Matter (2014), Tieken wrote, “The school fosters an identity, instilling shared values and local norms, socializing generations of youth. . .” (p. 126). Educational leaders are interested in a variety of information regarding the behaviors and local norms that identified their remote school, students, and community, along with descriptive details used together to describe its uniqueness as a whole. Coladarci (2007) said, “There is no single definition of rural . . . we should not seek consensus on a single definition of rural, but we should ask that rural education researchers carefully describe the context of their (putatively rural) investigations” (p. 2). Research regarding the uniqueness of frontier high schools and communities could have provided meaningful information that assisted decision-making that best served the educational needs of people who lived in such remote areas. The purpose of this mixed methods study was to create a profile of Montana frontier Level 4 high schools by using descriptive information focused on both in-school elements such as students, personnel, curriculum/instruction, finance, and maintenance/operations, along with out-of-school factors such as community health care, local economy, and behavioral risk factors. The data bases currently available contained frontier area information which may have provided individual pieces of material on these high schools, but did not view multiple components together. Research that combined the layers of the aforementioned topics of frontier education, health care, local economy, and behavioral risk factors contributed to understanding the overall portrait of Montana frontier high schools.

In particular, this dissertation sought to add to the description of frontier high schools using the lens of health care access regarding access and potential obstructions to student achievement. For example, data regarding the distance to health care treatment illustrated how far frontier students travel to access health care both in terms of miles and time. Additional factors of weather, road conditions, and perhaps even availability of transportation each impacted frontier student health care, absenteeism level, and consequent academic outcomes.

Likewise, the research sought to add economic conditions and their potential influence on frontier student achievement profile. Social economic status (SES), unemployment, poverty levels, and the local occupational bases each provided additional descriptions of student, family, and community financial opportunities and/or constraints that affected frontier high school student achievement.

Lastly, the unique frontier lifestyle's effect on student achievement was described using behavioral risk factors such as alcohol, tobacco, and drug use, suicide rates, and motor vehicle accidents, along with extra-curricular activity participation. This information added one more layer to the frontier high school profile and supported the purpose of this research.

Research Question

“Quantitative research questions inquire about the relationships among variables that the investigator seeks to know. They are used frequently in social science research and especially in survey studies” (Creswell, 2014, p.143). Qualitative studies, on the other hand, “pose broad, general questions to allow participants to explain their ideas”

(p. 151-152). For this mixed methods study the research question was: “What are the descriptive characteristics of a frontier Level 4 high school in Montana?”

Out of 192 high schools in Montana, 54 high schools were identified as being located in areas meeting the conditions of the USDA Economic Research Service Frontier and Remote (FAR) code 4. Information regarding education, health care, local economy, and behavioral risk factors were identified and used to create a broader profile in the aggregate of Montana’s most remote frontier high schools.

Definition of Terms

The following words and/or acronyms were used in this study, and the definitions were intended to assist in the understanding of them:

Access to health care

Included costs of medical care, lack of insurance, physician shortage, and transportation distance which includes the number of miles and/or travel time to non-emergency, needed medical services from certified personnel such as medical doctor (MD), nurse practitioner (NP), physician assistant (PA), and/or registered nurse (RN) (Office of Disease Prevention and Health Promotion’s Healthy People 2020).

Behavioral Risk Factors

Behavioral health encompassed mental and emotional well-being, as well as the actions that influenced overall wellness (Montana State Health Assessment, 2017, p. 40).

Class Size

Student enrollment guidelines based on Montana High School Association class designations. For example: Class AA=779+, Class A=307-778, Class B=108-306, and Class C=1-107 (Montana High School Association Handbook, 2019-2020, p. 19).

Critical Access Hospitals (CAHs)

Rural hospitals which provided affordable health care access in cooperation with Medicare and Medicaid. Facilities with less than 25 acute care inpatient beds, located 35 or more miles from another hospital, and offered 24/7 emergency care (Rural Health Information Hub, 2019, para 2).

Economically Disadvantaged Student.

Student who met the criteria for the Free/Reduced Lunch Program under the USDA National School Lunch Act based on household incomes at or below 130 percent of poverty (USDA, National School Lunch Program, 2020, para. 2)

Education

Montana State administrative rules governing standards as described through “school leadership; educational opportunity; academic requirements; program area standards; content and performance standards; school facilities and records; student assessment; and general provisions” under 20-1-101, MCA (Montana Code Annotated, 2019).

Federally Qualified Health Center (FQHC)

“Outpatient clinics that qualify for specific reimbursement systems under Medicare and Medicaid” (Rural Health Information Hub, 2019, para. 1).

Free and Reduced

Free and reduced price eligibility guidelines were centered on the federal income poverty guidelines to determine free and reduced price meals and free milk that follow associated program guidelines (USDA ERS National School Lunch Program, 2020, para. 2).

Frontier

Per the US Census Bureau, “the most remote and sparsely populated places along the rural-urban continuum in terms of population density and distance in minutes and miles to population centers; having a population density of six or fewer people per square mile” (Rural Health Information Hub, 2020, para. 5).

Frontier and Remote (FAR) area codes

Four distinct levels based on population and distance to urban areas (based on time vs. miles) where residents obtained necessary goods and/or services. These levels were determined by the US Department of Agriculture and the U.S. Department of Health and Human Services Federal Office of Rural Health Policy using urban-rural data from the 2010 US Census:

Level 1 – 60+ minutes from an urban area of 50,000+

Level 2 – 45+ minutes from an urban area of 25,000-49,999 people; and
60+ minutes from an urban area of 50,000+ people

Level 3 – 30+ minutes from an urban area of 10,000-24,000; 45+ minutes
from an urban area of 25,000-49,999 people; and 60+ minutes from an
urban area of 50,000+ people

Level 4 – 15+ minutes from an urban area of 2,500-9,999 people; 30+ minutes from an urban area of 10,000-24,999 people; 45+ minutes from an urban area of 25,000-49,999 people; and 60+ minutes from an urban area of 50,000 or more people (Rural Health Information Hub, 2020, para. 9).

Health Care System

“All activities whose primary purpose is to promote, restore, or maintain health” (The World Health Report, 2000, p. 5). This term included needed, non-emergency health care services via medical clinic, hospital, home or school setting from a medical professional such as medical doctor (MD), nurse practitioner (NP), physician assistant (PA), and/or registered nurse (RN). This included preventative health services.

Isolated

Locations that met the distance and population of frontier and remote (FAR) Level 4 areas (Rural Health Information Hub, 2020, para. 7).

Lifestyle

“A way of living of individuals, families (households), and societies, which they manifest in coping with their physical, psychological, social, and economic environments on a day-to-day basis” (businessdictionary.com, n.d. para. 1)

Local economy

Guidelines that measured frontier local economy included basic indicators such as economic job base, unemployment rate, earnings, population, per capita personal income, and poverty rate (Understanding Economic Change in Your Community, 2015, pp. 5-6).

Misassignment

"A licensed educator/specialist teaching outside his/her endorsed teaching area(s) and/or level (elementary K-8 and secondary 5-12)" (Administrative Rules of Montana 10.55.602, 2007 para. 28).

Montana Completion Rate

Students who met school district graduation requirements within the previous year and/or summer's end of current year
(Graduation Matters Montana, 2015, p. 7).

Nonlicensed

A person without a current Montana educator license granted emergency employment exceptions (Administrative Rules of Montana 10.55.602, 2019, para. 30)

Patient Advocacy

Assistance with patient navigation through the health care system, including "screening, diagnosis, treatment, and follow-up of a medical condition" along with "financial, legal and social support" (National Cancer Institute, n.d.).

Per Pupil Expenditure

"The per-pupil expenditures of Federal, State, and local funds, including actual personnel expenditures and actual nonpersonnel expenditures of Federal, State, and local funds, disaggregated by source of funds, for each local educational agency and each school in the State for the preceding fiscal year" (20 U. S. Code 6311, Section 1111, as cited in Montana OPI, 2020).

Principal endorsement

Individuals who met the Class 3 administrative license for K-12 principal endorsement in Montana (Administrative Rules of Montana 10.57.417, 2017).

Rural

Referred to all population, housing and territory not included within an urban area. "Whatever is not urban is considered 'rural'" (U.S. Census Bureau, 2010, para. 2).

Rural Health Clinics (RHCs)

Clinics in rural, underserved locations that provided "outpatient primary care and basic laboratory services" utilizing a team of physicians, nurse practitioners, physician assistants, and certified nurse midwives (Rural Health Information Hub, 2018, para. 1).

Social Economic Status (SES)

"The social standing or class of an individual or group. It is often measured as a combination of education, income and occupation" (American Psychological Association, n.d., para 1).

Student Health

"A state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (The World Health Organization Constitution, 1948), along with "a conscious, self-directed and evolving process of achieving full potential" (National Wellness Institute, n.d., p. 1).

Teacher endorsement

Individuals who met the Class 1 (professional certification that follows Class 2, master's degree and 3 years teaching experience) or Class 2 (standard initial certification for those who met the all state requirements) endorsements under Montana

Code Annotated 20-4-106 and Administrative Rules of Montana 10.57.412 including a minimum of a bachelor's degree, completed an approved teacher preparation program, and passed the Praxis Subject Assessments for their subject(s) (leg.mt.gov, 2019; mtrules.org, 2019).

Title 1 School

“Schools in which children from low-income families make up at least 40 percent of enrollment are eligible to use Title I funds to operate school wide programs that serve all children in the school in order to raise the achievement of the lowest-achieving students” (U. S. Department of Elementary & Secondary Education, 2020, para. 2).

Transient student (also known as “mobility”)

A student who was enrolled and/or attended a particular school for a short period of time before moving to a different district (dictionary.com, n.d.).

Delimitations and Limitations of the Study

Delimitations were characteristics of this mixed methods study that limited the scope, defined the borders, and were in researcher's control (studylib, n.d.). These included

- 1.) Inclusion of only Class C high schools located in the frontier Level 4 communities in the State of Montana. Class A and Class B high schools were not included. Likewise, Class C high schools not designated as within a frontier area were not part of this dissertation. Montana has over 100 Class C high schools, but only 54 met the definition of Level 4 high schools/communities. The source of this designation was determined by the Frontier and Rural (FAR) Code from the Rural Health Information Hub. Thirty counties in Montana had Class C high

schools in communities with the Level 4 frontier designation. These counties were Beaverhead, Big Horn, Blaine, Carter, Chouteau, Daniels, Dawson, Fergus, Gallatin, Garfield, Hill, Judith Basin, Liberty, Madison, McCone, Meagher, Park, Petroleum, Phillips, Ponder, Prairie, Richland, Roosevelt, Rosebud, Sanders, Sheridan, Toole, Valley, Wheatland, and Wibaux.

- 2.) High schools located in urban or other rural counties were not included in the research.
- 3.) The results of the study cannot be generalized to any other high schools or states and were only applicable to Montana Level 4 frontier communities for this period of time.

Limitations, on the other hand, were the potential weaknesses of the study that were out of the researcher's control. These included:

- 1.) Truthfulness and credibility of data received from outside sources, which included a variety of state and government agencies, along with individual research studies
- 2.) Data suppression from outside sources where low number of individuals or students could have indicated issues of confidentiality
- 3.) Missing or unavailable data for specific schools or data sets
- 4.) Incorrect or distorted perceptions when using county data to represent a community due to confidentiality concerns or overall missing data
- 5.) Overall survey response rate
- 6.) Survey response rate due to Covid 19 school shutdown

- 7.) Survey participation rate from frontier high school principals acting on behalf of their school
- 8.) Survey response accuracy based on the experience and perception of the individual frontier high school principals

Significance of the Study

In his book Miles from Nowhere, Duncan (1993) described the independent attitude of those choosing to live frontier areas:

They'll tell you the life they lead is different, perhaps not as different as in the old days of the frontier, but certainly unlike life in most of America in the late twentieth century. And they'll tell you the rest of the country doesn't understand them, always condescends to them, and never consults them when decisions are made about what should happen to the land they occupy. Before you leave they'll also tell you the special name *they've* given to this place. They call it home. (p. 3)

General misperceptions still existed regarding frontier living, and, while people have chosen this remote way of life, they were still subject to decisions based on these misunderstandings, including those in education. Tieken (2014) wrote, "Education research, in its focus on urban schools, mostly overlooks rural schools and communities. . . teaching and curriculum books were never written for my teaching, the state and federal policies were never written for my school" (pp. 3, 6). In addition to being overlooked, frontier schools were typically lumped together with rural, and rural was then lumped together with urban. The snowballing of schools was counter to reality. McArdle (2008) stated, ". . .It is important to note what rural schools are not—

namely, urban or suburban schools, only set in remote locations” (McArdle, 2008, p. 3). Tieken (2014) added, “. . . rural schools are often forgotten and, with today’s one-size-fits-all education reforms, they remain underserved” (p. 8).

This research sought to isolate and gather data on Montana Frontier Level 4 high schools. While student achievement could have been affected by a variety of factors, such as attendance and dropout rates, a mixed methods study including statistical information regarding these schools (students, personnel, curriculum/instruction, finance and maintenance/operations), along with health care access, local economy, and behavioral risk factors, added to the description of frontier high schools in Montana. A survey completed by frontier high school principals added another descriptive layer to the data collected. Frontier students needed teachers and administrators who were trained to appreciate and incorporate the unique aspects of remote schools and their communities. Education should be more than test scores, as Nodding (2005) stated, “We should demand more from our schools than to educate people to be proficient in reading and math” (p. 9). A one-size-fits-all hurt small schools because it distracted them from their inherent advantages of “developing positive relations among adults and students, for attaining a sense of community for developing relevant educational programming, and knowing students so well they do not need to be labeled” (Hurley, 2002, p. 139). To be effective, rural administrators needed to understand the “sense of place” and the geographic and cultural context of rural education (Smith, 2002, p. 56). A profile that described the frontier environment and social perceptions using education, access to health care, economy, and behavioral risk factors provided additional information that assisted Montana frontier high school principals in their role as

educational leaders when making decisions that affected the high school and its community. Expanding their knowledge of frontier life “sense of place” could have supported them not only for their position, but also for the academic achievement expectations for their frontier high school students, especially when considering the “push for school accountability with standardized testing as the primary metric to assess school performance” (Schafft, Killeen & Morrissey, 2010, p. 96). The significance of study was to broaden current information through a multifaceted profile of the realities of frontier high schools in Montana.

Thomas Sergiovanni (1992) stressed a moral commitment or covenant where educational leaders embraced a holistic sense of responsibility for student achievement (p. 102). Children spend 180 days a year at school, and, as Dr. Carter, executive director of Association for Supervision and Curriculum Development (ASCD), expressed, “Each of us that work with children must see our role as caretakers, as nurturers, as teachers in supporting the whole child” (Carter, 2013, para. 3). Using a profile of frontier level 4 high schools that includes the social determinants of education, access to health care, economy, and behavior risk factors, educational leaders could become more aware of student educational challenges and opportunities.

Summary

Research focused specifically on frontier areas was as sparse as the people who live on the fringes. While these frontier locations shared similar qualities which reflected their independence, have these attributes contributed to the level of academic success of their students? For this mixed methods study, the specific research question was, “What are the descriptive characteristics of a frontier Level 4 high school in Montana?”

This research presented a profile of Montana Level 4 frontier high schools using both the school (students, personnel, curriculum, finance, and maintenance/operations) and the community (health care, local economy, and behavioral risk factors). Each of the aforementioned categories and subcategories contributed to the overall portrait of a Montana frontier school, analogous to individual pixels combined to create a picture in time. This profile could be used to develop rural educational leaders who can shape and advocate for student achievement through improved understanding of procedures, policy, and performance specifically designed for the Level 4 frontier schools.

Chapter Two: Review of Literature

Very little has been published about the frontier...the word frontier conjures up a set of images. Historians have even argued that American character has been shaped by it. People associate the frontier with explorers such as Lewis and Clark, pioneers, hunters, trappers and Indians. Although the frontier of historic imagination no longer exists, a real frontier does live on. (Wagenfeld, 2003, p. 34)

Frontier and rural areas were unique in their varying degrees of remoteness, shared hardships, and perseverance. The term “rurality” described a “spatially defined area, a group of people (community), attitudes that prevail among the people, activities performed by the people, and the rules that guide those activities” (Chigbu, 2013, pp. 815-816). Tieken (2014) said, rurality “constitutes one’s identity; it shapes one’s perspectives and understanding; and it gives meaning to one’s daily experiences. This identity, this shared and place-dependent sense of rural belonging, gives rural its significance” (p. 5). In many frontier communities, people were either self-reliant or relied on the cooperation of others due to the lack of resources, and the rules of behavior were guided by “that’s just how we do it here.” This created sense of place in frontier locations allowed students to recognize “local values, histories, culture, and the ecology of the place they inhabit,” along with the “social, political, economic, and environmental problems” in their community (Budge, 2006, p. 9). These pieces combined to create Lightfoot’s “portraiture” model where layers were added to create a composite picture of the phenomenon being studied.

This portrait focused not only on where people lived, but also revealed their sense of place and purpose. “Our behavior, emotions, dispositions, and thoughts” are impacted by our environment (Budge, 2006, p. 2). The frontier picture itself was further fine-tuned by using school and community. Tieken wrote, “Exploring the influence of rurality and place on rural leaders’ beliefs about the purpose(s) of local public schooling and their theories of action could help determine the potential relationship between schooling and the well-being of frontier communities” (p. 2). This view was either forward-looking as school reflecting community or backwards with community reflecting school.

While frontier areas were found in many states, research studies on these remote areas were not so common, or, while the studies took place in a remote area, they did not necessarily address a rural concept or condition. Hence, researchers were cautioned when studying education or community characteristics of non-rural, rural, or frontier communities in general. As Theodore Coladarci (2007) wrote,

In short, researchers are not entitled to offer conclusions about rural education just because their research takes place (or draws on data from) a rural school, community, or region. Rather, researchers must establish warrants, or compelling justifications, for the rural-related conclusions they provide. Far too often, it remains unclear whether the researcher has uncovered a rural phenomenon or, instead, a phenomenon that is observed incidentally in a rural setting. (p. 3)

A relevant review of literature regarding frontier and remote areas to considered that warning when analyzing topics, theories, and types of research methods used.

Theory Relevant to Research Question

Documenting the specific features of these isolated frontier areas was conducted through quantitative and qualitative research methods. Each type provided different types of data regarding the research topic, and they can be used individually or together, as in a mixed methods approach.

Quantitative research regarding frontier characteristics expanded data collection across multiple characteristics and described a population or group by addressing “who,” “when,” and “where” using descriptive parameters, factor analysis, or logistic regression. Data from outside sources, such as state or government research agencies, were used as the basis for data collection. Non-parametric descriptive variables included frequency, averages or minimum/maximum range while a parametric study using assumptions or a hypothesis was explored by examining potential relationships between variables. An example of quantitative research includes Nayar, Yu, and Appenteng (2013) who used a descriptive study regarding frontier health systems across the United States.

While quantitative research was objective and usually more focused in design, qualitative research provided an in-depth, lived-in study to answer “why” or “how”, using personal perspectives instead of statistical data. A qualitative approach enabled primary and secondary fundamental data collection by the researcher in the natural setting. The research was a narrative, phenomenology, case study, grounded theory or ethnography that incorporated perspectives from those who had the lived-experience using interviews, observations, and documents, along with open-ended questions.

Inductive and deductive data analysis identified patterns or themes in a flexible holistic manner (Creswell, 2014, pp. 185-187).

“Portraiture” was a qualitative research method that sought to understand a person, place, or phenomenon in context (Tieken, 2014, p. 30). The researcher was active, using interviews, observations, and documents to explore, identify, and “capture the essences, rather than the visible symbols of school life” or the community (Lightfoot, 1983, p. 14). This process allowed the observer to “vigorously pursue themes” while the resulting portraits exposed the “insider’s view of what’s important” (Lightfoot, p. 14). These pieces were then pooled to unmask the phenomenon. In other words, portraiture provided a more authentic understanding of frontier high schools and their communities. In her study of rural schools in Arkansas, Tieken used portraiture method with numerous discussions, interviews, observations, and personal deliberation regarding the Delight and Earle school districts. These involved students, staff, and community residents with respect to political and historical perspectives. The resulting tapestry revealed a composite portrait of both these communities, their schools, and, upon a closer inspection, a portrayal of individual pieces separately.

Other studies that applied a qualitative approach regarding rural or frontier living include McArdle-Harrand (2008) and Chalker (2002), who provided multiple perspectives on the phenomenology of rural education; Wagenfeld (2003), who described the issue of rural behavior health, and Duncan (1993), who illustrated the culture of frontier living still existing across America. These studies documented the lived-experience and answered the questions of “why” and “how” from personal perspectives.

A mixed methods research approach, however, included both quantitative (closed ended data) and qualitative (open-ended data) study characteristics that reduced the limitations of each method and provided a more thorough understanding of the research question. Creswell (2014) wrote, “The key assumption of this approach is that both qualitative and quantitative data provide different types of information . . . and together they yield results that should be the same (p. 219). In 2011, Harmon and Morton used a mixed method in their study of frontier schools in Montana that incorporated a quantitative descriptive study and a qualitative survey.

Most remote area research, both qualitative and quantitative, was limited to a singular focus such as education or health care access in rural areas (as opposed to actual frontier). While these areas were important, other aspects of frontiers remained incomplete, unexplored or misunderstood. This mixed methods study, however, sought to describe the characteristics of frontier schools in Montana using quantitative descriptive data and qualitative survey data regarding the high schools and students, but also included information in relation to their frontier communities. Tieken (2014) wrote,

...school is more than a job or an institution; it’s an identity. It gives the community, this network of relationships and institutions and businesses, a ready identity providing shared symbols and traditions, perpetuating a set of common values, and establishing clear boundaries...” (p. 65)

In addition, Chance (2002) found, “The rural school provides entertainment, jobs and intellectual strength to the community by educating its youth. In turn, the rural community provides an infrastructure that includes economic support, raw materials

(i.e., students), and strong community encouragement for school activities” (p. 231). In short, a school and community are reflective of each other. Student success benefited the community, and community success benefited the school because communities where people were born, were raised, or lived out their lives contributed to their overall condition of health and well-being. These factors are called the social determinants of health. They included the five areas of education; neighborhood and physical environment; economy; community/social context; and health care system (Centers for Disease Control, n.d.; World Health Organization, n.d.; Office of Disease Prevention and Health Promotion’s Healthy People 2020). This mixed methods study used four of the five social determinants to health to address the research question of “What are the descriptive characteristics of a frontier Level 4 high school in Montana?” More specifically, it explored the determinants of education, health care access, economic stability, and community/social context as determined by behavioral risk factors. This research was conducted to provide an overall portrait along with snapshots of the social determinant separately.

Social determinants of health have been used in previous community analysis. For example, the U.S. Department of Housing and Urban Development used Healthy Communities Indicators (HCI) including education, health care, economic, and lifestyle characteristics. Likewise, SAVI (n.d.), a project from the Indiana University that supported data-driven decision-making, included population, economy, education, health and housing conditions in its definition of a community profile (SAVI, n.d.).

Other previous literature used social determinants of health individually or paired together. For example, prior studies on rural schools included demographic (population

decrease, older retirees), economic (lower rural income, fewer professional and upper management jobs, higher rates of poverty), and education (lower percentage of high school completion, lower college attendance, consolidation, funding), (Herzog & Pittman, 2002, pp. 15-18). Other studies included the relationships between education and student well-being as indicated by school achievement and attendance (Basch, 2011, p. 593); and parental involvement in education and socio-economic/poverty status for both students and their school districts (Henry, Cavanagh, Oetting, 2011, p. 1166). According to Chalker (2002), "Educational leadership in all schools exists in a climate where knowledge about social, economic, political, and technical forces is essential for success" (p. 8).

As a result, frontier high school students and frontier communities' under-representation in research literature may have contributed to a number of misperceptions. In other words, this lack of information may have been a factor in beliefs that were not necessarily accurate in regards to the profile of frontier schools and their communities. "Often misunderstood, rural educational goals, needs, and perceptions can be different than their urban and suburban counterparts" (McDonough, et al., 2010, p. 192). Frontier voices were either not heard or misunderstood. Frontier research information could, therefore, provide current or potential school administrators, economic leaders, community members, or government agencies with additional resources for more informed decisions affecting frontier communities, their residents, and students in regards to education, health care access, economy, and behavioral risk factors.

Frontier Education

“Then there are ‘frontier high schools’ that may have only dozens of students, located in very remote or isolated parts of the country such as Alaska, Appalachia, the prairies of the Plains states, and the Mountain West,” (Ayers, 2011, p. 1).

Schools and Community. “. . . schools are not just about buildings, budgets, teachers, and curriculum. Schools are about relationships – relationships among all the stakeholders in the school – administrators, parents, teachers, support staff, community members, and students” (Hicks, 2002, pp. 176-177). Schools came in all shapes and sizes, but the basic internal operational components were relatively similar. According to Hoy and Miskel (2008), “The ultimate goal of the school is student learning” (p. 33). This included educational elements such as students, staff, instructional technology, and facilities which strongly affected the school’s “potential for effective performance” (Hoy & Miskel, 2008, p. 297). Some of the specific descriptive characteristics of a frontier high school in Montana included information regarding students (e.g., graduation rates, class size, student/teacher ratio), staff (e.g., years of experience, areas of certification), curriculum and instruction (e.g., technology, online course availability), finances and funding (e.g., federal, state, local), and maintenance/operations (e.g., building age or condition, transportation). Each of these pieces added a critical layer to the portrait of the internal support structure of Montana’s frontier schools.

Small schools were oftentimes the center of a rural or frontier community. In fact, the inaccessible nature of these outlying areas brought about a collaborative spirit between the school and its community. According to Tieken (2014):

These schools define these communities, giving them substance, boundaries and meaning. They pull together a particular group of individuals and knit this assortment of residents into a collective, a unit, a community. They supply this community with an identity, a way to be known and recognized, and they write its boundaries . . . It's a home, the heart of the community. (p. 140, 151)

People from small towns developed a sense of pride and ownership regarding their hometowns. The sense of community in rural areas was so strong that it provided a connectedness between family, school, and church that affected behaviors lasting from childhood to adulthood (Stern, 1994, p. 21). DeYoung (2002) wrote that schools contributed to a community through a variety of functions and activities:

A centrally located and well attended high school facility signified civilization and culture in the mountains or on the prairie. . . [and] provided civic meeting places, sites for the arts and music, an athletic program that often competed with those of other small surrounding towns, and jobs for local citizens . . . (pp. 10-11).

For frontier Montana, this included a number of Native American reservations where community and school also shared a revere cultural heritage. Schools and their communities supported and reflected each other where sentiments and loyalties were tight-knit and span multiple age groups, from grandparents to kindergarteners.

However, this collaboration remains vulnerable to outside influences, particularly in regards to student education. According to Tieken (2014):

'School' can refer to school buildings and the spaces between and around them; it is the students and teachers and administrators and aides and families and janitors, and the relationships and stories linking them; it is generations of shared

history; it is the rules and norms and patterns of behavior and ways of being.

While 'community' has a clearly bounded definition, 'school' in both conversation and understanding, is notable for its expansiveness. Typically, though, 'school' remains a local entity, separate from – and endangered by – policies of 'the state'. (p. 46)

Prior Research.

Information regarding Montana frontier high schools was even more limited. According to Morton and Harmon (2011), "But little is known about the smallest of the small rural high schools, the 'frontier high schools' serving the most isolated of rural communities across the United States" (p. 2). Part of the challenge was defining "frontier" as a separate category from "rural." For educational purposes, the definition of frontier was based primarily on student population, population density, and distance/travel time to a market/service center with various government and private organizations. Harmon and Morton (2010) reported:

[Montana Small School Alliance (MSSA)] principal investigators decided on the term 'Frontier' to identify the schools and communities that are so small that they are actually a sub-group of rural America. The Frontier schools exist in places that are exceptionally remote, particularly in comparison to most rural schools in the eastern United States. (p. 2)

Research data is limited, though, even with an agreed upon definition of frontier. Urruty (2011) stated, ". . . little research has been done to investigate the role the frontier context plays in the process of identity formation among adolescents and emerging adults" (p. 40). As a result, the review of literature sought data for frontier schools and

communities, along with relevant research information for rural communities sharing the non-urban traits of frontier. Two previous studies used rurality explore the characteristics of frontier or rural schools and communities through the individual perceptions and cooperative spirit of residents who lived in a similar geographic setting.

In 2006 Budge used a case study to analyze the concept of “rurality” using a rural community in southwest Washington State. The research used data collected from interviews, document reviews, and member checks. N=11 (3 administrators, 2 school board members, 4 teacher leaders, and 2 parent/community leaders). She also examined rurality and “sense of place” from the lived experience of these 11 community leaders’ point of view using the reference points of “problem, privilege, and possibility” to analyze rurality (p. 4). Findings were then considered as starting points for leaders to support the community and school mutual dependence, sense of place, and source of opportunity.

Similarly, in 2016, Biddle and Azano conducted a case study using journal literature from 1911 through 2015 that addressed the concept of “rurality” or the “rural problem” by researching rural teacher recruitment, retention and training across the United States. They located 148 relevant articles, and the research was broken into 3 periods: 1909-1945, 1945-1980, and 1980-2015. Their findings discussed changes in local economies and the effects on local school districts as described through “rurality” by shifting political priorities, inequality of funding, and lack of acknowledgement of rural existence and its importance.

Case studies by Budge, along with Biddle and Azano, provided meaningful background information regarding rural sense of place and associated rural challenges.

Their studies indicated rural educators continue focus on the unique connection with the community by “looking inward, not outward” (Hurley, 2002, p. 150). Three other studies on remote area education used descriptive research focusing on frontier and rural schools. Two were specifically conducted using Montana frontier schools while a third study looked at frontier schools in the Great Plains.

In 2010 Harmon and Morton conducted a mixed methods study that focused on Montana K-12 school districts identified as frontier. A survey was administered to 3 different subsets: district personnel, school board chairs, and focus group members identified as local supporters. Areas of interest included internal school issues such as staff years of experience and education; student enrollment trends; technology and curriculum; academic achievement as measured by standardized tests; busing; finances; maintenance/operations; and other issues identified as district challenges. The survey also included community economics such as poverty as measured by free-and-reduced lunch and economic base industries. They used N=141 frontier school districts from 42 Montana counties, and n=237 surveys were completed. Respondents were asked to rank eight sustainability reasons for the school district, which included community/school cooperation, student travel, operating expenses, school closure, and politician support. Using the SPSS Cronbach alpha, reliability was determined to be .816 for district personnel and .709 for school board chairs. Forty-nine frontier school supporters attended focus group sessions where they were asked questions regarding school/cooperation, greatest school challenges/solutions, school sustainability issues, and goals. The study used ordinal data for respondents’ ranking of major challenges facing the school district, and focus group transcriptions were analyzed to identify

themes. Harmon and Morton viewed attending a small school as an advantage because many frontier schools already have practices in place that mirror the goals of current education reform, such as smaller class size, parent participation, and differentiated curriculum that can be tailored to student needs and interests (p. 1). Although Harmon and Morton identified positive attributes, the research also revealed an undercurrent of threatened survival where schools were seen as vulnerable to test scores and consolidation.

Another Montana study by Yoon, Mihaly, and Moore (2019), reported on educator mobility in Montana using a mixed method study of descriptive statistics and survey responses for the school year of 2017/2018. Their study, "A Snapshot of Educator Mobility in Montana" covered all school systems in the state of Montana. These school systems were separated into three groups of rural-remote, rural-distance/fringe, and non-rural. Rural remote (N=185) accounted for 61% of the schools systems with 26% of the teachers and 20% of the students. Non-rural, on the other hand, represented 14% of schools systems but 60% of teachers and 66% of students (p. 2). The study also found rural schools and schools with a higher Native American student enrollment had a greater teacher and principal turnover than larger, non-rural schools with a lower Native American student enrollment (p. 12). In addition, rural-remote schools had more difficulty filling these positions and were more impacted by the effects of teacher shortages. This was especially true for schools located near the Crow, Northern Cheyenne, and Fort Peck reservations and included the six frontier schools of Northern Cheyenne, Plenty Coup/Pryor, Box Elder, Lambert, North Star/Sunburst, and Chester/Joplin/Inverness (p. 6, 8). To address these staffing issues,

rural-remote schools shifted assignments where “36% of teachers, 40% of principals held more than one position” in remote-rural schools in 2016/2017 (p. 18). While teacher shortages exist across the state, non-rural school districts had fewer positions that were difficult or unable to fill than rural schools (p. ii). Ironically, teachers moving to a bigger school district contributed to the turnover in rural areas (p. 14).

The third study, “Declining Counties, Declining School Enrollments,” by Terry Duggan Schwartzbeck (2003) used a descriptive study including much of the United States, but focused on the Great Plains region in particular. Her research found rural and frontier population decreases due to a “graying” of the aging community members, younger citizens leaving for better jobs in another location, and fewer births overall. School districts in these areas were faced with less state funding due to fewer students, shortages in resources (instructional and physical) and staff recruitment issues. These observations were consistent with those of Harmon and Morton, along with the issue of potential school consolidation. Duggan Schwartzbeck (2003) also found smaller districts were resourceful in bridging gaps in funding and staffing. For example, some rural and frontier high schools combined the positions of superintendent and principal, raised starting teacher salaries, allowed teachers to teach out of their field, combined classes, changed to a 4-day week for students and staff, used cooperative agreements with other districts, belonged to purchasing and technology consortiums, and relied on staff to cover extracurricular activities. Duggan Schwartzbeck (2003) did not support the issue of consolidation citing frontier/rural school student transportation issues such as increased commute time, especially with inclement weather and road conditions,

actually adding to the potential attendance challenges for school districts and parents while also affecting student achievement.

Frontier Health Care

Frontier health care access is the second social determinant that could contribute to student academic achievement. Although students may miss school for a variety of reasons, chronic absenteeism is often due to severe or ongoing health conditions.

According to Ayers (2011),

Some students come to school with significant nonacademic challenges that interfere with their ability to learn. Such problems can include health and dental issues, social or emotional problems, low levels of parent education or involvement, or lack of before- and after-school opportunities. (p. 4)

Furthermore, “Health care is a prerequisite for education” (Hahn & Truman, 2015, p. 658), and high schools cannot be expected to meet educational goals while their students face health inequities (Redlener, 2014, p. 24). Missing school had consequences as “student absenteeism adversely affects opportunities to learn academically and to grow socially” (Basch, 2011, p. 596).

Frontier student health care centered around the type of care available and accessible. In the *Journal of Rural Health*, authors Regan, Schemph, Yoon, and Politzer (2003) reported, “Rural populations have few health care resources, limited access to care, and often, poor health status” (p. 121) which means, unfortunately, that health care centers were not available in every remote community. Ironically, “communities that are most in need of medical professionals are least likely to have them” (Holley, 2013, p. 2).

Various government agencies and private entities such as Commonwealth Fund, Montana Department of Public Health and Human Services, National Rural Health Association, Robert Wood Johnson Foundation, Rural Health Information Hub, etc. have reported on health care in regards to access, facilities, providers, financial, and resistance. Their findings include the following information.

The Commonwealth Fund (2019) reported, Montana state health care “ranks 32th (out of 50) for access and affordability, 36th for prevention and treatment, and 25th for health care disparities (p. 1).” Furthermore, 51 of Montana’s 56 counties are described as having primary care shortages, 25 out of 56 have dental health care shortages and 55 out of 56 counties have mental health care shortages (Montana Primary Care Needs Assessment, 2016, pp. 19-20). Consequently, students and their families who lived in rural or frontier areas did not have the same access to health care providers as urban residents (US Department of Health and Human Services, 2006), even though access to primary health care had been consistently identified as a priority by state and local health officials. Native Americans in remote reservations, in particular, were one part of the underserved populations who lived in frontier areas. “Montana has 8 Indian reservations, and Native Americans as a group in Montana are particularly affected by a lack of access to health care services” (Montana Governor’s Office of Indian Affairs, n.d.). Access included “availability, accessibility affordability, accommodation, and acceptability” (Gamm, Castillo & Pittman, 2003, p. 17). Frontier community health care access barriers also included insufficiency of clinic/hospital facilities, medical professionals/providers, financial, and denial (the resistance faced in seeking or obtaining care).

Facilities. The Centers for Medicare and Medicaid Services (CMS) (2017) reported the United States had approximately 4,100 rural health clinics (p. 1). In 2019, Montana had 49 critical access hospitals and 52 federally qualified health centers, which addressed rural health issues by increasing care availability and reducing financial constraints, and 58 rural health clinics that provided outpatient primary care in rural, underserved areas (Rural Health Information Hub, 2020, para. 2). While this appeared an adequate number for a state this size, some of these health care resources were centered at or near population hubs, like Billings or Great Falls, and these metro and micropolitan centers were still miles or hours from remote frontier communities.

Health care providers. Just as access to a clinic or hospital facility were a challenge, “Medical deserts are forming across the nation, significantly adding to the health care workforce shortage in rural communities” (NRHA, 2016, para. 7). Understanding the characteristics of frontier communities and relating to patient needs and comfort levels of care, was ideal, but not enough of these providers wanted to practice medicine in a remote area. Oftentimes, the school nurse became the health care provider (Some Nurse Shortage May Imperil Some Children, Robert Wood Johnson Scholars Warn, 2013, para. 7). The lack of health care providers could prolong illness for frontier students, which could be a detriment to learning.

Financial. Another hurdle to health care for remote frontier residents was the affordability of either out-of-pocket or health insurance coverage. “Access to affordable health insurance matters, especially for the medically vulnerable and underserved” (Bolin & Gamm, 2010, p. 5), and rural areas differed in comparison to urban regarding

coverage. According to the National Organization of State Offices of Rural Health (2018), “Approximately 21.9% of residents in remote rural counties are uninsured, compared to 17.5% in rural counties adjacent to urban counties and 14.3% in urban counties” (para. 3). In 2017, 35.0% of Montana residents had Medicare or Medicaid for their health care; however, 9% of Montana residents did not have health insurance. Of those, almost one-fifth (19.0%) were American Indian/Alaskan Native (Kaiser Family Foundation, 2017).

These financial barriers did not evolve overnight. Rural areas have experienced a decrease in manufacturing jobs since the 1990s. Along with the loss of the jobs, the employee health benefits disappeared as well. As a result, these areas have turned to more self-employment, which did not always provide health insurance benefits. “The lack of employer-sponsored health insurance is particularly acute for low-skilled jobs,” which are more common in rural areas” (National Advisory Committee on Rural Health and Human Services, 2008, p. 10). Because of these rural economies of self-employment and small businesses, “rural people are generally less insured, more underinsured, and more dependent on the individual insurance market...and are more dependent upon public health care programs such as State Children’s Health Insurance Programs (SCHIP), Medicare, and Medicaid” (Bailey, 2009, p. 1 & 2). While critical access hospitals and rural health centers were designed to bridge gaps in rural health by working with these programs, depending on the location of the frontier community, the services were still out of reach.

Resistance. Lastly, resistance to seeking medical help was a barrier for some frontier or rural residents. The resistance from external sources included distance to

health care services, limitations of types of services available, and financial concern including lack of insurance. The resistance also included personal responses such as ignored early-warning symptoms, overwhelmed by appointments/treatments/follow-ups, and wagered that the injury or disease was not really serious. Some people, no matter where they live, have a general reluctance to seek medical care. For frontier residents, the aforementioned barriers of distance, time and accessibility to receive treatment could have justified the postponement of medical help. For some, though, resistance to medical treatment was based on a sense of self-reliance. "Rural Montana has a reputation for people who are stoic, and who have a difficult time expressing their feelings" (Rowland, 2016, p. 328), so they may not have admitted the need or importance of addressing or treating health care issues, including mental health.

Resistance also involved self-diagnosis and treatment without actually seeking a medical provider's opinion. These approaches were understandable, especially if a trip to the doctor's office required securing a ride, a babysitter, or time away from work. On the other hand, self-treatment was reasonable alternative, depending on the severity of the ailment, with less-severe illnesses addressed by either waiting until the next day to see if they go away, asking a friend, or using "Dr. Google" where serious issues warranted a trip to a provider or emergency room regardless of the distance (Wathen & Harris, 2006).

Frontier health care prior research. While literature solely regarding Montana frontier health care was limited, one study focused specifically on specialty health care for rural American Indians. Baldwin, Hollow, Casey, Hart, Larson, Moore, Lewis, Andrilla, and Grossman (2008) conducted research addressing Native American access

to specialty health care, using data from New Mexico and Montana Native Americans. A survey was sent to 106 providers in Montana (60) and New Mexico (46). The survey addressed referrals from rural Indian clinics and community-based clinics to specialty physicians, along with perceived barriers to receiving treatment. Using SUDDAN for chi-squared logistic regression and Release 9.0.3 for provider factor analysis, the report found that, according to Montana Indian clinic providers, Montana patient access to specialty care was inferior, and was inadequate compared to non-Indian clinic providers. According to Baldwin et al., (2008), “. . . Montana’s Indian clinic providers are dependent on referral to community-based specialists alone, as Montana has no academic center offering specialty services” (p. 273). Barriers were primarily financial, but additional hurdles included patient lack of follow-through, lack of insurance, and travel constraints. The findings from this research cannot be generalized to other populations or locations.

Frontier Economy

The well-being of a school and its community could also be measured using the social determinant of its local economy. Frontier economies often depended on the natural resources inherent to their geographic region. Resource-based economies such as logging, mining, and farming, appealed to independent individuals; however, resource-based economies oftentimes had a boom-or-bust cycle. In the good times, jobs and money were plentiful, but then came the bust, when work and money were scarce. Previous literature for frontier economy included federal and state government agency reports of local economic indicators such as unemployment and poverty rate

(e.g., U. S. Department of Agriculture Economic Research Service) while other literature reviewed the effects of these on student achievement.

The USDA Economic Research Service (ERS) reported in 2018 that rural Montana had a 3.6% unemployment rate, a 13.4% poverty rate, and 7.2% of the population had not completed high school (ERS, 2020). When the strength of a local economy wavers, schools stood to lose students and state funding connected to attendance, and they also lost tax base funding from business closures and residents relocating. This, in turn, further drove down property values and further evaporated school property-based local funding (Schafft, Killeen, & Morrissey, 2010, p. 97). “In many rural areas, schools have faced these challenges in the context of increasing financial constraints as tax bases have eroded and state and federal budget cuts have had implications at the local level” (Biddle & Azano, 2016, p. 299). Furthermore, in many frontier communities, the school district was the largest employer (Tieken, 2014, p. 61), which only compounded the effects.

Rural unemployment brought “increased poverty, emigration, and changing family patterns,” all of which affected schools (Stern, 1994, p. 11). Academic progress and economic conditions were related, as frontier/rural high schools were already aware. Rural Education at a Glance (2017) reported, “Rural counties with the lowest levels of educational achievement face higher poverty, child poverty, unemployment, and population loss than other rural counties” (USDA, p. 5). Henry, et al. wrote that childhood education was negatively affected by poverty, and rural/frontier students from low SES have higher drop-out rates (p. 1164). Individuals who were raised in poverty and failed to graduate from high school further perpetuated the cycle of unemployment

and impoverished lifestyle. Those who lacked the credentials or further training could be overlooked for whatever employment opportunities the frontier or rural area were presented. Hence, poverty increased in rural areas (USDA, 2017, p. 5-6). Education, though, was one way for them to break this cycle

Struggling economies contributed to the number of transient students. In prosperous economies, student mobility may have represented an upward move toward financial opportunity. However, student mobility in a weakening economy could be the result of a family member losing a job or housing and being forced to escape a negative situation (Schafft, Killeen, & Morrissey, 2010, p. 99). Transient school children were often encumbered with poverty and learning challenges which negatively affected their academic potential. Furthermore, moving from one district to another interfered with their educational progress (Schafft, Killeen, Morrissey, 2010, p. 99).

Montana is one of eight states with a 20+% graduation rate differential between all rural students and vs. rural students from low-income families (Why Rural Matters 2015-2016, p. 5.). While living in frontier or rural areas did not imply poverty, when the two were combined, it could have been harmful to student progress. Showalter, Hartman, Johnson, and Klein (2017) reported,

Although rural areas have made gains in educational attainment over time, there is still wide geographic variation in educational attainment within rural areas...for example some counties have 20% or more of the working-age population (adults age 25-64) that lack a high school diploma. And the overall educational attainment of people living in rural areas has increased markedly over time, but

the share of adults with at least a bachelor's degree is still higher in urban areas (The Geography of Low Educational Attainment section, para. 6).

Frontier Behavioral Risk Factors

Finally, frontier schools and communities can be studied using the social determinant of social context or behavioral risk factors. Some people choose frontier life despite the hardships. Personal decisions, however, could have increased adversity and contributed to individual behavioral risks. For over a century, those living in frontier and rural areas faced an imbalance in both overall health status and access to health care (DeAlessi & Pam, 2011), which was further exacerbated by an inherently more dangerous lifestyle and higher risk of dying than those in urban areas experience (Jones, Parker, Ahearn, Mishra, & Variyam, 2009). While Montana boasted of being an outdoor paradise, the isolation and hardships associated with the frontier may actually have contributed to certain behavioral risk factors through the sense of self-sufficiency and invincibility. Previous literature from federal and state reports on behavioral risks included substance abuse, injury, and premature death.

Substance abuse. “Much is known about individual, family, and peer influences on adolescent alcohol use, particularly in urban settings, but little is known regarding alcohol use in rural settings, especially in relation to community influences” (DeHaan, Boljevac, Schaefer, 2010, p. 630). According to MDPHHS (2017), Montana ranked among the highest nationwide for percentage of alcohol use disorder (14.0%) and percentage of alcohol dependence (6.0%) with many first-time consumptions occurring before the users were even teenagers (Montana Youth Risk Behavioral Survey, 2017; U. S. Youth Behavioral Risk Survey, 2015). The Montana State Health Assessment

(MSHA 2017) also concluded socioeconomic status, particularly poverty, contributed to youth substance abuse.

Unintentional injury. Overall, Montana’s rural residents have a greater risk of unintentional injury than those residents residing in more urban Montana. “When examining Montana communities by geographic location, residents of rural counties had a one-and-a-half-times higher mortality rate due to unintentional injury compared to residents of micropolitan and small metropolitan sized counties” (MSHA, 2017, p. 17). The unintentional injury deaths were oftentimes the result of motor vehicle accidents. In fact, “motor vehicle crash deaths were highest among American Indians and residents living in rural counties” (MSHA, 2017, p. 4). Unfortunately, these vehicle accidents claim adults and children. “In 2015, the mortality rate among Montana’s children was among the highest in the nation. Furthermore, the leading cause of childhood mortality was unintentional injuries, namely motor vehicle crashes” (MSHA, 2017, p. 5).

Premature death. Sometimes, however, the deaths were not accidental, but rather, the direct result of individual behavioral choices. MSHA (2017) reported unintentional injuries, which included self-inflicted injuries, were one of the primary causes of premature death in Montana (p. 4). “From 2011-2015, Montana’s suicide rate was nearly two times higher than the U.S. average. Suicide rates did not differ significantly by race, but suicide was significantly higher among . . . residents of rural counties compared to micropolitan counties” (MSHA, 2017, p. 5).

Self-infliction included the aforementioned substance abuse of alcohol, but also drugs and tobacco. While youth tobacco smoking was decreasing, especially for

American Indian high school students, e-cigarettes were reported as “the most used nicotine product among Montana high school students” (MSHA, 2017, p. 24).

Similarly, the high occurrence of vehicular injuries and/or death could also have been considered self-inflicted injury. MSHA (2017) reported, “A higher percentage of males, American Indians, and residents of rural counties reported not always wearing their seatbelt than their counterparts” (p. 37).

Unfortunately, students in these rural areas may have lacked the health care resources to address the behavioral risks associated with alcohol, drugs, and tobacco, or with suicidal feelings. Moreover, some students may have had family members who engaged in risky behaviors themselves, which contributed to the normalization and perpetuated a series of harmful choices. All of these had the potential to affect student achievement and the trajectory of their future.

Cross Studies

Prior research for rural or frontier areas included the use of descriptive studies focusing on a combination of community attributes, including education, health care, economics, or behavioral risk factors. With the exception of Harmon and Morton (2011) and Baldwin et al., (2008), previous research did not specifically address the Montana frontier. The prior research, however, included other rural studies using the aforementioned social determinants of health. For example, adolescent health care for a cross section of students in Oregon (Zimmer-Gembeck, Alexander, & Nystrom, 1997); adolescent health care in mid-sized and rural Minnesota (Elliot & Larson, 2004); health care and student achievement in schools from all 50 states (Vinciullo & Bradley, 2009); and health care, SES, and lifestyle using all counties (frontier and non-frontier) in the

United States (Nayar, Yu, & Appenteng, 2013). Each of these studies were in the following review of literature.

Zimmer-Gembeck, Alexander, and Nystrom (1997) analyzed data with a chi-squared test on health care needs and use for urban and non-urban youth in Oregon. The first dependent variable was no care from a doctor or nurse practitioner in the previous two years. $X^2=114.7$; $p<.0001$, $n=13,030$. The research revealed “students in rural areas had an increased risk of no visit to a doctor/NP compared to students in urban schools” (p. 393). The second dependent variable was no care from a dentist in the past two years. $X^2=293.8$; $p<.0001$, $n=13,369$. Again, “. . . compared to urban students, those living in rural areas were also at increased risk” (p. 394).

Elliott and Larson (2004) also looked at rural health (including mental health) care barriers and access issues, as well as lifestyle activities, using direct logistic regression to determine non-urban student health care needs and barriers, along with related risk factors. Independent variables were: active in club activity, future expectations, have HIV/AIDS, sexually active, drug/alcohol/tobacco use, and dangerous activities. X^2 (6, $N=1948$, $p\leq 0.001$ and $p\leq 0.01$). Those behaviors with $R\geq 0.2$ were included in the model. Five barriers to receiving health care were identified using factor analysis: anxiety/fear, access, self-reliance, non-supportive parent, and helpless/hopelessness. Focus group discussions revealed additional barriers of cost/lack of insurance, stigma of mental health services, parental control, confidentiality, and preference to talk with athletic coach about problems rather than a of medical provider. The study found 90% of 1,049 teen students felt they needed care, but 44% decided not to receive it.

Vinciullo and Bradley (2009) focused on school health programs and student achievement using a quantitative regression analysis with cross-sectional design. The research studied the years 2000-2001. The level of data gathered was nominal (“yes” or “no”) for the student survey responses, along with ratio for the percentage of positive (“yes”) responses. Other levels of data gathered were ratio for state school health program implementation, NAEP proficiency levels; and U.S. Census Bureau poverty percentage rates; and interval for middle/high school drop-out rates. The assessments used to generate data were the School Health Policies and Programs Survey (SHPPS) for Coordinated School Health Program (CSHP) intervention, National Assessment of Education Progress (NAEP) for academic achievement, and U.S. Census 2000 Profile rate of poverty for each state. Because the research included all high schools, both public and private, the sample of the study was equal to the population. The statistics included the dependent variable of student achievement as measured by 4th, 8th and 12th grade proficiency scores on state assessment reports. The independent variables were the responses to the CSHP questions and the U.S. Census Bureau 2010 poverty percentages. The level of elimination for the regression were $p < 0.5$ for the independent variables. The study found high schools with health education, physical education, health services, nutrition services, or mental health services had increased test scores. In addition, health services programs had a strong association with academic achievement; whereas, poverty had an inverse relationship to academic achievement and direct relationship to dropout rates.

In contrast, Nayar, Yu, and Appenteng (2013) conducted a cross-sectional descriptive study including all frontier and non-frontier counties in the United States. The

research compared and contrasted two independent groups consisting of frontier (N=438) and non-frontier (N=2,635) in terms of demographics, health systems, and health outcomes using a Wilcoxon or Mann-Whitney rank sum test using SPSS 18 and Stata 10. They found frontier counties have more elderly residents (Mean=18.97, SD=5.30 versus Mean=15.15, SD=3.68) and Native Americans (Mean=4.8, SD=12.75 versus Mean=1.29 SD=4.37), but lower income (Mean=40,361.15, SD=7,614.94) versus (Mean=44,648.87, SD=11,710.33), illiteracy (Mean=11.650, SD=.03011 versus Mean=13.07, SD=0.1198), access to primary care healthcare providers (Mean=73.79, SD=80.56 versus Mean=84.47, SD=52.55), and unemployment (Mean=6.34, SD=3.04) versus Mean=9.41, SD=3.02).

Conclusion

According to Farmer, Dadisman, Latendresse, Thompson, Irvin, and Zhang (2006), rural high schools and their communities must work together for mutual growth and survival (p. 11) while educational leadership needed to make sure community and educational objectives are well-matched. According to Clauss (2002):

[Communities] are pondering the highly interrelated problems that place kids at-risk, such as poverty, substance abuse, child abuse, teen parenthood, untreated or undiagnosed health problems, delinquency, gang activity, and even homelessness. It is not surprising that kids who face these kinds of problems are difficult to reach and teach . . . the schools already have full plates, but if schools want to increase the learning potential of children, then they must be one of the key players in resolving some of the social and health-related problems that interfere with or disrupt the learning process. (pp. 221-222)

Although limited research data exists for frontier areas, some rural research was relevant if they shared similar characteristics. Prior research, which included quantitative, qualitative and mixed methods studies, focused on frontier education, rural and urban health care needs and use of services, health care access, health care for teenagers, attendance and student achievement, along with specialty health care access for Native Americans, and rural behavioral risk factors. Three studies (Baldwin, et al., 2008; Harmon & Morton, 2010; Yoon, et al., 2019) involved Montana directly in their research while others (Nayar, Yu, & Appenteng, 2013; Vincillio & Bradley, 2009) looked at U.S. students as a whole or frontier areas as a group, which also included Montana students.

Former teacher and Montana senator from the frontier community of Big Sandy, John Tester was quoted, "There's no better place to have a quality life than rural Montana and rural America" ("Tester Notes Benefits", Sidney Herald, 2016). Those who chose to live on the frontier have embraced, accepted, or at least acknowledged the challenges it presents - a unique lifestyle that required independent thought and action for nearly every facet of their daily living. When this lifestyle was viewed through the lens of student academic achievement, those factors affecting their futures took on increased relevance.

Chapter Three: Methodology

Choosing and designing the research method for a dissertation was critical, as it not only supported the research question, but also drove and affected every component from participants, collection and data analysis. The aim of this research was to use a mixed methods procedure for gathering statistical and survey data to create a profile of frontier high schools in remote Montana. According to Howell (2007), “Whenever our purpose is merely to describe a set of data, we are employing descriptive statistics” (p. 4). The description, however, was based on the parameters of a population as a whole, versus a sample reflecting the population and did not seek to generalize. In addition, “Descriptive research is research aimed at describing the characteristics of a group without generalizing or testing statistical hypotheses” (Suter, 2012, p. 58). While statistical data were used to describe characteristics numerically, a survey was utilized to reveal a “lived experience” through narrative or shared impression, which is qualitative in nature. This combination of quantitative and qualitative approaches is referred to as a mixed methods procedure. Creswell (2014) explained, “The two forms of data are integrated into the design analysis through merging the data, connecting the data, or embedding the data” (p. 217).

This research used a convergent parallel mixed method. The first component involved the quantitative descriptive statistical analysis using the mean, median, mode, standard deviation, range and frequency for each data set relating to the frontier high schools of Montana and the associated social determinants of health. In regards to the statistical data, Creswell (2014) said, “This analysis should indicate the means, standard deviations, and range of scores for these variables” (p. 163). The resulting

data sets were analyzed to determine outliers or test underlying structures and assumptions. The second component was based on the qualitative portion using survey responses from the high school principal of each studied frontier high school district regarding student achievement and the community's social determinants of health. Data analysis was done using a side-by-side comparison of descriptive statistical data and principal survey responses to reveal occurrences of convergence and divergence.

The following sections provided further discussion regarding particular components of the study's methodology. These included the research design, research questions, population, participants, variables, data collection procedures, research procedures, reliability and validity, data analysis, a priori assumptions, and statistical assumptions.

Research Design

This mixed methods research design used a two-phase descriptive parameter with quantitative analysis using "descriptive" statistics for population data, along with survey responses to provide a qualitative analysis with deeper understanding of what the data revealed. The descriptive parameter part of the study used mean, median, mode, range, and standard deviations for data analysis. Hence, the design for this study was nonparametric which involved no sample. The research design was also a convergent parallel which involved a separate, but confidential survey that was administered the same time as the statistical data collection. The purpose of survey data was to provide deeper understanding through responses of the high school principals who participated and reflected their perspectives. While the two types of data

were different, when used together, their conclusions could have been similar and supported each other. In this way, multiple research data was analyzed to consider potential associations; however, this study was non-directional as it was unknown if an association existed between variables. Depending on the information they represented, the type of research data could have varied. For example, a Likert scale (nominal or ordinal) could be used for respondents' opinions or ranking scale (ordinal) to measure responses by frequency and degree of variation; whereas graduation rates may be expressed in percentages (ratio).

Research Question

This mixed methods study sought to answer the question, "What are the characteristics of Level 4 frontier high schools in Montana?" The focus of the profile involved the aspects of frontier education, health care, local economy, and behavioral risk factors. Survey questions for a deeper understanding included:

1. What is the school administrator's perception regarding education issues in a frontier school district?
2. What is the school administrator's perception regarding the role of student health care issues in a frontier school district?
3. What is the school administrator's perception regarding the role of economic issues in a frontier school district and its community?
4. What is the school administrator's perception regarding the role of the behavioral risk factors associated with a frontier school district community?

Research Hypothesis

The research utilized a mixed methods study for Level 4 frontier high schools in Montana. The study did not involve an intervention on the variables, and, as such, neither a hypothesis nor a null hypothesis were required.

Population and Participants

A population is “the complete set of numerical information on a particular quantity in which the investigator is interested” (Newbold, 1984, p. 7). For this study, the population was all the frontier high schools in Montana in areas designated by the USDA Frontier and Remote (FAR) Codes as Level 4. The unit of measurement was the data set obtained from the sources previously mentioned and the survey responses from each high school’s principal. The State of Montana has 192 high schools of which 54 are located in communities meeting these Level 4 criteria:

- 15 minutes or more from an urban area of 2,500-9,999 people;
 - 30 minutes or more from an urban area of 10,000-24,999 people;
 - 45 minutes or more from an urban area of 25,000-49,999 people;
 - 60 minutes or more from an urban area of 50,000 or more people
- (Rural Health Information Hub, n.d.)

The population for this research was the 54 Montana frontier Level 4 high schools located in areas as described above; however, this research did not use a sample of the population. The central limit theorem “says that the sampling distribution of the mean approaches normal as n increases. . . If the population is markedly skewed, sample sizes of 30 or more may be required before the means loosely approximate a normal distribution” (Howell, 2007, pp. 170-171). Hence, a minimum sample size of 30 out of a population of 54 would have been required, but, because the statistical

information from sources such as Montana OPI, U.S. Census, etc. could be accessed for all 54 Level 4 high school communities, the additional schools' participation was used for a more complete set of data. As a result, data collection for this study included all members of the population instead of random sampling. Likewise, the survey portion of the qualitative research was sent to all 54 frontier high school principals to participate in a confidential online survey using Survey Monkey.

Statistical data was acquired from a variety of sources such as the American Dental Association, MapQuest, Montana Department of Labor & Industry Montana Department of Transportation, Montana Department of Public Health and Human Services, Montana Healthcare Workforce, Montana High School Association, Montana Medical Association, Montana Office of Rural Health, Montana Office of Public Instruction (OPI), National Center for the Analysis of Healthcare Data, National Center for Education Statistics, National Park Service, National Provider Identifier, Robert Wood Johnson Foundation, Rural Health Information Hub, and U.S. Census Bureau. In addition, a confidential survey was sent to each frontier Level 4 high school principal and used to gather additional information and a deeper understanding of living in and being an administrator at a frontier school district. Confidentiality allowed the survey questions to include information about the respondent such as years of experience in teaching, administration, level of education, and prior career experience (See Appendix A). The degree of participation from the principals was unknown prior to the response deadline.

Variables

According to Howell (2007), “A critical aspect of planning research involves selecting the variables to be studied” (p. 3). A variable is a feature that can be observed or measured and can take on different values (Creswell, 2014; Howell, 2007). The role of the variables is connected to both the purpose statement and research question.

Survey response variable. A survey was administered to principals for additional information regarding the descriptive parameter components of the profile of their frontier high schools. This qualitative approach used frequency of these responses to provide categorical, nominal data through Likert and multiple choice responses as survey response variables.

Role of the researcher

The qualitative portion of a mixed methods study could have reflected the “researcher’s own personal training and experiences...along with consideration for the audiences that will accept their research” (Creswell, 2014, pp. 20-21). The researcher for this dissertation attended K-12 in the same small school district in North Idaho as her father, and her mother attended a one-room-schoolhouse in rural Minnesota. The researcher had nearly 20 years of classroom experience in rural settings and has the perspective of seeing education through the eyes of a teacher. In addition, she has been an advocate for community health care, which also included student health issues. She was the committee leader to extend a federally qualified health care center to Mullan, Idaho, and she was responsible for establishing a school meal program at the Mullan School District in Idaho. However, she has not analyzed Level 4 frontier high schools or communities in Montana in any manner and maintained an unbiased approach in all aspects of this study.

Unit of Analysis

The unit of analysis for this dissertation was Montana high schools located in a Level 4 frontier community. Measurements for the unit of analysis included central tendency, dispersion/variation, frequency, and position.

Data Collection Procedures

This mixed methods study was a descriptive parameters study that created a profile representing the 54 Level 4 frontier high schools in Montana. It was a convergent parallel profile using both statistical data (quantitative) and survey responses (qualitative) at the same time (Creswell, 2014).

Survey requests were sent to frontier high school principals who met the endorsement requirements as set forth under Administrative Rules of Montana 10.57.417. As such, they could provide specific information for their school as they were responsible for the students, staff, finances and operation of their frontier high school. In 29 out of 54 frontier schools, the principal was also the superintendent, which added to their overall perspective and insights. One administrator was the principal/superintendent at one frontier school district, along with being the superintendent at a neighboring school. County superintendents were not chosen for survey participation because they may not be as familiar with the daily ongoing operations and knowledge of individual students, staff, and instructional concerns and objectives as the principal. Additional desired attributes for the principals completing the survey were based on the National Policy Board for Educational Administration Professional Standards for Educational Leaders 2015:

1. Mission, Vision, and Core Values – effective educational leaders develop, advocate, enact a shared mission, vision, and core values of high-quality education and academic success and well-being of *each* student.
2. Ethics and Professional Norms – effective leaders act ethically and according to professional norms to promote *each* student’s academic success and well-being.
3. Equity and Cultural Responsiveness – effective leaders strive for equity of educational opportunity and culturally responsive practices to promote *each* student’s academic success and well-being.
4. Curriculum, Instruction, and Assessment – effective educational leaders develop and support intellectually rigorous and coherent systems of curriculum, instruction, and assessment to promote *each* student’s academic success and well-being.
5. Community of Care and Support for Students – effective educational leaders cultivate an inclusive, caring, and supportive school community that promotes the academic success and well-being of *each* student.
6. Professional Capacity of School Personnel – effective educational leaders develop the professional capacity and practice of school personnel to promote *each* student’s academic success and well-being.
7. Professional Community for Teachers and Staff – effective educational leaders foster a professional community of teachers and other professional staff to promote *each* student’s academic success and well-being.

8. Meaningful Engagement of Families and Community – effective educational leaders engage families and the community in meaningful, reciprocal, and mutually beneficial ways to promote *each* student’s academic success and well-being.
9. Operations and Management – effective educational leaders manage school operations and resources to promote *each* student’s academic success and well-being.
10. School Improvement – effective educational leaders act as agents of continuous improvement to promote *each* student’s academic success and well-being. (pp. 10-18).=

Data collection had two different components: the preliminary steps taken before the data were gathered and the actual collection of data. During the initial phase, the researcher determined a comprehensive method to obtain the desired information. This step required attaining permission, securing storage requirements, and addressing ethical issues (Creswell, 2013). The University of Montana Institutional Review Board protocol for data collection and research plans were followed and approved to ensure the research was conducted in an ethical and proper manner. Data obtained was collected using two types of sources.

Instrument. The statistical data were collected from a variety of external sources. They included American Dental Association, MapQuest, Montana Department of Labor & Industry Montana Department of Transportation, Montana Department of Public Health and Human Services, Montana Healthcare Workforce, Montana High School Association, Montana Medical Association, Montana Office of Rural Health,

Montana Office of Public Instruction (OPI), National Center for the Analysis of Healthcare Data, National Center for Education Statistics, National Park Service, National Provider Identifier, Robert Wood Johnson Foundation, Rural Health Information Hub, and U.S. Census Bureau, USDA Frontier and Remote (FAR) location codes, and survey results.

In order to obtain a deeper understanding of the relationships, associations, and statistical data, a survey was sent to Level 4 frontier high school principals. Invitations to participate were emailed to all 54 principals with a follow-up request in two-weeks. The survey used fill-in-the-blank and short answer responses. Participants submitted answers via the online survey data website Survey Monkey. The procedures followed the University of Montana IRB Statement of Confidentiality for online surveys along with the Subject Information and Informed Consent Form.

Table 1

Survey Questions (responses should be as of February 3, 2020)

Question	Response	Importance
<u>Student Data</u>		
1. What is the approximate percent of student socioeconomic levels at your high school (Affluent, upper-middle, middle, lower-middle, poor)?	Fill-in-the-blank	Student Demographic
2. What are the approximate percent of student racial/ethnic backgrounds at your high school (White, American Indian, Hispanic, Black, Asian, or other)?	Fill-in-the-blank	Student Demographic
3. What is the approximate number and percent of high school students in your district that are homeschooled?	Fill-in-the-blank	Student Demographics

Personnel Data

- | | | |
|---|-------------------|---------------------|
| 4. How many certified teachers (counselors, classroom and resource) are employed at your high school? | Fill-in-the-blank | School Demographics |
| 5. How many uncertified and classified staff (aides, office workers, custodians, and kitchen workers) are employed at your high school? | Fill-in-the-blank | School Demographics |
| 6. What is the approximate annual teacher turnover rate per school year for your high school? | Fill-in-the-blank | School Demographics |
| 7. How many superintendents and principals are employed at your district and what is their grade level responsibility? | Fill-in-the-blank | School Demographics |

Curriculum & Instruction Data

- | | | |
|--|--------------|---------------------------------------|
| 8. Describe the availability and use of technology/online and advanced placement learning at your high school. | Short Answer | Perception of Technology & Curriculum |
|--|--------------|---------------------------------------|

Facility & Transportation Data

- | | | |
|--|-------------------------------------|-----------------------------------|
| 9. How many buildings are included in your district? | Fill-in-the-blank | School Maintenance and Operations |
| 10. What is the approximate age of each school district building (elementary, junior high, senior high, etc.)? | Fill-in-the-blank for each building | School Maintenance and Operations |
| 11. What is the approximate amount spent on maintenance at your school district? | Fill-in-the-blank | School Maintenance & Operations |
| 12. How many high school students ride the bus? | Fill-in-the-blank | School Maintenance & Operations |
| 13. How many bus routes does your district run? | Fill-in-the-blank | School Maintenance & Operations |

14. How do the distances of the bus routes affect your student's education?	Short Answer	Perception of student transportation
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Health Care Access Data

15. What is the approximate daily attendance rate for your high school?	Fill-in-the-blank	Health Demographics
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16. What are the top 5 reasons students are absent in your high school?	Short answer	Health Demographics
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17. How do students access the nearest provider/health care facility?	Fill-in-the-blank	Health Demographics
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18. How does student health affect attendance at your school?	Short Answer	Perception of student health issues
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Behavioral Risk Factors

19. Which of the following has been experienced by a student or student family member in your school in the past 5 years: suicide, major substance abuse, or major vehicular accident/death?	Short Answer	Student & Community Demographics
20. What lifestyle activities in your high school's community contribute to student success?	Short Answer	Perception of community behavioral risk factors
21. What lifestyle activities in your high school's community do you consider to be the most detrimental to student success?	Short Answer	Perception of community behavioral risk factors

Note: The responses to this series of survey questions provide additional data regarding frontier community high schools, student health care access, economy, and behavioral risk factors.

Table 3

Open-Ended Survey Questions

Questions	Source of Data	Importance
1. What are the most pressing educational concerns for your frontier school district?	Survey Responses	A deeper understanding of student educational issues
2. How do these concerns affect your students?		
3. What are the most pressing health care concerns affecting your students?	Survey Responses	A deeper understanding of student health care access issues
4. How does health care access affect your students?		
5. What are the most pressing economic concerns for your high school's community?	Survey Responses	A deeper understanding of school/community economic issues
6. How do these economic concerns affect your high school and its students?		

<p>7. What are the most pressing behavioral risk factor concerns in your high school's community?</p>	<p>Survey Responses</p>	<p>A deeper understanding of community behavioral risk factors</p>
<p>8. How do the behavioral risk factors of your community affect your high school students?</p>		

Note: The responses to this series of interview questions provide a more in-depth understanding of educational, health care access, economic, and behavioral risk factor issues.

Reliability and Validity

Reliability is the consistency of the measurement tool. In other words, the same level of accuracy is achieved each time it is used. Validity, on the other hand, is “the extent to which a concept is accurately measured” (Heale & Twycross, 2015, p. 66). Reliability refers to the instrument, and validity refers to the outcome it generates. Both are equally important if the descriptive parameters study measurements are to be trusted.

In a mixed methods design, the data were collected, and the analysis was done separately. The data from various outside sources and the surveys for deeper understanding were used to create a profile of Level 4 frontier high schools in Montana. This method presumes the results from each method should support each other even though they are using different kinds of data (Creswell, 2014).

Reliability within qualitative research focused on similar findings if the test were repeated. This repetition can be obtained using methods such as triangulation, thick, rich descriptions, or multiple observers. Selection of the respondents, or subjects, then, becomes critical, as they were the source of the descriptive research information. As a result, this dissertation sought to gather additional "detail-rich" information through open-ended, short-answer questions that captured the first-hand knowledge and details of frontier schools and their communities. Broader themes were then generated from the resulting data and analysis conducted by the researcher.

"Validity of scale refers to the degree to which it [the instrument] measures what it is supposed to measure" (Pallant, 2016, p. 7). This mixed methods study used descriptive statistical parameters obtained regarding education, health care, economics, and behavioral risk factors for Montana Level 4 frontier high schools. In addition, a survey was conducted using all 54 high school principals. Two types of validity will be addressed in this study: content and construct.

Content validity looked at the degree to which the measurement tool measures what it is supposed to (Suter, 2012, p. 268). This mixed methods study used all 54 Level 4 frontier high schools in Montana for descriptive statistical parameters and survey questions regarding education, health care, economics, and behavioral risk factors data.

Construct validity, on the other hand, asked if the instrument measures the construct (potential relationships) being studied. Construct validity was addressed using homogeneity as both data and survey were focused on describing the

characteristics of the Level 4 frontier high schools in Montana in terms of education, health care, economics, and behavioral risk factors.

Validity also sought to address credibility or accuracy of the survey responses. This study addressed validity using frequency distribution of individual survey responses, along with triangulation with corroboration of outside source statistical data results.

Data Analysis

The data analysis utilized Microsoft Office Excel for the descriptive statistical parameters; whereas, survey response frequencies and short-answers were compiled by Survey Monkey. Descriptive statistical parameters analysis was conducted for all 54 community/high schools in Montana that qualified as frontier Level 4 and included specific measures such as mean, median, mode, standard deviation and range for data in the areas of frontier education, health care, economics, and behavioral risk factors. Outliers were identified using minimum and maximum values.

Likewise, responses to the general short-answer, open-ended, unstructured survey questions allowed the respondents to be unrestricted in their reflections. Once this data collection process was completed, the researcher switched the focus to analyzing the qualitative data to discover underlying themes.

Descriptive Parameters

Assumptions. This dissertation used a mixed methods study. According to Pallant (2016), statistical assumptions for this type of study were observations that are independent and not influenced by each other. Data obtained from separate federal and

state agencies (e.g., U. S. Census Bureau, Montana Office of Public Instruction) were not subject to any other measurement or influence (p. 215).

A Priori Assumptions. This research was a nonparametric descriptive parameters mixed methods that used interval and ratio statistical data along with ordinal and nominal information from survey response frequencies from 54 frontier high schools. The design was established a priori, but was flexible and shaped by the data.

Ethical Considerations

Data collection for this study was obtained from statistics as reported by government agencies or adults. Responses were confidential and adhered to the University of Montana IRB Statement of Confidentiality for online surveys along with the Subject Information and Informed Consent Form. No underage children were directly involved. The survey was completed by high school principals, responses remained confidential, and personal information was limited to years of education and experience. This mixed methods study was seeking descriptive information that in and of itself was not biased.

Summary

Findings from this research were used to describe remote living in Montana to those individuals who may not understand how it could affect more than just day-to-day life. As an outsider looking in, the issues of education, health care access, economic, and behavioral risk factors were not apparent, but research revealed another level of understanding. As Eisner (2017) stated, “They [researchers] aim beneath manifest behavior to the meaning events have for those who experience them” (p. 35).

This mixed methods research design sought to provide a variety of statistical and survey information to create a profile describing characteristics of 54 frontier Level 4 high schools and communities in Montana. The mixed methods study was nonparametric, non-experimental and descriptive; however, using statistical as quantitative data and survey responses as qualitative data generated a more thorough and complete analysis of existing elements of frontier living. This chapter identified the research participants, instruments, materials, procedure, and analysis. Subsequent chapters offered results of the data analysis, an interpretation related to the research question(s), and a discussion of further research.

Chapter Four: Results

“In the United States there is more space where nobody is than where anybody is. That is what makes America what it is” (Stein, 1936, pp. 53-54).

This mixed methods study pursued the research question, “What are the descriptive characteristics of a frontier Level 4 high school in Montana?” where “frontier” was generally based on population, location, and accessibility. This mixed methods study applied four social determinants of health— education, access to health care, economy, and behavioral risk factors — to reveal a profile of these remote high schools and their communities. A descriptive statistics component used measures of central tendency (e.g., mean, median, and mode), dispersion or variation (e.g., range, standard deviation, and variance), frequency (e.g., count, percent, and frequency), or position (e.g., percentile or quadrant rank) to describe a set of data.

Descriptive statistic characteristics of education, health care, economy, and behavioral risk factors of Montana’s frontier Level 4 high schools were gathered from 54 high schools and their communities using data from state and federal government agencies, health care organizations while survey responses from high school principals provided a deeper understanding of the frontier high schools and their communities.

Participants

The focus of this research was the smallest and most remote high schools in Montana, based on enrollment and location criteria. Fifty-five high schools were initially identified as Class C schools, which, according to the Montana High School Association Handbook, have from 1 to 107 students (Montana High School Association Handbook, 2019-2020). Communities where these schools operate were then identified and

verified as frontier Level 4 locations in Montana using the Rural Health Information Hub (2019). The Frontier and Remote (FAR) level codes are designated according to distances from population hubs as described by U.S. Department of Agriculture and the U.S. Department of Health and Human Services Federal Office of Rural Health Policy using urban-rural data from the 2010 U.S. Census (Appendix B).

The high schools meeting those requirements were found in 30 (out of 56) Montana counties and 6 (out of 8) Native American reservations. Unfortunately, one district, Peerless, has closed, and its high school is no longer in operation. As a result, the study was reduced to 54 high schools.

The descriptive statistics and survey questions associated with these remote high schools were based in part on the “social determinants of health,” which include education, health care system, economic stability, community/social context, and neighborhood and physical environment (Centers for Disease Control, n.d.; World Health Organization, n.d.). The focus of this study examined statistical data from the four areas of education, health care, economy, and community/social context as described using behavioral risk factors.

Data Collection

Descriptive statistical data were collected from a variety of sources, including federal and state education, health, labor, and economic agencies, and transportation departments. Data were selected on the basis of their contribution to the overall profile of education, health care, economics, and behavioral risk factors, as indicated by student and school demographics, technology, maintenance and operations, health care availability and access, economic conditions, and inherent social behaviors.

Wherever possible, data for individual high schools and/or communities were used; however, due to confidentiality concerns, which would allow for the potential identification of individuals, specific community data were not always available. In those cases, county data were used as a representation. While the county data may not specifically represent the community in all areas, the overall picture may have been revealed.

In addition to statistical data, high school principals were invited to participate in a survey via Survey Monkey to provide their experience and perceptions regarding their high school students and communities. Similar to the statistical data, the survey questions were designed to contribute to the overall profile and knowledge of principals in regards to the four social determinants of health (education, health care, economics, and behavioral risk factors) for their high school and its students.

Data and Analysis

The statistical data were based on its contribution to the profile of frontier education, health care, economy, and/or behavioral risk factors, were gathered from the aforementioned state and federal government, etc., agencies and entered into four Microsoft Excel spreadsheets. For each subcategory of data, such as enrollment numbers, miles to health care, or unemployment rates, statistical formulas were used to calculate measurements of central tendency, dispersion or variation, along with measures of frequency and position if applicable.

The survey result information was obtained from Survey Monkey Question Summaries based on the responses submitted. Survey invitations were sent to 54 frontier Level 4 high school principals using Survey Monkey, and 18 were returned.

Because the response rate was 33%, the survey information was not used as a representation of all the frontier Level 4 high schools in Montana, but rather used as individual observations. Frequency of responses was reported, and apparent themes from open-ended responses were identified. Some survey question responses were not reported, as more complete answers to specific questions were obtained from alternative sources such as OPI or National Education Statistics.

Frontier Education

Fifty-four schools were identified as operating in a frontier Level 4 community. They are located in 30 counties, and six are located on Native American reservations.

Table 3

Frontier Counties and School Districts

County	School District	Native American Reservation
Beaverhead	Lima	
Big Horn	Northern Cheyenne/Busby	Northern Cheyenne
	Plenty Coups/Pryor	Crow
Blaine	Chinook	
	Hays/Lodge Pole	Fort Belknap
Carter	Turner	
	Ekalaka	
Chouteau	Big Sandy	
	Geraldine	
	Highwood	

Table 4 (Continued)

Frontier Counties and School Districts

County	School District	Native American Reservation
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Daniels	Scobey	
Dawson	Richey	
Fergus	Denton	
	Grass Range	
	Roy	
	Moore	
	Winnifred	
Gallatin	West Yellowstone	
Garfield	Garfield/Jordan	
Hill	Box Elder	Rocky Boy
	North Star/Rudyard	
Judith Basin	Geyser	
	Hobson	
	Stanford	
Liberty	Chester/Joplin/Inverness	
Madison	Ennis	
	Sheridan	
McCone	Circle	
Meagher	White Sulphur Springs	
Park	Gardiner	
Petroleum	Winnett	
Phillips	Dodson	
	Saco	
	Whitewater	
Pondera	Heart Butte	Blackfeet
	Valier	

Table 4 (Continued)

Frontier Counties and School Districts

County	School District	Native American Reservation
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Pondera (cont.)	Culbertson	
Prairie	Terry	
Richland	Lambert	
	Savage	
Roosevelt	Bainville	
	Froid	
Rosebud	Rosebud	
Sanders	Hot Springs	Flathead
	Plains	
Sheridan	Medicine Lake	
	Westby	
Toole	North Toole/Sunburst	
Valley	Hinsdale	
	Opheim	
Wheatland	Harlowton	
	Judith Gap	
Wibaux	Wibaux	

Note: Frontier Level 4 schools identified using MHSAA Class C Schools and Rural Health Information Hub for Level 4 frontier communities

The overall profile of a frontier high school included basic information regarding students, teachers, classroom sizes, operational concerns, and special programs. Specific measures of student achievement and student demographics provided yet another layer of description.

Table 4

Overall Frontier High School Characteristics

Montana Frontier Level 4 High Schools						
	Mean	Median	Mode	(SD)	Max/ Min	Range
Enrollment	46	38	17	30	132/ 6	126
Student- Teacher Ratio	7:1	7:1	4:1	3:1	14:1/ 1:1	13
Classroom Teachers FTE	5.87	5.70	6.50	2.04	11.50/ 2.16	9.34
Expense per Student (\$\$)	\$20,291	\$19,972	n/a	\$9,816	\$60,244/ \$7,638	\$52,606
Households with Broadband (%)	72.25	72.75	73.20	10.31	94.10/ 46.90	47.20
Building Age 20+ Years (%)	87.21	88.70	88.30	7.43	96.60/ 58.80	37.80

Note. Data for enrollment and student-teacher ratio from Montana OPI GEMS School Profile School Characteristics (2018-2019); classroom teacher FTE, households with broadband, building age 20+ from National Center for Education Statistics District Demographic Dashboard (2018-2019), expense per student from Montana OPI GEMS School District Profile Financials.

According to Montana Office of Public Instruction’s Growth and Enhancement of Montana Students (GEMS) (2018-2019) and Public School Review (2016-2017), *enrollment* at Montana frontier Level 4 high schools ranged from 6 to 132, with an average of 46 students and an average of 7:1 *student- teacher ratio*. One school, however (Whitewater), with eight students, had a 1:1 student-teacher ratio. Judith Gap

had the smallest enrollment (6 students) and the smallest classroom teacher FTE (2.16). Overall, classroom *teacher FTE* ranged from 2.16 to 11.50. The enrollment range revealed the largest school (Plains, 132) was over 20 times larger than the smallest (Judith Gap, 6). *Administrative positions* were combined in 29 of the frontier schools where the same person functioned as both the principal and superintendent. Filling teaching positions was an on-going problem for these schools. Combining positions or sharing teachers was not uncommon for districts, especially in areas such as music, foreign language, and vocational education. According to the Annual Montana Accreditation Report (2018-2019), the following *deviations* were reported for frontier Level 4 high schools:

- Big Sandy – Misassignment, Non-licensed Teacher
- Box Elder – Non-licensed Teacher, Principal Not Endorsed, Student Performance
- Chinook – Class Size
- Circle - Misassignment
- Geraldine – Student Performance
- Hays Lodge Pole – No Library Media Specialist FTE, Student Performance, Administrator Non-licensed
- Heart Butte – Non-licensed Teacher, Misassignment, Student Performance
- Hot Springs – Misassignment
- Medicine Lake – No School Counselor, Misassignment, Non-licensed Teacher
- North Star/Rudyard–Library Media Specialist Not Endorsed, Student Performance

- Northern Cheyenne – Accreditation Status, Performance Level, Student Performance
- Plains – Insufficient Library Media Specialist FTE
- Plenty Coup/Pryor – Student Performance
- Roy – Misassignment, Superintendent Non-licensed, Principal Nonlicensed
- Savage – Non-licensed Teacher, Superintendent Not Endorsed, Program Area Not Offered
- Sheridan – Non-licensed Long-Term Substitute
- Terry – Student Performance
- Wibaux – Non-licensed Teacher, Library Media Specialist Not Endorsed
(pp. 55- 56, 61-63, 69-70, 87, 95).

Non-licensed positions occurred most frequently (9) followed by student performance (8). Nonlicensed positions were consistent with recruitment challenges.

Expense per student data for frontier high schools were based on a new federal requirement for reporting per pupil expenditure under ESSA which “includes the actual costs including salaries and benefits of teachers, administrators and other school staff, instructional expense, and transportation among other expenses” (National Association of Secondary School Principals, 2020, para., 1). The expenses also included federally funded educational programs like Title 1 (Montana OPI GEMS, 2020). This per pupil expense per high school provided separate and consistent reporting of data for all frontier Level 4 high schools compared to overall school district amounts. Judith Gap had the smallest enrollment of six, but it had the largest amount per pupil expense (\$60,244). However, Whitewater with only eight students reported the smallest per

pupil expense amount (\$7,638). The range difference between the minimum and maximum was \$52,606, and the standard deviation was \$9,816. The three schools with the highest expense per pupil were Judith Gap (\$60,244), Froid (\$45,343), and Denton (\$38,901). Overall, average *revenue per pupil* for all frontier level 4 high schools was \$25,086 with a range of \$11,078 (Plains) to \$51,131 (Gardiner). Both expenses and revenues had large standard deviations.

Nearly three-quarters (72.25%) of all frontier high schools had *household broadband* available. Overall, frontier high schools reported a maximum availability of 94.10% (Froid) and a minimum of 46.90% (Plenty Coups) with a range of 47.

The *age of the buildings* were comparable for frontier high schools overall. According to the National Center for Educational Statistics (2018-2019), 87.21% of the frontier high school buildings were over 20-years old. The mode was 88.30%, and the standard deviation was 7.43%. Ennis had the lowest percent of buildings over 20 years old with 58.80% while Box Elder had the highest percent with 95.50%.

Table 5

Frontier High School Programs or Classifications

Montana Frontier Level 4 High Schools						
	Mean	Median	Mode	(SD)	Max/ Min	Range
Economically Disadvantage Participation (%)	45.25	41.7	100	27.34	100/0 100	100
Special Ed Participation (%)	11.64	11.30	0.00	6.36	29.40/ 0.00	29.40

Limited English Proficient (%)	2.08	0.00	0.00	9.83	67.20/ 0.00	67.20
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Note. Data from Montana OPI GEMS School Profile School Characteristics (2018-2019)

Special programs or qualifiers such as economically disadvantaged or special education were important descriptors of a frontier Level 4 high school. The *economically disadvantaged participation* for frontier students averaged 45.25% with a range of 0 (3 schools) to 100% (mode=6 schools), and a standard deviation of 27.34. This meant less than half (45.25%) of all frontier high schools qualified as economically disadvantaged. Every frontier Level 4 high school in Montana was a *Title 1* school (National Center for Education Statistics, 2018-2019), and *special education* participation averaged 11.64% with a range of 0.00% (mode=3 schools -Judith Gap/Opheim/Richey) to 29.40% (Geysler) (Montana Office of Public Instruction GEMS, 2018-2019).

Limited English proficiency averaged 2.08% in frontier Level 4 high schools. Specific guidelines for the identification of limited English proficiency in school districts were based on “listening, speaking, reading, and writing” were developed using Criteria for Identification of Limited English Proficiency (Montana OPI, n.d.). This reflected seven schools (Box Elder, Dodson, Harlowton, Hays Lodge Pole, Heart Butte, Plenty Coups, and West Yellowstone) while the range extended from 67.20% to 0.00% (mode=46 schools) for frontier level 4 high schools overall.

School and student *achievement* provided another layer of description regarding attendance; proficient and advanced scores on the American College Test (ACT) given to juniors in the areas of math, reading, and/or science; percent of students graduating in 4 years; percent of student college/career readiness; and the percent of students who

enrolled into the Montana University System within 3 months of graduation. Frontier high school achievement data for specific high schools were not always available due to the smaller number of students and confidentiality concerns. According to Montana OPI:

All student information and data published by the OPI follows the OPI’s Student Records Confidentiality Policy, which prohibits the OPI from disclosing data from student groups that are 5 or fewer in number or would otherwise reveal the identity of an individual student. Montana has many small schools and small sub-group populations where an individual student’s identity could be revealed without this safeguard. In places where data has been suppressed to protect student privacy, you will see an asterisk (*) instead. (Montana OPI GEMS, Student Privacy & K-12 Data Governance, 2016, para.2).

Because of confidentiality data suppression, the following table included the count of schools reporting data.

Table 6

Frontier High School Achievement

Montana Frontier Level 4 High Schools							
	Mean	Median	Mode	(SD)	Max/ Min	Range	Count
95% Attendance for Entire School Year	40.71	41.51	52.63	20.03	75.00/ 0.80	74.80	53
Proficient or Advanced Math (%)	47.52	50.00	0.00	29.96	100.00/ 0.00	100.00	53

Proficient or Advanced Reading (%)	53.27	50.00	50.00	26.76	100.00/0.00	100.00	53
Proficient or Advanced Science (%)	56.61	58.33	50.00	28.24	100.00/0.00	100.00	53
Students Graduating in 4 years (%)	93.45	100.00	100.00	10.00	100.00/60.00	40.00	53
College/ Career Readiness (%)	70.49	91.67	100.00	35.14	100.00/0.00	100.00	53
Enroll in MUS Within 3 months of Graduation	39.94	33.33	33.00	24.19	100.00/0.00	100.00	53

Note. Data from Montana OPI GEMS School Report Card (2018-2019)

Attendance was reported using the percent of students having 95% attendance for the entire year. Less than half, (40.71%) of students average 95% attendance for the entire year. The range extended from 75.00% (Whitewater) to 0.80%. Montana OPI GEMS (2018-2019) also reported chronic absenteeism as part of the school climate. Frontier Level 4 high schools had an average of 7 students with chronic absenteeism concerns. It was unclear, other than from the survey responses, what contributed to the absenteeism rates for either group.

While test data was suppressed for some of the 54 high schools, over half of the frontier high school students overall were proficient and/or advanced in reading, math or science with SD nearly 30.00%. The range of math scores for 53 schools reporting had a mean of 47.52 and extended from 100.00% to 0% (mode=8 schools). Reading scores for 53 schools reporting had a mean of 53.27 and ranged from 100.00% to 0% with

mode of 50.00% (7 schools). Finally, science scores for 40 reporting schools had a mean of 56.61 and ranged from 100.00% to 0.00% with a mode of 100.00% (8 schools).

The Every Student Succeeds Act High School *Graduation Rate* set forth the definition and calculation of “Average Cohort Graduation Rate” (ACGR). The specific graduation rates are defined by the Montana Secretary of State under Rule 10.55.905 Graduation Requirements for both college and career readiness, which indicates both total units of study and specific content and performance standards for Montana. The percent of students graduating from frontier Level 4 high schools in four years averaged 93.45% with a range of 100.00% to 60.00% with a mode of 100.00% (31 schools) .

Career and College Readiness indicated 70.49% of frontier Level 4 high school students met the coursework requirements. The frontier high school mode was 100.0% with 20 schools.

Another indicator of student achievement was the percent of students who enrolled into the Montana University System (MUS) within three months of graduation. The *MUS enrollment* was over one-third (39.94%) of frontier students, ranging from 100.00% to 0.00% and a mode of 3.33% (6 schools).

The last indicator of *student achievement* was accelerated coursework for frontier Level 4 high schools in Montana. These high schools had an overall average of 4 students per school participating in accelerated programs.

A final descriptive layer of these remote schools was the demographics of the students in terms of their race and ethnicity. The following table was based on all 2,508 frontier Level 4 high school students in Montana.

Table 7

Frontier High School Student Diversity

Montana Frontier Level 4 High Schools

Race/Ethnicity	Mean		Students
	Percent	(SD)	
White	80.18	24.76	2,011
Native American	15.49	29.33	388
Hispanic	2.10	1.86	53
Black	0.16	0.41	4
Bi-Racial/Other	2.07	2.41	52

Note. Data for number of students from Montana OPI GEMS School Profile School Characteristics (2018-2019) and data for race/ethnicity percent from National Center for Education Statistics (2018-2019)

When student diversity was examined together for all frontier Level 4 high schools, the standard deviation for White and Native American students was large. Similarly, Native American schools viewed separately revealed a near mirror image of race and ethnicity profile, including high standard deviations.

This statistical data was focused on the school environment and revealed a snapshot of frontier Level 4 high schools regarding student, teachers, classroom sizes, operational concerns, special programs, achievements, and race/ethnicity demographics. Another area of consideration to further describe the remote life on the frontier was health care access.

Frontier Health Care

Frontier health care was based on access to medical insurance, providers, and care facilities. Many Montana children have medical insurance through private insurance or from programs such as Healthy Montana Kids. In fact, an average of 85.50% of children from 22 frontier Level 4 school districts had health insurance

coverage. The range of coverage was 50 to 100%. Five districts had 100% student coverage, which was also the mode (National Center for Education Statistics, 2014-2018).

Health care itself can be administered by a variety of personnel such a local paramedic, nurse, or physician. The availability of these people can varied in frontier areas and could have been considered adequate for the vast and remote frontier areas, depending on the type of illness or injury or expediency of necessary care. In Table 10, data for health care providers was based on the 30 counties (out of 56) having frontier Level 4 communities. However, it was interesting to note that the number of available medical care personnel changed when a single county, Gallatin, was removed from the calculations. Gallatin County, with over 2,600 square miles and 114,434 people, includes population centers such as Bozeman and Belgrade (U.S Census Bureau, 2019). It is also home to West Yellowstone, which is a Level 4 frontier community and a gateway to Yellowstone National Park that had over 4 million visitors in 2019 (National Park Service, 2019). With these factors, Gallatin County had considerably more health care providers than any other county, as indicated by the maximum for each provider type, which contributed to the greater standard deviation for each provider type. After Gallatin, Fergus County had the most RN's with 209, which is 60 more than the next highest (Park County with 149). The following table presented provider information both with and without Gallatin County.

Table 8

Frontier Health Care Professionals

Licensed Provider	Frontier Counties (30)		Without Gallatin County		Gallatin County Individually
	Mean/ (SD)	Min/Max	Mean/ (SD)	Min/Max	
Paramedic	3 (10)	0/56	2 (3)	0/17	56
EMT	34 (85)	2/478	19 (13)	2/53	478
LPN	14 (16)	0/89	12 (9)	0/29	89
RN	62 (67)	0/318	53 (47)	0/209	318
PA	4 (11)	0/59	2 (2)	0/8	59
PCP	7 (18)	0/97	4 (5)	0/18	97
FMP	4 (9)	0/47	3 (2)	0/10	47
Dentist	5 (13)	0/74	2 (3)	0/8	74

Note. Data for paramedics, EMT's, LPN's, and RN's from Montana Department of Labor and Industry (2016) as reported by Montana Office of Rural Health (2017), data for PA's from the Montana Medical Association (2016) as reported by Montana Healthcare Workforce Statewide Strategic Plan, data for PCP's, FMP's, and Dentists from the National Center for the Analysis of Healthcare Data (2015) as reported by Montana Office of Rural Health (2017).

The number of available medical personnel could increase the miles and response time as coverage was spread throughout their service area. Although

Montana had health care facilities scattered across the state, getting patients to the health care facilities that provided necessary health care services such as federally qualified health centers (FQHC), critical access hospitals (CAH), dental health care, and mental health centers, involved similar distance and time constraints.

Table 9

Health Care Facility Access per County

Facility	Mile Access			Minute Access		
	Mean (SD)	Min/Max	Range	Mean (SD)	Min/Max	Range
FQHC	56 (31)	15/179	164	58 (31)	15/184	169
CAH	32 (16)	10/73	63	33 (16)	10/78	68
Dental Health	35 (14)	10/77	67	36 (16)	10/96	86
Mental Health Centers	40 (19)	12/94	82	42 (20)	12/101	89

Note. Data for federally qualified health centers and mental health centers from National Provider Identifier (2019), data for critical access hospitals from Montana Medical Home Portal (2019), data for dental health from American Dental Association (2019), and data for driving mileage/times from MapQuest (2020).

The standard deviation reflected the varying range of miles/hours to health care which can extend to 3 times the mean and demonstrated how remote and removed from health care access some of these locations are. It should be noted, however, these times represented driving conditions in June from recent MapQuest data. Winter driving conditions could be significantly different.

According to the US Department of Health and Human Resources Health Resources & Services Administration (n.d.), “Health Professional Shortage Areas (HPSAs) are designations that indicate health care provider shortages in primary care, dental health, or mental health. These shortages may be geographic, population, or facility-based.” Over half of Montana’s 56 counties had health professional shortage area designations. For example, 27 frontier community counties had primary care HPSAs, 31 frontier community counties had mental health HPSAs, and 24 frontier community counties had dental care HPSAs (MDPHHS, 2019).

Table 10

Frontier County Health Professional Shortage Area Designation Frequencies

Health Care	Primary Care	Mental Health	Dental Care
Low Income	14	2	17
Geographic	13	27	5
Indian Health Facility	<u>0</u>	<u>2</u>	<u>2</u>
Total	27	31	24

Note. Data for health professional shortage areas from Montana Department of Public Health & Human Services (2019)

While over 85% of Montana frontier Level 4 children, including the high school students in this study, had the advantage of health insurance coverage, other families may have faced challenges in regards to access to providers and care facilities.

Frontier Economics

The terms “far”, “remote”, and “frontier” brought forth images of rural living in wide-open spaces where people were employed in farming or ranching, and the nearest neighbor was miles away. While these features could very well have been true, a more complete economic picture considered population density, along with income levels, poverty and unemployment rates, and industrial bases.

Level 4 communities had small populations ranging from 55 to 1,271 people, and they may also existed in isolation from the nearest neighboring community. According to the US Census Bureau *Population, Housing Units, Land Area, and Density: 2010*, population density was measured by the number of people per square mile. Montana Level 4 frontier communities averaged 3.2 people per square mile. This figure, however, included Gallatin County which has 34.4 people per square mile (US Census, 2010). If Gallatin County was omitted from the calculations, the population density average for the remaining frontier Level 4 areas dropped to 2.2, with maximum of 5.6 and minimum of 0.3 people per square mile, and range of 5.3. Table 11 reported population and population density which was available for all 54 frontier communities. Table 12, on the other hand, reported mean household income, annual employment and 5-year average employment which was available at the county level, 30 out of 56 which had frontier Level 4 communities. Family income below poverty level data included only 23 counties due to confidentiality concerns.

Table 11

Frontier County Population and Population Density (2019)

	Mean (SD)	Minimum	Maximum	Range	Number of Counties
Population	440 (346)	55	1,271	1,216	54
Population Density (per square mile)	3.2 (6.1)	0.3	34.4	34.1	30

Note. Data for population and population density from US Census (2010),

Table 12

Frontier County Household Income, Family Income Below Poverty Level, and Unemployment (2019)

	Mean (SD)	Minimum	Maximum	Range	Number of Counties
Mean Household Income	\$46,828 (\$10,064)	\$26,719	\$81,250	\$54,531	54
Family Income Below Poverty Level (\$25,750)	18.56% (52.40%)	0.00%	52.40%	52.40%	23
Annual Unemployment (2019)	3.34% (1.15%)	2.0%	7.4%	5.4%	30
5-Year Average Unemployment Rate (2015-2019)	3.79% (1.37%)	2.02%	8.78%	6.76%	30

Note. Data for mean household income from US Census Bureau (2010) ACS Demographic and Housing Estimates, and family income below poverty level from US Department of Health & Human Services (2019), and annual (2019) and 5-year (2015-2019) unemployment Montana Department of Labor & Industry.

Frontier income levels averaged \$46,828, with a range of \$54,319 (\$26,719 minimum and \$81,250 maximum), which contributed to a standard deviation of 10,064. Bennett, Fry and Kochhar with Pew Research Center (2020) reported middle-income for 2018 ranged from \$48,500 to \$145,500 and low-income below \$48,500 based on a three-person household (Fact-Tank, 2020). As a result, the average for frontier Level 4 was in the lower income tier for 27% of Montana adults (Fact-Tank, 2020). The frontier minimum income was 25.26% greater than the national poverty level for a family of 3 of \$21,330 (US Health and Human Services (2019)). The average percent of family income below poverty level was 18.56%; however, due to confidentiality concerns, data was only available at the county (vs. community) level for 23 out of 56 communities.

Poverty and unemployment were both important economic indicators. The 2019 unemployment rates for these frontier areas, when compared to a 5-year average from 2015 to 2019, appeared fairly consistent. For example, actual unemployment rates per county for 2019 averaged 3.34% and ranged from 2.00% (Daniels County) and 7.40% (Big Horn County); whereas, the 5-year average was 3.79% and ranged from 2.02% (Meagher County) and 8.78 (Big Horn) (Montana Department of Labor & Industry, 2019).

While ranching and farming were the stereotype for rural Montana, the US Census Bureau provided additional information regarding industrial bases and business types for frontier communities. The types of industry in the 54 frontier communities across the state included education, wholesale, finance/insurance, professional science, information, agriculture/forestry, construction, retail, arts/entertainment, transportation, public administration, and other service. A frequency calculation using the top three

types in each community revealed the four primary industrial bases were education, agriculture/forestry, construction, and retail.

Table 13

Frontier Community Industrial Bases

Industry Type	Frequency
Education	48
Agriculture/Forestry	28
Construction	19
Retail	19
Arts & Entertainment	16
Transportation	12
Public Administration	8

Note. Data for industry types from US Census Bureau ACS (2018).

Not surprisingly, employment opportunities for residents of frontier communities were limited. Schools were the main employers, but families may have operated a farm or ranch, or sought additional entrepreneurial options through self-employment. Over 40.00% of the frontier industry was based in government, which included education, or reported as self-employment (US Census Bureau ACS, 2018). Government could have included forest service, state/county road maintenance, fish and wildlife, along with agriculture extension offices.

Table 14

Frontier Self-Employment vs. Government Employment

Industry Type	Mean % (SD)	Min/Max %	Range
Self-Employment	12.41 (8.14)	0.00/36.10	36.10
Government-Employment	28.37 (17.91)	3.40/100.00	96.60

Note. Data for industry types from US Census Bureau ACS (2018).

The town of Inverness in Liberty County had the distinction of 0.00% self-employment and 100.00% government employment. “Transportation” was given as the sole industry type, which may be explained by the state or county road maintenance departments or from the Amtrak Empire Builder route that ran through Inverness along Highway 2. The maximum of 100% also contributed to the higher standard deviation.

Although affected by agriculture commodity price swings and boom-or-bust oil production, the frontier was surviving. The economics of frontier Level 4 towns in Montana revealed a fairly solid middle-of-the road base in terms of employment, income, and industry bases.

Frontier Behavioral Risk Factors

Duncan (1993) wrote, [frontier living is] “a way of life that exalts risk-taking and independence so that people are simultaneously more likely to get into life-threatening situations and yet less likely to seek help when they need it.” (p. 68). The fourth social determinant of health used for this research was directed toward behavioral risk factors, as part of “community/social context. Some behaviors were inherently dangerous, like smoking, drinking, taking drugs, or driving on rural highways in the winter; whereas

other beneficial behaviors, such as belonging to certain positive peer groups, could mitigate risky behavior choices through positive social influence.

The aforementioned behaviors associated with a higher risk of injury or deaths were not unique to these areas; however, information about frontier communities specifically was not always available due to confidentiality concerns. As a result, the data, where available, were gathered at the county level and did not include all 54 frontier Level 4 high school communities or all 30 counties with frontier Level 4 communities. Data became informational only and did not represent frontier Level 4 high school students or communities as a group.

Motor vehicular accidents also contributed to behavioral risk factors. Fourteen frontier counties reported vehicular deaths in 2010-2016 according to the Robert Wood Johnson Foundation Health Rankings (2018). Of those 14, three (Gallatin, Hill, and Richland) had both motor vehicle crashes and fatality vehicular crashes with drivers ages 14-20. These same three counties, along with two others (Roosevelt and Choteau), recorded drinking and driving in grades 9-12 in the Montana Youth Behavior Survey (2009-2019) as reported by MDPHHS.

Table 15

Frontier High School Students Behavioral Risks

Risk	Mean % (SD)	Min Max %	Number of Counties Reporting
Tried Cigarette Smoking (2019)	40.94 (8.29)	32.05 55.65	10

Tried Electronic Vaping (2019)	53.12 (11.25)	34.78 67.19	10
Been offered, Sold, or Given Drugs on School Property (2019)	16.07 (5.42)	7.89 23.81	10
Been bullied on School Property in the Past 12 Months (2019)	27.97 (7.32)	15.75 34.78	10

Note. Data for high school student behaviors from Montana Youth Risk Behavior Survey (2019) as reported in Montana OPI.

Frontier high school students were surveyed in regards to overall cigarette and drug usage. The *Montana Youth Risk Behavior Survey 2019* results from 10 counties including Blaine, Choteau, Fergus, Hill, Madison, Phillips, Pondera, Richland, Roosevelt, and Sheridan indicated over 40% admitted to having tried cigarette smoking, over 53% admitted to having tried electronic vaping, and over 16% had been offered, sold or given drugs on school property. In addition, over a quarter (28%) reported they had been bullied on school property.

These activities had inherent risks, but the behavior with the most troubling consequence was suicide. According to the Montana DPHHS (2016), a disturbing 80.00% of frontier counties (24 out of 30) have experienced a suicide occurrence where the average was six per county reporting data from January 2014 to February 2016. The minimum was 1 per county (Carter, McCone, and Sheridan), the maximum per county was 30 in Gallatin County; however, excluding Gallatin, the average dropped to 5 and maximum to 19 (Park County). Unfortunately, Native American suicides across all ages for the same time frame, reported an average of 3 suicides, minimum of 1 and maximum of 6 (Roosevelt County). For students ages 11-17 residing in frontier Level 4 communities, the suicide rates in the six reporting counties was an average and minimum of 1 and a maximum of 2 (Park County).

Student risk behavior decisions were also revealed in the school setting. According to Montana OPI GEMS (2018-2019), frontier high school students had 263 absences for an average of 5 per school. However, 154 were from Native American high schools, which had an average of 31 suspensions/expulsions per school.

The portrait of Montana frontier Level 4 high school students and their communities revealed negative behavioral risk factors; however, the picture also needed to include those activities having a positive influence on student social behaviors. One of the advantages of small schools was the increased opportunity to participate. With small enrollments, frontier school activities were inclusive, and students rarely faced try-outs for sports teams or club memberships. These schools were able to provide their students positive extracurricular social activities in the arts

(e.g., band, choir, drama), athletics (e.g. football, volleyball, basketball), and vocational aptitudes (e.g. Future Farmers of America, Business Professionals of America).

With an average enrollment for frontier Level 4 high schools in Montana in 2018 of 46 students, student participation for arts and vocational programs was nearly half the student body, and almost 100% for athletics. While athletics had the greatest participation, each student participated in at least two activities on average with a maximum of 7 at Judith Gap.

Table 16

Frontier High School Extracurricular Student Activity Participation 2018

Activity	Mean (SD)	Minimum	Maximum	Number of Schools Reporting
Arts	21 (22)	0	92	50
Athletics	51 (39)	0	147	50
Vocational	25 (18)	0	64	49
Total	97			

Note. Average enrollment for 2018 = 46 students. Data on student participation from Montana OPI GEMS Student Engagement Extracurricular Participation Dashboard (2018-2019)

Occasionally, data for an individual school was either missing altogether or the participation for one year was inconsistent with other years. To address the variability, a 5-year participation table was compiled.

Table 17

Frontier High School Extracurricular Student Activity Participation 5-Year Average

(2013-2017), Average Enrollment ≈57

Activity	5-Year Mean (SD)	5-Year Minimum	5-Year Maximum	Number of Schools Reporting
Arts	32 (16)	0	90	27
Athletics	59 (34)	0	139	34
Vocational	33 (18)	0	73	38
Total	124			

Note. Average enrollment for 2013-2017 = 57 students. Data on student participation from Montana OPI GEMS Student Engagement Extracurricular Participation Dashboard (2013-2017)

Overall, average student enrollment (46 vs. 57) and participation (97 vs. 124) were greater in the 5-year average than 2018. The maximum amounts were roughly the same for arts and athletics, with a 2% increase in 2018 arts and a 5% increase in 2018 athletics. However, vocational activities had a 14% decrease in 2018.

Some frontier Level 4 schools did not have enough students to field a sports team. Rather than go without, these small schools were partnering with other Class C schools, or even nearby Class B schools, so students had the opportunity to participate. Decades-long rivalries are put away as students played together for a new common goal.

Table 18

Frontier High School Student Activity Cooperative Sponsorships

Activity	Class C Schools with other Class C Schools	Class C Schools with Class B Schools	Total
6-Player Football	16	1	17
8-Player Football	2	5	7
Volleyball	17	4	21
Basketball	19	3	22
Wrestling	2	4	6
Softball	2	2	4
Golf	6	1	7
Cross Country	10	0	10
Total	74	20	94

Note. Data on student participation from Montana High School Association (2019)

Frontier student extracurricular activities demonstrated benefits to both students and the community, bringing people together for a shared purpose as they cheered on teams, attended musical and dramatic performances, or supported vocational competitions. As stated by Tieken (2014), “. . . athletics may be the most common, [but] . . . other school-related extracurricular activities also bring people to the school as parents and relatives and friends gather to support children in school plays or attend the Halloween festival” (pp. 53-54).

Survey Responses

A survey consisting of 30 questions was emailed via Survey Monkey to each of the 54 frontier Level 4 high school principals. Two follow-up reminder emails, plus a

personal phone call, was used to maximize the number of responses. While the Covid-19 school shutdown contributed to a unique school situation, it was unclear how it affected the number of survey responses that could normally be anticipated. That said, the response rate was 33% (18 out of 54). For some of the survey questions, seeking data from alternative sources was a more reliable option. A list of the unused survey questions along with the alternative source of data was listed in Appendix C.

Frontier Education Survey Questions.

Survey Question #1 “What is the approximate percent of student socioeconomic levels at your high school? (Must add up to 100%)”

Table 19

Frontier High School Socioeconomic Levels, 18 principals

Level	Total Number	Average Number	Percent	Number of Responses
Affluent	36	5	2.00	8
Upper-middle	204	17	11.33	12
Middle	684	40	38.00	17
Lower-middle	617	34	34.28	18
Poor	259	16	14.39	16

The survey results indicated nearly two-thirds (72.28%) of these frontier high school families were middle (38.00%) or lower-middle (34.28%) socioeconomic class. This was in line with the mean household income of \$46,828 from the Frontier Economy section.

Survey Question #3 “What is the approximate number of high school students in your district that are home-schooled?”

Table 20

Frontier Home-Schooled High School Students, 18 principals

	Total Number	Average Number	Adjusted Responses
Number of Students	88	5	17
Percent of Total High School Students	10.90%	6.81%	16

According to the survey responses, frontier homeschooled students equaled 88 for an average of 5 students per district. This was 6.81% of the total high school students in the survey. School #7’s information created an outlier as it responded 100 homeschooled students as 23% of their total students. This puts student enrollment over 400 which exceed frontier Level 4 schools.

Survey Question #4 “How many certified teachers are employed at your high school?”

Table 21

Frontier High School Teaching Staff, 18 high school principal responses

Position	Total Number	Average Number Per High School	Percent of Staff	Responses
Classroom Teacher	210	12	79.24	18
Counselors	15	1	5.66	18
Resource Staff	28	2	10.57	17
Other	12	2	4.53	7

Montana frontier Level 4 high schools had an average of 5.87 classroom teachers FTE according to the National Center for Education Statistics (2018-2019). However, the average survey response was an average of 12 classroom teachers per school. Perhaps the survey responses include the number of classroom teachers in the school district as opposed to just the high school. For example, one school reported 18 teachers, and another reported 24 teachers, which is nearly 5 times the average.

Survey Question #5 “How many non-certified and classified staff are employed at your high school?”

Table 22

Frontier High School Non-Certified/Classified Staff, 18 high school principal responses

Position	Total Number	Average Per School	Percent of Staff	Responses
Classroom Aides	45	3	27.78	18
Custodial	39	2	24.07	18
Kitchen Staff	38	2	23.46	17
Office Staff	32	2	19.75	18
Other	8	1	4.94	6

The survey indicated classroom aides and custodial staff account for over half the non-certified/classified staff, but the breakdown was fairly evenly split with the exception of the “Other” staff. Frontier Level 4 high schools averaged 46 students. The survey results indicated an average of one classroom aide per 15 students, one custodial/kitchen/office staff personnel per 23 students, along with one additional support staff member.

Survey Question #6 “What is the approximate annual teacher turnover per school year for your high school?”

Table 23

Frontier High School Annual Teacher Turnover, 17 high school principal responses

School-Year	Total	Adjusted Total	Average	Adjusted Average	Percent	Adjusted Percent	Responses
2018-2019	52	22	3	1	32.50	22.00	17/16
2017-2018	50	20	3	1	31.25	20.00	17/16
2016-2017	23		1		14.37	23.00	16
2015-2016	15		1		9.38	15.00	14
2014-2015	20		2		12.50	20.00	12

The SY2018-2019 and SY2017-2018 data appeared to have an outlier from School 16 as it reported a turnover of 30 for each year which was nearly three times the average number of certified teachers reported in Question 4 and 10 times more than any other school surveyed. The adjusted amounts showed the figures without the outlier. Overall, the surveyed schools have an average of one vacant teacher position each year, which is approximately one-fifth of the staff.

**Survey Question #7 “What is the approximate administrator
(superintendent, high school principal) turnover per school year in the past five
years?”**

Table 24

Frontier School Superintendent Turnover, 17 high school principal responses

School- Year	Total	Adjusted Total	Average	Adjusted Average	Turnover Percent	Adjusted Turnover Percent	Responses
2018-2019	105	5	6	0.23	194.44	9.26	17/16
2017-2018	1		0		1.85		16
2016-2017	3		0		12.96		16
2015-2016			0		20.37		17
2014-2015			0		11.11		17

The data for SY 2018-2019 had an outlier of 100 for School #16 superintendent turnover. If that amount was eliminated from the calculations, the average number for turnover per high school superintendents dropped to 9.26% for SY 2018-2019. The average turnover rate for the surveyed schools for SY 2014-2018 was less than one while the turnover percentages ranged from 1.85% to 20.37%. It is also important to note that some of the frontier administrative positions of superintendent and principal are combined and performed by one person.

Table 25

Frontier High School Principal Turnover, 17 high school responses

School-Year	Total	Turnover Percent	Responses
2018-2019	2	12.50	16
2017-2018	0	0.00	16
2016-2017	4	23.53	17
2015-2016	3	18.75	16
2014-2015	2	12.50	16

Similar to the survey regarding superintendents, the average annual turnover rate of principals for the surveyed schools for SY 2014-2019 was approximately 2, while the turnover percentages ranged from 0.00% to 23.53. The average principal turnover percentage rate for the surveyed schools was 13.46%.

Survey Question #9 “Describe the availability and use of technology/online and advanced placement learning at your high school.”

The high schools represented in the survey were taking advantage of digital opportunities for their students. Eight of the 18 schools had 1:1 computers, usually Chromebooks, and 13 out of the 18 schools had AP and/or dual credit classes available. Comments included:

Great availability (School 1). The entire school is WiFi connected (School 3). We partner with our local internet provider to get it into homes. AP is offered to students interested in it and has been a great experience for students. (School 8). We currently

have students with 20+ dual credits that will transfer into universities. We are fortunate to be able to offer various dual credit courses in our Math and English departments as they are Master’s level educators (School 10). More than 50% of our graduates take AP courses (School 16).

One school, however, expressed concern and frustration in the technology provided. *Technology is outdated and not readily available. AP is not offered* (School 15).

Survey Question #10 “How many buildings are included in your school district?”

Table 26

Frontier School District Buildings, 18 high school principal responses

Number of Buildings	1	2	3+	Average	Min/Max	Mode	Number of Responses
Response	12	3	3	2	1/6	1	18

Administrators at a frontier school district were responsible for the maintenance and expense of the district facilities. These smaller districts usually had one building, oftentimes with additions, that housed their K-12 students. Some districts, however, had a separate grade school, athletic facility, or maintenance/bus garage. As reported earlier, many of these buildings were over 20 years old, which could have contributed to their overall maintenance and expense.

**Survey Question #13 “How many high school students ride the bus?” and
Survey Question #14 “How many bus routes does your district run?” (Combined)**

Table 27

Frontier High School Busing, 17 & 18 high school principal responses

Number of Students/Bus Routes	0-5	6- 10	11-15	16+	Min/Max	Mode	Responses
Students	6	4	3	4	0/35	5,10	17
Bus Routes	16	2	0	0	1/6	4	18

The 17 frontier schools surveyed had a combined ridership of 213 students, which was an average of 13 students per school. If frontier schools had a mean of 46 high school students, this indicated that over a quarter (28.27%) of the students ride the bus. Similarly, the surveyed schools had a total of 63 bus routes, which was an average of 3.5 routes per school district.

Survey Question #15 “How do the distances of the bus routes affect your students’ education?”

Bus transportation for frontier students ranged from 0 to 35 students and 1 to 6 routes. Comments from the surveyed principals indicated a split in perceived impact, however, with six citing negative impacts, 10 mentioning no or minimal impact, and 2 neutral remarks. Comments included:

Greatly-the closest bus stop is 17 miles from the school. Most kids live 25-40 miles away (School 1). Long routes, early mornings and late nights – Our students are very busy (School 7). Substantially, limits after-school programs especially for K-8 (School 13). Generally only a factor when inclement weather exists (School 10).

Minimal, we miss 1-3 days probably a year due to weather (School 14). They don't have any affect at all (School 18).

Survey Question #16 “What is the approximate daily percent of attendance for your school?”

Table 28

Frontier High School Daily Attendance Percentage, 18 high school principal responses

	80- 89%	90- 95%	96- 100%	Min/ Max %	Mode %	Number of Responses
Approximate Daily Attendance	1	8	9	85/99	98, 95	18

Frontier high schools surveyed indicated student attendance was in the 90th percentile the majority of the time. The following question probed the reasons for student absences.

Frontier Health Care Survey Questions.

Survey Question #17 “What are the top five reasons students are absent from your high school? (Please do not include the Covid-19 virus related absences).

Table 29

Frontier High School Top 5 Reasons for Absences, 18 high school principal responses

Reasons	Number Responses out of 69 Total	Percent
# 1 Sick/Medical	14	20.29
#2 Doctor Appointments	14	20.29
#3 Farm/Ranching	10	14.49
#4 Family	8	11.59
# 5 School Activities	7	10.14
#6 Truancy	6	8.70
#7 Weather/Transportation	4	5.80
#8 Miscellaneous (court, hunting/fishing, work, bereavement)	6	8.70

Illnesses or health care accounted for over 40% of the surveyed schools' excused absences, while farming/ranching, family, school activities, along with weather/transportation accounted for 42%. Frontier students had high attendance rates and, when they did miss school, it was an excused absence over 80% of the time. The following question explored the issue of health care access for frontier students.

Survey Question #18 “How do students access the nearest provider/health care facility?” (Select all that apply)

Table 30

Frontier High School Student Access to Health Care, 18 high school principal responses

Access	Response Rate	Response Rate %
Ride with a Family Member	18/18	100.00
Drive themselves	12/18	66.67
Walk	4/18	22.22
Other (Nurse practitioner 5 miles from school)	1/18	5.56
Public Transportation	0/18	0.00
Online tele-med	0/18	0.00

Students represented by the survey results accessed health care most often by riding with a family member or driving themselves. The survey did not take into account the family member who took time off work or safety issues with sick teenagers driving themselves to the doctor. Frontier areas were defined as being remote, which negates buses, taxis, or subway as public transportation options, but interestingly enough, the alternative that had the most promise for isolated areas, online tele-med, was not available or used.

Survey Question #19 “How does student health affect attendance at your school?”

The survey responses were split on the effects of health care on attendance. Seven indicated it was a big problem. For example, *One hour commute to nearest doctor, has big impacts, major reason for absences, main reason for absences, hits us hard during flu season, sizeable impact, number one factor in student attendance* (Schools 1, 4, 5, 6, 7, 8, and 15). On the other hand, other schools reported, *Not much, doesn’t and very little* (Schools 1, 3, 9, 10, 12, 13, and 18). Two schools, however, did mention the growing issue of student mental health. *Mental health is starting to have a larger impact on attendance* (School 17), and *mental health seems to be a factor* (School 18).

Frontier Behavior Risk Factor Survey Questions.

Survey Question #20 “Which of the following has been experienced by a student or student family member in your high school in the past 5 years?”

Table 31

Frontier High School Student Behavioral Risk Factors, 18 high school principal responses

Incident	# of Responses	Response %
Major Substance Abuse	13/18	72.22%
Major Vehicular Accident/Death	12/18	66.67%
Suicide	4/18	22.22%
Other (Suicide attempt by parent, on-line predators)	2/18	11.11%

The frontier behavioral risk factors indicated by the survey results were disturbing. Major substance abuse occurred in 13 out of 18 schools, major vehicular accident/death in 12 out of 18 schools, and suicides in 6 out of 18 schools. These were events that can significantly impact a community, especially its students.

Survey Question #21 “What lifestyle activities in your high school’s community contribute to student success?”

The survey responses indicated extracurricular high school activities promote physical and mental well-being. For example, eight out 18 responses mentioned organizations such as music, FFA, BPA, and 4H as positive activities, along with 11 out of 18 responses supporting athletics. Two schools included strong community support (Schools 5 and 6). In addition to these, two schools mentioned nutrition and outdoor lifestyle promoting good health (Schools 10 and 16). Other comments of interest included *showing up every day* (School 10), *students are well-traveled* (School 16), and *learn a work ethic that transfers to their studies* (School 18).

Survey Question #22 “What lifestyle activities in your high school’s community do you consider to be the most detrimental to student success?”

The survey results revealed the most detrimental lifestyle activity to a student’s success was substance abuse, which included drinking, taking drugs, smoking cigarettes and vaping (11 out of 17). Three other harmful contributors were also noted: student’s home life (4 out of 17), excessive computer time (2 out of 17), and the isolation/boredom from remote living (2 out of 17). Comments included: *School is not always top priority* (School 5), *Too much online gaming late into the night* (School 8),

Not a lot to do for students (School 14), and Use of alcohol and tobacco is generally accepted by the community and is not a positive in the growth of our students as they move toward adulthood (School 17).

Frontier Education Open-Ended Survey Questions.

Survey Question #23 “What are the most pressing educational concerns for your frontier school district?”

The frontier schools surveyed had four areas of educational concern: Funding (12 out of 18), recruiting teachers (8 out of 18), declining student enrollment (6 out of 18), and providing adequate student opportunities (5 out of 18). Comments included: *We are unable to pay as well as “oil” districts (School 18). I have often believed that a school would either run out of money or students and that would be the end of the district. However, the past few years have taught me that the educator shortage may end up being the demise. If we can’t place quality teachers in the classroom, school will look much different (School 10). Offering our students the same benefits as the larger schools (School 1). The ridiculous notion that “oil” schools should be allowed to keep millions of dollars in oil and gas revenues, it’s not at all surprising that there is a lack of funding for our schools at the state level (School 18).*

Survey Question #24 “How do these concerns affect your students?”

The responses for educational concerns from the previous question indicated students were affected in a number of ways. Basically, schools were striving to do their best, but acknowledged their limitations. For example, *teachers teaching out of content areas (School 6), not having the personnel to teach multiple levels of a class (School 8), less dollars mean less opportunities for students (School 15), parents constantly*

threaten to pull them from our school and move them to another (School 17), Our students have a narrow understanding of larger happenings/events that occur in our world/nation/state (School 12), and We have less money to go around (School 18).

Frontier Health Care Open-Ended Survey Questions.

Survey Question #25 “What are the most pressing health care concerns affecting your students?”

The two most pressing health care concerns were lack of access (5 out of 16) and mental health care (2 out of 16). Several other responses included nutrition, lice, cleanliness, hygiene, poor sleep habits, vaping, and common ailments.

Survey Question #26 “How does health care access affect your students?”

The lack of health care access affected students in two ways: They missed school and/or they did not receive the needed health care. In the survey responses, 12 out of 16 included school absences and transportation issues. *Takes time from school to drive to and from the doctor. Usually miss at least half of the school day if they have an appointment (School 5).* Two responses, however, identified mental health effects. *Lack of resources for mental health, and the stigma keep kids from getting the support they need (School 14), and The mental health aspect is also large in our school with the seasonal changes, low income, and drug and alcohol use by the parents, students have some pressing mental health needs (School 7).*

Frontier Economy Open-Ended Survey Questions.

Survey Question #27 “What are the most pressing economic concerns for your school’s community?”

Frontier school communities were facing four economic concerns according to the survey responses: school enrollment/funding (7 out of 18), lack of job opportunities (6 out of 18), falling agriculture and oil commodity prices (6 out of 18), and shortage of affordable housing (5 out of 18). Comments included: *Minimal economic opportunity, local tax base is poor* (School 6), *Not many professional jobs in the community* (School 8), *Agri-business takes a lot of money, but the crop/beef prices don’t keep up* (School 13), and *Crops failing, oil money dried up, businesses closing, town falling apart, enrollment dropping* (School 17).

Survey Question #28 “How do these economic concerns affect your high school and its students?”

Small frontier communities found themselves buffeted by the strong winds of economic uncertainty. The casualties from a downturn reached from individuals and families into the bedrock of the community. When asked about the effects of economic concerns, those surveyed acknowledged the co-dependency between the economy, education, and families. Ten out of 17 responses expressed concern with the personal effects on students and their families struggling to make ends meet while 6 out of 17 listed both school funding and student/family issues. Out of the 17 respondents, 9 addressed school funding issues like program cuts and the likelihood of passing a mill levy. Comments regarding school funding included: *a constant worry about financial success of our school* (School 1), *decrease in enrollment/budget and decrease in*

taxable value (School 2), limits what we can offer (School 3), It affects who we can get to teach (School 7), reduction in staff (School 15), and As the price of wheat and beef go, so does our chance of passing a mill levy (School 17).

The frontier school and its community economics were yoked together through good and bad, as the comments revealed: *Students affected are not ready to learn when they come to us in the morning (School 4), lower expectations of students (School 5), struggle to make ends meet at home also (School 11), Students don't participate due to money for shoes or fees, but we are able to cover it (School 13), and Students have no ownership in school culture and feel desperate. They cannot wait to leave the town and never return (School 16), It is huge . . .when things are going well, life is bearable. When they aren't, the whole family struggles. In our case, the whole community wonders and worries as all three industries are on the brink of ugly. It totally affects the kids (School 9).*

Frontier Behavioral Risk Factors Open-Ended Survey Questions.

Survey Question #29 "What are the most pressing behavioral risk factor concerns in your high school's community?"

The social determinants of health included community and social context, which include both positive and negative behavioral risk factors. The survey respondents expressed concern about negative attributes of student life, primarily in the area of substance abuse. In the 17 responses, 10 indicated a concern regarding student use of alcohol, drugs, and tobacco, which also includes vaping/e-cigarettes. Some additional risks had to do with mental health (2/17), internet/gaming (2/17), lack of parental guidance (2/17), and inappropriate sexual behaviors/relationships (2/17).

Comments included: *Drug use is becoming more prevalent with kids showing no regard for what the consequences may be (School 7), substance abuse, particularly vaping (School 11), not much supervision from parents (School 7), lack of parental support at home in regard to completing assignments and holding their children accountable (School 13), gaming too late into the night (School 8), and sexist and sexual behaviors exhibited by males who do not respect females (School 17).*

Survey Question #30 “How do the behavioral risk factors in your community affect your high school students?”

Behavioral risk factors in frontier communities can become part of the accepted norm, like a right-of-passage. According to the survey responses, students saw their peers or adults in the community as the traditional role models, even when they’re abusing a particular substance, and the behavior became normalized and accepted. Unfortunately, those attitudes influenced risky decision-making and lead to mental health issues like anxiety, depression, hostility, or even addiction. Comments included: *Students see adult use of alcohol as permission for them to use it (School 10), and Alcohol use among teens is an accepted and ongoing tradition in small rural communities in Montana and will continue to be (School 13), Students see alcohol as a way to escape from their issues (School 6), Sometimes these risks cause student to become out of control (School 4), It affects the users and students in poor situations pretty heavily as in mental health issues and feelings of depression, suicidal thoughts, and feelings of hopelessness (School 7), The trouble with risk factors and behavior is simple. What seem like innocent teenage mistakes can turn tragic in a hurry. . . can become lifelong habits (School 9), Levels of generalized anxiety and depression have*

risen (School 14), and creates hostility between females and males and tension between parents and administration who hold different values regarding gender norms (School 15).

Conclusions

This chapter provided a mixed methods analysis regarding the research question of “What are the descriptive characteristics of a frontier Level 4 high school in Montana?” Fifty-four school districts were identified as being located in frontier Level 4 (FAR) communities in Montana. The high schools included six on Native American reservations. A profile for each high school was constructed based on descriptive statistics from the school district, community, and/or county where it resides, along with high school principal survey responses that provided a deeper understanding. The descriptive statistics and survey questions were focused around four social determinants of health: education, health care, economy, and behavior risk factors. Data were gathered from federal, state, and local, agencies, along with a survey sent to each high school principal.

Although the data came from a variety sources, the information reinforced how the high schools’ identity were connected to being small and remote, whether the analysis was in regards to education, health care, economy or behavioral risk factors. It also revealed the re-occurrence of an unmet health care issue for students – mental health care.

Frontier education’s profile revealed a variety of distinct characteristics. For example, the schools had small enrollments, teacher full-time-equivalents, and student-to-teacher ratio, but high graduation rates. The administration was oftentimes a

combined superintendent and principal position. Location and budget constraints contributed to the difficulty of teacher and administrator recruitment/replacement. Broadband availability was good, and the schools took advantage of online AP and dual credit courses for their students. Both frontier and Native American high school student bodies lacked racial/ethnicity diversity. Most of the buildings were over 20 years old and have combined K-12 classes under one roof. Riding the bus to school was commonplace, with some students living as far away as 25-40 miles, which was a reflection of the school's remote nature.

Health care was certainly impacted by the isolation of the frontier communities. The average population density for these areas was 3.2 persons per square mile, and they were identified as health professional shortage areas (HPSA) for primary health care, mental health care and dental health care due to low income, geography, and Indian health facilities. Many frontier community residents lived 30 to 60 miles/minutes away from clinics and hospitals, but fortunately a number of EMT's or RN's lived nearby and were available for health care assistance. Access to health care, both in terms of distance and the number of providers available, was identified as having an effect on student attendance. Unfortunately, student mental health care was also identified as an area of concern, due to the stigma and lack of access for help.

The top three industries for jobs in these frontier areas were education, agriculture/forestry, and construction. More than a quarter of the jobs were in the government sector, including local school district personnel, U.S. Forest Service, state fish and game, and agriculture agencies operating in these remote areas. Although frontier communities were currently experiencing fairly low (approximately 3-4%)

unemployment, the schools were still bound to specific economic conditions of their local community. Everyone was affected if agriculture commodity prices were low in the farming and ranching communities – students, their families, and the school district. As one survey response stated, “We’re all in it together.”

The last social determinant of health was behavioral risk factors. Even though they live in remote areas, frontier students confronted substance abuse from alcohol, tobacco, and drugs. In addition, the students revealed experimentation with electronic cigarettes or vaping. Other behavioral risk issues included online/technology misuse and student home life problems. Again, these behaviors could contribute to the student’s mental health condition. On the other hand, frontier schools provided their students with a variety of positive extracurricular activities in which to participate, such as music, drama, athletics, and vocational clubs like BPA and FFA, with an average of two extracurricular activities per student.

Frontier high schools have learned to survive in spite of the harshness of their location. The social determinants of health regarding education, health care access, economy, and behavioral risk factors each revealed a descriptive layer to the portrait of student academic achievement in these small and remote schools and their communities. Chapter Five provides the summary for critical analysis.

Chapter Five: Discussion

A system of general instruction, which shall reach every description of our citizens from the richest to the poorest, as it was the earliest, so will it be the latest of all the public concerns in which I shall permit myself to take an interest.
(Jefferson, T., 1810-1820, Jefferson to J. C. Cabell, January 14, 1818)

The purpose of this study was to create a profile of Montana frontier Level 4 high schools using a mixed methods procedures with descriptive statistics such as mean, mode, standard deviation, and frequency for the quantitative analysis, along with high school principal survey responses for deeper understanding in the qualitative analysis. The overall descriptive portrait was based on the social determinants of education, health care access, economics, and community/social context using student behavioral risk factors. More specifically, the profile included both in-school elements such as students, personnel, curriculum/instruction, finance, achievements, and maintenance/operations, along with out-of-school factors in the community such as access to health care providers and facilities; local economic base, income, and unemployment rates; along with both positive and adverse social behaviors. This chapter reviews the key discoveries in describing frontier Level 4 high schools using education, and community health care access, economy, and behavioral risk factors while providing a comparison of previous literature findings. The implication for practice based on these discoveries includes both policy setting and delivery of findings. Finally, the chapter identifies and examines limitations of the mixed methods study, including areas for future research.

The research question was focused on “What are the descriptive characteristics of a frontier Level 4 high school in Montana?” Data for Montana’s frontier Level 4 high schools was gathered from 54 high schools and their communities using indicators from state and federal government agencies, health care organizations, and survey responses from high school principals.

Basic findings indicated, even though teacher recruitment was a challenge, frontier high schools were providing a core curriculum with small class-sizes and nearly 94% 4-year graduation rates. Approximately one-third of the students scored advanced/proficient on the ACT math, reading, and science exam. Unfortunately, the benefits of smaller class sizes, etc., were not always realized in the Native American high schools. Frontier students and their families encountered access barriers to health care providers and facilities, especially regarding student mental health care. Education and agriculture/forestry were the primary industry bases, and schools struggled financially from swings in the local economy and the resulting shifts in student enrollments. Although students had extracurricular activities available, they were still susceptible to negative peer influence and substance abuse.

Interpretation of Findings

“Frontier” is generally determined by population, location, and accessibility. The analysis included the descriptive statistics and high school principal survey responses in regards to the four social determinants of health— education, access to health care, economy, and behavioral risk factors — to reveal a profile of Montana’s remote frontier high schools and their communities. This profile not only described the unique characteristics of frontier living, which could help outsiders, but it also exposed some of

the misperceptions of frontier school districts when compared to their larger rural or urban counterparts.

Frontier Schools

Overview.

Frontier high schools in Montana provided small class sizes and low teacher-to-student ratios, which allowed for practically one-on-one instruction. The average American College Testing (ACT) scores for reading and science were above 50% for advanced/proficiency levels, and frontier students overall averaged nearly 94% 4-year graduation rate. Native American schools, on the other hand, had an average graduation rate of 82%, and lower demonstrated proficiencies in math, reading, and science according to ACT scores. Fewer were considered college/career ready or enrolling in the MUS after high school graduation. In addition, they experienced higher absenteeism and higher suspensions/expulsions. However, they had a higher percent of students in accelerated coursework than frontier Level 4 overall. The perceived benefits from smaller class sizes and low student-teacher ratios were not as evident for this group of students.

Although operating on limited resources, frontier schools utilized technology in both instruction and curriculum offering classes such as online AP or dual-credit classes. Wide broadband was also available in 72.25% of the households. Brick-and-mortar frontier classes were held in aging facilities, oftentimes with all grades under the same roof or attached additions.

Recruitment and retention.

Recruiting and retaining teachers and administrators to these remote areas presented a challenge for these smaller school districts and their limited funding. Previous literature included a mixed methods study including a survey and focus group input conducted by Harmon and Morton (2010) that reported increased teacher turnover in frontier schools, including elementary. This, however, was not consistent with the frontier high school principal survey responses in this study which reported the replacement of one high school teacher per year on average. Nevertheless, even one teacher in a staff of six is a 17% turnover rate. The issue of turnover, however, is exacerbated by the problem of filling the vacant position due to the shortage of teachers. Yoon, et al. found rural remote schools have a greater challenge filling vacant teaching positions which supports survey responses from this study that indicated similar problems filling open-positions. The previous research conducted by Biddle and Azano (2016) on “rural teacher training, recruitment, and retention” revealed rural districts faced diminished economic bases and political influence as they compete with more affluent districts that can pay more (p. 300). The gap in pay could dissuade both educators and administrators from choosing a rural or frontier school district (McArdle, 2008, para. 19). This study reviewed staffing turnover, but did not address the recruitment issues regarding pay differentials between frontier and other districts. Duggan Schwartzbeck’s (2003) research looked at the challenges faced by schools in frontier counties, particularly in the Great Plains. While this dissertation focused solely on Montana frontier Level 4 high schools, the survey findings in regards to lower salaries, declining enrollment and difficulty attracting quality teachers were consistent.

Shared programs.

The findings in regards to shared programs such as extracurricular activity co-ops between frontier districts align with Duggan Schwartzbeck (2003), who previously reported frontier school districts could share resources with a neighboring district using co-op agreements for specialized teachers, administrators or athletic programs. Behavioral Risk Factors included extracurricular activities where co-ops provided teams that otherwise would not be available. The study results indicated frontier districts in Montana used a variety of combinations for athletic teams, arts, and vocational activities. Unfortunately, data was not available for an analysis of the sharing of teaching positions in these districts.

Community.

Frontier schools and their communities shared responsibility for their mutual survival. Previous literature on the reciprocal relationship between school and community included studies by Budge whose research took place in southwest Washington and discussed leadership in rural schools. Her findings were consistent with this study in regards to isolation, community pride and collaboration, along with a sense of place in a rural school setting. Budge (2006) stated, "The health and well-being of rural schools and communities are inextricably linked" (p. 8). Tieken's study on community and school district issues in Arkansas had similar findings in regards to community support, but this dissertation did not address racial concerns within the frontier districts. Although Harmon and Morton's research on frontier school districts in Montana, which included elementary and high schools, had similar findings concerning declining enrollment, percent of students qualifying for economic disadvantaged participation, and financial constraints, the findings differed regarding the largest

economic base and student substance abuse. In addition, this study did not include the perspectives of elementary schools or students, school board or parents, rather, it incorporated a more in-depth review in the areas of health care, economy, and behavioral risk factors.

Consolidation and closure.

The survival of both a school and its community were essential because they relied on each other for continuity. Districts were threatened with consolidation when enrollments decline, and, while the quality of education could also be impacted by recruitment and retention issues, decreased school funding from lower enrollments also impacted the school's survival (Duggan Schwartzbeck, 2003). The closure of the school would have a ripple-effect across the community, especially if the school was the largest employer (Biddle & Azano, 2016, p. 299). McArdle (2008) stated, "Since schools are often the heart of small communities, there are devastating social implications when they are closed" (p. 5). As a result, the existence of small schools and townships were contingent upon a mutual commitment of support. Tieken (2014) wrote they must have, ". . . a shared vision for the continued existence of the school that link community members and students and staff" (p. 127). Working together on a common goal could bring about a synergy realized through collaborative efforts. As Budge (2006) found, ". . . the ability of each to thrive is dependent upon the other" (p. 8). This was observed in Montana frontier schools where the "importance of the school to the community in educating children and/or youth is the primary reason that has been the most important consideration for sustaining the small rural public school(s) in the frontier school districts," reported Harmon and Morton (2010, p. xi). While this research

did not specifically address the threat of consolidation or closure, the issue was mentioned in previous literature and included in the high school principal survey responses in this study. The findings were compatible with these views overall, but they differed, however, in regards to the issue of loyalty, where survey data indicated parents used the threat of removing their children from the school if they had a disagreement.

Frontier Health Care

Frontier community remoteness affected access to health care in terms of distance and number of medical providers available in a given area. Nearly all frontier communities or counties in Montana were identified as health professional shortage areas due to low income, geography, or lack of Indian health facilities. These findings were consistent with two previous studies. Nayar, Yu, and Appenteng (2013) found frontier counties across the country shared similar health care provider shortages and recruitment. Likewise, Baldwin, Hollow, Casey, Hart, Larson, Moore, Lewis, Andrilla, and Grossman (2008) identified provider scarcity, especially for Montana Native American clinics and specialty referrals, along with financial and transportation issues. This study focused solely on the frontier areas in Montana, which included six Native American reservations, while Nayar, Yu, and Appenteng (2003) used frontier versus non-frontier counties across the United States. Similarly, Baldwin, et al. (2008) compared access to specialty health care using Native Americans in Montana and New Mexico.

According to the survey responses, the majority of frontier high school student absences were due to illness and/or doctor appointments. The overall student daily attendance was still over 90% in the schools surveyed, but Montana OPI GEMS

indicated only 40.72% of students had 95.00% attendance for the whole year. Frontier high schools were split on whether or not illnesses affect student attendance, but the survey responses indicated actually getting to health care was the problem due to the distance. This study did not include an urban youth comparison, but these findings were broadly aligned with previous studies by Elliott and Larson (2004) and Zimmer-Gembeck, Alexander, and Nystrom (1997) both of which found rural community youth in the Midwest and Oregon would skip obtaining health care more often than urban youth, due to transportation and lack of insurance.

Another previous study by Vinciullo and Bradley (2009) including schools in all 50 states found a strong relationship between school-based health services and student academic performance. While school-based health services specifically were not part of this study, considering the remoteness of frontier students, having a school bus provide the transportation to the school-based health center could lead to earlier diagnosis and medication while also supporting student attendance. A further consideration of the transportation issues was the logic of bringing one healthy person to see multiple sick people, which would seem to outweigh having multiple sick people driving to see one provider. School-based health center approach was particularly relevant because data and survey responses identified the need for high school student mental health care. Vinciullo and Bradley (2009) study found schools with mental health services available had increased student attendance.

Frontier Economics

Frontier communities in Montana, as a whole, were a lower-income class of working people, with low unemployment rates in economies based on education,

agriculture/forestry, construction and retail. The school district was oftentimes the largest employer, which was consistent with the findings of both Biddle and Azano (2016) and Tieken (2014). The school districts were subject to a limited industry tax base and were more susceptible to downturns in economic cycles. These economic swings affected the tax base, along with student enrollment. Regardless of socioeconomic status, frontier students have achieved both high 4-year graduation rates and high participation rates in school extracurricular activities.

Frontier Behavior Risk Factors

Substance abuse from alcohol, tobacco, and drugs could contribute to the aforementioned student mental health and safety issues. These behaviors were oftentimes deemed socially acceptable, as they were learned from family members or other adults in the community.

The schools were supportive of student activities outside the classroom, and students were given the opportunity to participate in a variety of fine arts, athletics, and career/tech activities ranging from drama to Future Farmers of America. Participation was inclusive with an average of two activities per student and rarely required any type of tryouts. Frontier communities were small and isolated from other townships, but they used co-op agreements with neighboring districts to keep their extracurricular programs alive and available for their students.

Frontier schools exhibited a paucity regarding diversity in their student bodies. The majority of the non-reservation school students were white while the reservation school students were primarily Native American. In larger schools, students could break into racial- or ethnic- based cliques, but frontier schools were unique in that they

do not have enough students for more than one clique, which was basically the whole high school. This could have contributed to the high activity participation rate; conversely, the lack of diversity could have contributed to nearly a third of students reporting being bullied on school property.

Implication for Practice

Implication for practice consisted of two elements. First, what did the findings mean regarding education practice or policy setting for frontier Level 4 high schools or the frontier school districts as a whole? Secondly, how could the findings and implications for practice be delivered to the appropriate people and agencies to influence or expand the decision-making perspectives? When state or federal government agencies made educational policy, they could have failed to recognize the distinct characteristics of small districts and instead made their decisions on the more observable urban schools. “Yet the vast majority of resources in the U.S. education system address urban or suburban schools and ignore the unique concerns of rural institutions” (McArdle, 2008, para. 10).

Frontier Educational Leadership

Because frontier Level 4 communities were a small segment of the overall population, decisions about overall education and education policy could have been based on the larger, more evident, urban districts. This was unfortunate and could even have been a disadvantage for the 2,500 frontier high school students across Montana.

This research, however, revealed a more complete picture or portrait of the characteristics of frontier high schools in Montana in an effort to bring their unique qualities to light and separate them from the larger rural or urban schools. This study

supported the learning environment as provided in a frontier setting as being conducive to student academic success and extracurricular activity participation.

Student health care issues were worthy of attention and needed to be addressed. Coordinating with an outside health care agency could have been a daunting task for administrators at first, but, according to Clauss (2002), “. . .in the longer view, schools will be able to do their job of teaching better, because the children will have fewer health and social problems and can now focus their minds on academics (p. 225). In the meantime, however, frontier students’ health care access could have been overlooked.

The research revealed frontier students had health care access issues, which contributed to attendance. In addition, data affirmed a need for increased awareness and access for student mental health care. This included additional school guidance counselor positions in rural school districts. Montana Small School Alliance and the Montana Board of Public Education were providing accreditation programs and annual workshops to increase the number of potential applicants for these positions. More recently, the University of Montana, along with Montana Office of Public Instruction and Montana State University, received a \$2.3 million grant from the U.S. Department of Education to recruit and train high school counselors and mental health counselors for rural areas in Montana (Cantrell, 2019). These programs supported findings from this study regarding recruitment, student mental health issues, and behavioral risk factors.

School and community collaboration can be extended to support individual student needs. The research revealed frontier students had a high level of participation in extra-curricular activities, and co-op agreements with other small districts have been central to the success and availability of extracurricular activities to more students.

However, the findings also exposed negative student activities outside of school, such as drinking and smoking, which were oftentimes learned behaviors from peers/older siblings/parents/other adults. These cultural behavioral norms can be difficult to change. An educational leader would have to be diligent in the utilization of resources from state or federal health agencies to influence or sway the perceived attractiveness of these harmful activities. Again, the school guidance counselor position would be a necessary, although elusive, player in this effort.

Finally, as educational leaders, administrators should look for economic collaborations such as vocational training or entrepreneurial opportunities for students and their community. Students can learn job skills while exploring potential niche markets that could also bring benefits for their community. Examples include diesel mechanics, carpentry, animal husbandry, horticulture, or computer technology. In other words, use the school-community relationship to further develop the existing synergy to promote and provide mutually beneficial opportunities that slow the drain of students leaving after graduation and expand the local tax base. As Smith (2002) wrote, "Small schools have an obligation to become central cohesive forces for social and economic improvement within small communities "(p. 38).

Delivery of Implications

The implications of this study need to be delivered to three groups of people: *students* considering a teaching or administrative position in one of these remote communities, *officials* from state or federal education, health, economic and tribal agencies, and *legislators* for the State of Montana.

The implications of this research could be integrated into the overall school administrator curriculum within Montana University System. Currently, Montana Small School Alliance collaborates across the MUS with its Center for Research on Rural Education, which prepares teachers and administrators for rural positions with resources both for the school and also for the community. Teacher and administrative coursework currently provide an overview of key educational issues. However, the material could be made more relevant to rural or remote schools in the hinterlands. Opportunities could include a facilities class addressing maintenance/facility efficiencies on aging school buildings or strategies for increasing maintenance and operations levies; a human resources class could include the rural teacher recruitment and retention; school finance classes could include potential funding opportunities through rural educational grants such as Rural Education Achievement Program (REAP); and a public relations class could explore rural partnership with organizations such as tribal agencies and the Bureau of Indian Affairs. College students who may not have otherwise considered a position in these isolated areas of the state could perhaps find the frontier more desirable after preparation through resources and support which gives them a more complete portrait of frontier schools. The description from this mixed methods study could contribute to this overall profile.

Findings from this research could also be shared with rural education organizations such as the Montana Small School Alliance (MSSA) or Montana Rural Education Association (MREA), which offer professional development through training seminars that include not just an overview of specific characteristics of frontier high schools, but also regarding overarching areas such as curriculum, policy, and financial

opportunities for modification or changes. In addition, the findings could be conveyed to other state agencies that are not as frontier/rural centered, such as Montana Association of School Business Officials (MASBO), School Administrators of Montana (SAM), Montana Conference of Education Leadership (MCEL), Montana Office of Public Instruction, and the Montana Board of Public Education. Professional development can be used to raise awareness of the unique characteristics of frontier high schools and their communities and give them that equal seat at the table.

The discoveries from this frontier profile should also be disseminated to state and federal agencies, to assist frontier students and their communities regarding health care access and local economy issues. For example, the use of school-based health centers could be coordinated with local health departments, so a provider is scheduled at a school on a regular basis, or use of substance abuse counselors to address teen substance abuse risk factors. "Health screening and diagnosis is more efficient when services are brought to a concentration of clients instead of the clients traveling long distances to the county health facility (Clauss, 2002, pp. 224).

The other group that could benefit from this data is the state legislators to whom laws and funding responsibility are given. From the capital building in Helena, it is difficult to see frontier towns such as Denton or Roy, but they exist and their residents pay their taxes just like the residents in Billings and Bozeman. Government officials would benefit from this research as it illustrates both the success and struggle these frontier schools and their communities face, particularly from funding and economic volatility. Using this study, state government officials could refine their focus from a

one-size-fits-all approach to a more holistic approach using local education, health care access, economy, and social context when decisions are being made.

Limitations and Recommendations

The findings of the research were restricted to all 54 remote frontier Level 4 high schools in Montana. Data for 53 of the frontier schools was available on the Montana OPI GEMS website; however, for Northern Cheyenne Tribal School in Busby, a public school, data was oftentimes missing or incomplete. Additional data limitations for this study existed where data was not available due to confidentiality concerns in small communities and individuals may be identifiable. When this occurred or was a concern, county level data was used as a representation of the community. However, the county may not always be a fair reflection of an individual community within it. This was particularly true for West Yellowstone in Gallatin County.

A similar limitation regarding representation was survey responses where individual input may not be an accurate reflection of the school or schools as a whole. In addition, the response or participation rate may skew results and accuracy. The survey response was 33.33% (18 out of 54), which may have been affected by the Covid19 school closure, as administrators were consumed with guiding their school and students through the uncharted waters of a pandemic. Understandably, the survey may not have been given a very high priority.

The findings were also limited in that they cannot be seen as indicative of any other set of schools, frontier or otherwise, at any other time, or any other place other than frontier Level 4 schools in Montana as of 2019. In addition, this study was a nonparametric and did not use a random sample to represent a population. It did not

compare or contrast the individual or overall results with other schools. It was not to be used to demonstrate any cause-and-effects. It was a snapshot in time and place, not an all-encompassing panorama of the State of Montana education system.

Recommendations for future research have several potential studies that could be pursued. For example,

- The sharing of teachers between frontier and rural school districts is an on-going practice, but data is not available on Montana OPI. How widespread is it and what are the overall considerations?
- The effects of a statewide teacher pay scale on frontier or rural school districts, where teacher recruitment is a concern, could be explored.
- This study used four social determinants of health to describe frontier schools, but a more in-depth research project on individual social determinants and frontier or rural communities could be pursued.
- The effects of the lack of student diversity in frontier Level 4 high schools in Montana could be studied.
- A study that provides a comparison of frontier and non-frontier schools
- Frontier Level 4 Native American high schools, individually or as a group, regarding cultural opportunities for extracurricular activity participation, such as drumming, dancing, and performing native songs, could be studied for effects on overall student achievement. Did the extracurricular activity participation increase and, if so, what were the additional effects of increased student participation on suspension/expulsion and chronic absenteeism rates?

- Finally, while this mixed methods study used statistics and survey responses to create a picture of frontier Level 4 schools and their communities in Montana, additional qualitative approaches such as narrative, ethnography, or case study could be used to add another layer of individual or group perspective from the students and residents that reflect their lived-experience.

Conclusion

Using four social determinants of health of education, access to health care, economics, and social context as described using behavioral risk factors, this dissertation applied descriptive statistics and survey responses to answer the research question of “What are the descriptive characteristics of a frontier Level 4 high school in Montana?” The mixed methods research gave multiple layers to the description of the 54 frontier Level 4 schools that extended into the surrounding community. These schools have small class sizes and low student-to-teacher ratios, and the majority of students had broadband access from home and was able to take dual-credit and advanced placement courses online. Standardized test scores averaged over 50% proficient/advanced while graduation rates were over 90%. Over 70% qualified for college/career readiness, and nearly 40% enrolled in MUS within three months of graduation. Student health care access contributed to attendance, but it was unclear if it affected student achievement. The economic base for these frontier schools were primarily based on the school district, along with agriculture and forestry, which resulted in a low- to middle-class income bracket. The schools were dependent on the stability of this tax base and the alliance that existed for both recognition and survival between

these schools and their towns. The behavioral risk factors for these students included the concerns of substance abuse and mental health care. On the other hand, students had access to participate in a variety of extracurricular activities, including co-operative sports teams with neighboring schools. While remote frontier high schools demonstrated a lack of diversity overall, the racial/ethnic breakdowns were near mirror images when compared to those of Native American high schools.

The attributes of a small, frontier high school could be overshadowed by larger schools, especially when outsiders viewed it as needing to become “like the big schools” through consolidation. The irony was not been lost on the frontier when the bigger schools implemented programs in an effort to mimic what the small schools were already providing. If frontier schools were delivering and achieving educational goals, they should be rewarded and supported. Harmon and Morton (2010) wrote,

Community supporters of the small frontier school view the school as an essential family support structure for choosing the way of life associate with working as ranchers and farmers in isolate areas of Montana . . . These small schools are also achieving exceptional success that is benefiting students, schools, and their communities. (p. 67)

Instead, these schools were oftentimes grappling with the issues of student enrollment, declining tax basis, closure and consolidation.

Frontier Level 4 high schools were persevering regardless of the number of students, teachers, and dollars in their districts. Increasing the awareness of frontier Level 4 schools through a mixed methods profile was an important step in understanding, supporting, and preserving the educational heritage that has endured for

over a century of challenges and changes. The schools and their communities together faced shortages of health care, economics, and fluctuating number of students while they continue to embrace the risks, the trials, and the satisfaction of their lifestyle with prideful determination.

Epilogue

Last summer I had the opportunity of visiting 17 of the 54 frontier Level 4 communities. The sheer number of miles knitting them together is daunting, but each had a personality and sense of perseverance about them. The high school buildings more often than not reflected an era of prosperity from generations past. Nearly all of them were located in farming areas or Native American reservations. They included Big Sandy, Box Elder, Chinook, Denton, Geraldine, Geysler, Grass Range, Harlowton, Hays Lodge Pole, Highwood, Hobson, Judith Gap, Moore, Roy, Stanford, Winifred, and Winnett. The schools were easy to find – just look for the lights on the football field or the school crosswalk signs. We found “camping” in an RV in the school parking lot was ideal for social distancing, and driving around the towns looking for the schools provided the opportunity to see the community, their businesses, and neighborhoods in real time. Big Sandy had signs proclaiming U. S. Senator John Tester was from their town. On the other hand, Box Elder’s tribal police had a roadblock set up less than a block from the school, and they were screening people/cars for Covid 19 before allowing entrance onto the reservation. While driving through the Fort Belknap Reservation, we observed a tribal funeral/memorial taking place at a community center outside of Harlem with the attendees on horseback dressed in their finest regalia. When considering these smallest of the small schools, being able to picture the schools provided mental anchors

making the school and their community real, not a nebulous, vague concept. They consisted of real people in real places with real lives and expectations. As Duncan (1993) stated:

. . . the frontier West is still the repository of many of the stereotypes associated with what defines (and sells) 'America' to the rest of the world and to ourselves: plenty of open spaces, small community values and the rugged personality symbolized in visual shorthand by a cowboy on a horse. (p. 289)

As their ancestors or the pioneers that came before them, people living in the remote frontier areas reflect the perseverance that binds them with the heritage and history of their lifestyle. Stegner (1992) wrote, "These towns and cities [are] still close to the earth, intimate and interdependent in their shared community, shared optimism, and shared memory (p. 116).

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Appendix A

Survey Questions

(Responses should be as of February 3, 2020)

Student Data:					
<p>1. What is the approximate percent of student socioeconomic levels at your high school?</p> <p>A. Affluent (____ %)</p> <p>B. Upper-middle (____ %)</p> <p>C. Middle (____ %)</p> <p>D. Lower-middle (____ %)</p> <p>E. Poor (____ %)</p>	<p>Fill-in-the blank (must add up to 100%)</p>				
<p>2. What are the approximate percent of student racial/ethnic backgrounds at your high school?</p> <p>A. White (____ %)</p> <p>B. American Indian (____ %)</p> <p>C. Hispanic (____ %)</p> <p>D. Black (____ %)</p> <p>E. Asian (____ %)</p> <p>F. Other (____ %) (Please explain if other: _____)</p>	<p>Fill-in-the blank (must add up to 100%)</p>				
<p>3. What is the approximate number of high school students in your district that are homeschooled?</p> <p>A. Number of students: _____</p> <p>B. Percent of total high school students: _____ %</p>	<p>Fill-in-the blank</p>				
School Personnel Data:					
<p>4. How many certified teachers are employed at your high school?</p> <p>A. Classroom teachers _____</p> <p>B. Counselors _____</p> <p>C. Resource staff _____</p> <p>D. Other _____ (Please describe _____)</p>	<p>Fill-in-the blank</p>				
<p>5. How many uncertified and classified staff are employed at your high school?</p> <p>A.) Aides _____</p>	<p>Fill-in-the blank</p>				

B.) Office workers _____ C.) Custodians _____ D.) Kitchen workers _____					
6. What is the approximate annual teacher turnover rate per school year for your high school? _____	Fill-in-the blank				
7. How many superintendents and principals are employed at your district and what is their grade level responsibility? A.) Superintendents _____ Grade Level _____ B.) Principal #1 _____ Grade Level _____ C.) Principal #2 _____ Grade Level _____ D.) Principal #3 _____ Grade Level _____	Fill-in-the blank				
Curriculum & Instruction Data	<table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> </table>				
8. Describe the availability and use of technology/online and advanced placement learning at your high school.	Short Answer				
Facility & Transportation Data	<table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> </table>				
9. How many buildings are included in your school district? _____					
10. What is the approximate age of each school district building (elementary, junior high, senior high, etc.) A.) Elementary _____ B.) Junior high _____ C.) Senior high _____ D.) Other _____ (please describe _____)	Fill-in-the blank				
11. What is the approximate amount spent on maintenance at your school district? \$ _____	Fill-in-the blank				
12. How many high school students ride the bus? _____	Fill-in-the blank				
13. How many bus routes does your district run? _____	Fill-in-the blank				

14. How do the distances of the bus routes affect your students' education?	Short Answer
Health Care Access Data	
15. What is the approximate daily attendance rate for your high school? _____	Fill-in-the blank
16. What are the top 5 reasons students are absent in your high school? (Please don't include the Covid19 virus related absences) A.) Reason #1: _____ B.) Reason #2: _____ C.) Reason #3: _____ D.) Reason #4: _____ E.) Reason #5: _____	Fill-in-the blank
17. How do students access the nearest provider/health care facility? (Select all that apply) A. Drive themselves ____ B. Ride with a family member ____ C. Public transportation ____ D. Walk ____ E. Online tele-med ____ F. Other (please describe: _____)	Fill-in-the blank
18. How does student health affect attendance at your school?	Short Answer
Behavioral Risk Factors	
19. Which of the following has been experienced by a student or student family member in your school in the past 5 years: A. Suicide B. Major substance abuse C. Major vehicular accident/death D. Other significant trauma event (please explain)	Short Answer
20. What lifestyle activities in your high school's community contribute to student success?	Short Answer
21. What lifestyle activities in your high school's community do you consider to be the most detrimental to student success?	Short Answer

<i>Open-Ended Survey Questions</i>	
1. What are the most pressing educational concerns for your frontier school district?	Short Answer
2. How do these concerns affect your students?	Short Answer
3. What are the most pressing health care concerns affecting your students?	Short Answer
4. How does health care access affect your students?	Short Answer
5. What are the most pressing economic concerns for your school's community?	Short Answer
6. How do these economic concerns affect your high school and its students?	Short Answer
7. What are the most pressing behavioral risk factor concerns in your high school's community?	Short Answer
8. How do the behavioral risk factors of your community affect your high school students?	Short Answer

Appendix B

Frontier and Remote (FAR) Area Codes

Four distinct levels based on population and distance to urban areas (calculated as time vs. miles) where residents can obtain necessary goods and/or services. These levels are determined by the US Department of Agriculture and the US Department of Health and Human Services Federal Office of Rural Health Policy using urban-rural data from the 2010 US Census:

Level 1 – 60+ minutes from an urban area of 50,000+

Level 2 – 45+ minutes from an urban area of 25,000-49,999 people; and 60+ minutes from an urban area of 50,000+ people

Level 3 – 30+ minutes from an urban area of 10,000-24,000; 45+ minutes from an urban area of 25,000-49,999 people; and 60+ minutes from an urban area of 50,000+ people

Level 4 – 15+ minutes from an urban area of 2,500-9,999 people; 30+ minutes from an urban area of 10,000-24,999 people; 45+ minutes from an urban area of 25,000-49,999 people; and 60+ minutes from an urban area of 50,000 or more people (Rural Health Information Hub, n.d.)

Appendix C

Unused Survey Questions

The following survey questions were not used as part of the frontier Level 4 high school profile of this paper, due to the limited number of responses, and/or more complete data could be obtained from alternative sources.

Question	Alternative Source
Q2. What are the approximate percent of student racial/ethnic backgrounds at your high school? (Must add up to 100%)	National Center for Education Statistics 2018-2019
Q8. How many superintendents and principals are employed at your district, and what is their grade level responsibility?	Montana Office of Public Instruction GEMS (2019)
Q11. What is the approximate age of each school district building (elementary, junior high/middle school/senior high, etc.)?	National Center for Education Statistics 2018-2019
Q12. What is the approximate annual maintenance expense at your school district? What is your district's annual operating budget?	Montana Office of Public Instruction GEMS (2019)

Appendix D

Native American School Descriptive Statistic Characteristics

Table 32

Overall Frontier High School Characteristics

Montana Native American Frontier Level 4 High Schools

	Mean	Median	Mode	Std Dev	Max/Min	Range
Enrollment	78	74	n/a	18	105/ 60	45
Student-Teacher Ratio (#:1)	9:1	9:1	n/a	0	9/ 8	1
Classroom Teachers FTE	8.1	7.3	n/a	2.0	10.8/ 6.3	4.5
Expense per Student \$\$	22,860	23,620	n/a	6,202	\$28,622/ 13,698	14,924
Households with Broadband (%)	56.12	57.00	n/a	6.98	66.40/ 46.90	19.50
Building Age 20+ Years (%)	88.40	86.30	n/a	4.31	95.50/ 85.00	10.50

Note. Data for Enrollment and student-teacher ratio from Montana OPI GEMS School Profile School Characteristics (2018-2019); classroom teacher FTE, households with broadband, building age 20+ from National Center for Education Statistics District Demographic Dashboard (2018-2019), expense per student from Montana OPI GEMS School District Profile Financials.

The six Native American high schools have a mean enrollment of 78 and range of 45. Over half (56.12%) of Native American households have broadband access.

Native American high schools a range of 19.50 from a maximum of 66.40% (Heart Butte) and a minimum of 46.90% (Plenty Coups).

Table 33

Frontier High School Programs or Classifications

Montana Native American Frontier Level 4 High Schools

	Mean	Median	Mode	Std Dev	Max/Min	Range
Economically Disadvantage Participation (%)	100.00	100.00	n/a	0	100/100	0
Limited English Proficient (%)	20.16	6.20	n/a	28.22	67.20/0.00	67.20
Special Ed Participation (%)	11.06	9.90	n/a	4.81	18.20/5.00	13.20

Note. Data from Montana OPI GEMS School Profile School Characteristics (2018-2019)

All (100%) of Native American high school students qualified as economically disadvantaged. Participation in special education programs for Native American high schools was 11.06%, ranging from 5.00% (Plenty Coups) to 18.20% (Hot Springs). The average limited English Proficiency for Native American high schools was 20.16% with SD=28.22 and ranging from 0.00% (Hot Springs) to 67.20% (Heart Butte).

Table 34

Frontier High School Achievement

Montana Native American Frontier Level 4 High Schools

	Mean	Median	Mode	Std Dev	Max/Min	Range
95% Attendance for Entire School Year (%)	10.20	4.00	n/a	34.00	35.00/1.00	34.00
Proficient or Advanced Math (%)	3.40	0.00	n/a	5.64	13.00/0.00	13.00
Proficient or Advanced Reading (%)	14.00	14.00	n/a	10.49	26.00/0.00	26.00
Proficient or Advanced Science (%)	13.20	10.00	n/a	14.18	30.00/0.00	30.00
Students Graduating in 4 years (%)	82.00	84.00	n/a	13.19	93.00/61.00	32.00
College/Career Readiness (%)	20.00	0.00	n/a	37.39	86.00/0.00	86.00
Enroll in MUS Within 3 months of Graduation (%)	16.00	14.00	n/a	5.70	23.00/10.00	13.00

Note. Data from Montana OPI GEMS School Report Card (2018-2019)

Native Americans high schools had 10.10% of students with 95% attendance, ranging from 35.00% (Hot Springs) to 1.00% (Box Elder/Heart Butte). Native American schools also had 42 students with chronic absenteeism, but it was unclear what contributed to these rates. Native American high school ACT scores in math averaged 3.40% and ranged from 13.00% (Hot Springs) to 0.00% (Hays Lodge Pole/Heart Butte). Reading scores averaged 14.00%, ranging from 26.00% (Hot Springs) to 0% (Heart

Butte). Lastly, science scores averaged 13.00%, ranging from of 30.00% (Hays Lodge Pole) to 0% (Heart Butte).

The percent of students graduating from Native American high schools in four years was 82.00%. An average of 20.00% of Native American high school students met career and college readiness requirements with percentages ranging from 86.00% (Heart Butte) to 0.00% (Box Elder/Hays Lodge Pole/Plenty Coups). It is interesting that Heart Butte had a high college and career readiness percent, but scored very low on the ACT.

Native American students who enrolled in an MUS school within three months of graduation averaged 16.00%, ranging from 23.00% (Hays Lodge Pole) to 10.00% (Box Elder). Interesting to note, Native American high schools averaged 6 students per school who were enrolled in accelerated program.

Table 35

Frontier Native American High School Diversity

Race/Ethnicity	Mean Percent	SD	Students
White	23.62	33.88	110
Native American	72.49	36.68	337
Hispanic	2.27	2.19	11
Black	0.00	n/a	0
Bi-Racial/Other	1.62	3.06	7

Note. Data for number of students from Montana OPI GEMS School Profile School Characteristics (2018-2019) and data for race/ethnicity percent from National Center for Education Statistics (2018-2019)

Student racial/ethnic diversity in Native American frontier high schools indicates nearly three-quarters (72.49%) Native American and almost one-quarter (23.62%) are White. The deviations for both groups are fairly high. Other ethnic/racial groups account for a small percentage (3.89%) of the student population.