CARDIOVASCULAR KNOWLEDGE, BELIEFS AND HEALTHCARE PRACTICES
OF THE AMISH IN NORTHERN INDIANA

by

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Submitted to Rush University in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

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DISSERTATION APPROVAL FORM

The undersigned have examined the dissertation entitled: Cardiovascular Knowledge, Beliefs and Healthcare Practices of the Amish in Northern Indiana presented by Deborah R. Gillum, a candidate for the degree of Doctor of Philosophy and hereby certify that in their judgment it is worthy of acceptance.

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Abstract

Title of Dissertation: Cardiovascular Knowledge, Beliefs and Healthcare Practices of the Amish in Northern Indiana

Deborah R. Gillum, Doctor of Philosophy, 2010

Dissertation directed by: Beth A. Staffileno, PhD, FAHA, Assistant Professor

Background: The Amish are a conservative ethno-religious Christian subculture who are doubling in number every 14 years. There are now more than 249,000 located in 28 states and Ontario, Canada. To our knowledge, no previous study has examined cardiovascular disease (CVD) knowledge and preventive healthcare practices among this socially and technologically isolated population.

Purpose: Cardiovascular knowledge, beliefs, and healthcare practices among northern Indiana Amish were explored using Leininger’s Culture Care Diversity and Universality as a guiding theoretical framework.

Sample: Data was obtained from an Amish settlement located in northern Indiana.

Methods: A qualitative ethnographic exploratory approach was used. Data analysis included exploring the three primary categories (cardiovascular knowledge, beliefs, healthcare practices) and identifying common themes under each.

Results: Data from 7 females and 8 males (mean 61 years ± 18.35) found that cardiac knowledge was limited, and receiving additional educational information from outside the Amish culture was often viewed suspiciously because maintaining cultural traditions was a top priority. Maintaining cultural traditions was a top priority and often conflicted with recommended healthy lifestyle changes. The use of alternative healthcare providers,
and complementary and alternative practices were the first option and modern healthcare was sought only after alternative treatments failed. The Amish have distinct beliefs about diet, alkalinity, and exercise that are significantly different from mainstream culture.

Conclusion: These data support the supposition that there is a lack of knowledge regarding cardiovascular function and CVD prevention in the Amish community. Additionally, the Amish have distinct cardiovascular beliefs and healthcare practices that affect their diet, activity, choice of healthcare practitioners, and use of complementary and alternative medicine. Further work is needed to develop culturally appropriate educational interventions for the Amish that will be acceptable and used to make healthy lifestyle changes.
Dedication

This work is dedicated to my family, who have sacrificed significantly during this process

My husband and best friend, Tim, you remain my rock and my soft place to fall

Our children, Jessica and Cameron, who have given up a lot of ‘mom’ time over the last 4 years

To my parents, Leon and Louise Ferguson, who always believed that I “could do anything that I set my mind to”
Acknowledgements

Finishing a dissertation requires the dedication and hard work of more than just one individual. I would like to especially acknowledge the following people who graciously dedicated their time and expertise to my efforts. Dr. Beth Staffileno has been a wonderful advisor that has intuitively known when to encourage and when to push me to finish this project. It has been a great experience working with you over the last four years. Dr. Lola Coke has the gift of providing insightful feedback that makes my work better. Thank you for your encouragement. Dr. Louis Fogg has provided statistical expertise that has been much appreciated, while Dr. Denise Reiling has shared her knowledge and insights of the Amish. Thank you for all that you have done to help make this research be the best it could be.

Dr. Karon Schwartz began this journey with me as a colleague, but has become a mentor and a very dear friend. Your insight, expertise, and encouragement have been invaluable. I have truly enjoyed our time together and hope to continue our Amish research for years to come.

I would like to thank the nursing faculty of Bethel College, Mishawaka, IN. Their understanding and prayers during this voyage have been appreciated. I would like to also acknowledge Dr. Ruth Davidhizar, who passed away during this process. She planted the seed that I could accomplish this monumental task.

Last but not least, I thank my husband Tim, who helped me numerous times solve my computer crises. Your love, support and faith in me allowed me to finish this research.
Table of Contents

Dissertation Approval Form ................................................................. ii
Abstract ............................................................................................. iii
Dedication .......................................................................................... v
Acknowledgements ........................................................................... vi
Table of Contents ............................................................................... vii
List of Tables and Figures ................................................................. x
Chapter One: Introduction ................................................................ 1
  Overview ........................................................................................... 1
Problem and Significance .................................................................... 1
  Amish Culture .................................................................................. 2
  Education ........................................................................................ 3
  Use of Alternative Treatments ......................................................... 5
  Medical/Financial Issues ................................................................. 5
  Use of Technology ........................................................................... 6
  Literature Review ........................................................................... 7
Preliminary Study .............................................................................. 9
Study Purpose .................................................................................. 24
Chapter Two: Design and Methods .................................................. 25
  Overview ........................................................................................... 25
  Design ............................................................................................. 25
  Theoretical Framework .................................................................... 26
  Operational Definitions ................................................................... 27
<table>
<thead>
<tr>
<th>Chapter/Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>27</td>
</tr>
<tr>
<td>Access to the Community</td>
<td>27</td>
</tr>
<tr>
<td>Sampling</td>
<td>29</td>
</tr>
<tr>
<td>Setting</td>
<td>30</td>
</tr>
<tr>
<td>Protection of Human Subjects</td>
<td>31</td>
</tr>
<tr>
<td>Data Collection</td>
<td>31</td>
</tr>
<tr>
<td>Data Entry and Analysis</td>
<td>33</td>
</tr>
<tr>
<td>Establishing Trustworthiness</td>
<td>33</td>
</tr>
<tr>
<td>Chapter Three: Conclusion and Implications</td>
<td>35</td>
</tr>
<tr>
<td>Overview</td>
<td>35</td>
</tr>
<tr>
<td>Results of Exploratory Study</td>
<td>35</td>
</tr>
<tr>
<td>Knowledge</td>
<td>35</td>
</tr>
<tr>
<td>Beliefs</td>
<td>36</td>
</tr>
<tr>
<td>Practices</td>
<td>37</td>
</tr>
<tr>
<td>Discussion</td>
<td>39</td>
</tr>
<tr>
<td>Limitations</td>
<td>44</td>
</tr>
<tr>
<td>Implications for Research and Clinical Implications</td>
<td>45</td>
</tr>
<tr>
<td>References</td>
<td>48</td>
</tr>
<tr>
<td>Appendices</td>
<td>56</td>
</tr>
<tr>
<td>Appendix A</td>
<td>56</td>
</tr>
</tbody>
</table>

Appendix B 84


Appendix C 103

Leininger’s Sunrise Enabler to Discover Culture Care

Appendix D: Informed Consent 104

Appendix E: HIPAA form 107

Appendix F: Demographic Form 110

Appendix G: Interview Guide 112

Appendix H: 113

List of Tables and Figures

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review of the Literature</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Demographic Characteristics</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Prevalence and Comparative Data</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>Body Mass Index Characteristics</td>
<td>23</td>
</tr>
<tr>
<td>5</td>
<td>Health Care Providers</td>
<td>37</td>
</tr>
<tr>
<td>6</td>
<td>Alternative Medications for Cardiovascular Health</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Model for Cardiovascular Knowledge, Beliefs and Healthcare Practices</td>
<td>42</td>
</tr>
</tbody>
</table>
Chapter 1: Introduction

Overview

This chapter contains a brief description of the significance of cardiovascular disease along with a description of distinct cultural attributes of the Amish that indicate a need for exploratory cardiovascular research in this population. A summary of the literature and a discussion of completed preliminary work are presented. The chapter concludes with identification of the purpose of the research study.

Problem and Significance

Cardiovascular disease (CVD) remains the leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2009). Even though mortality rates have decreased over the last 20 years due to mass prevention efforts and improved treatment methods, CVD continues to have a significant impact on the health and life of Americans (American Heart Association [AHA], 2010). The AHA reports CVD was responsible for 831,300 Americans deaths in 2006, nearly 2,300 people per day, averaging 1 death every 38 seconds. More than one third of Americans have one or more types of CVD. The AHA estimates that the direct and indirect costs of CVD for 2010 will reach over $500 billion. Healthy People 2020 objectives continue to make heart disease and stroke a major focus (U. S. Department of Health and Human Services [USDHHS], 2009). Improving the nations’ cardiovascular health, in part by increasing knowledge levels regarding early warning signs of heart disease and stroke, remains a challenge for all health care professionals.

CVD affects rural Americans at greater rates than those living in urban areas. According to the 2006 National Health Interview Survey, rural Americans self-reported
higher rates of heart disease (14.1%) when compared to Americans in large or small metropolitan areas (9.3% and 11.8%, respectively) (USDHHS, 2007). The Old Order Amish (hereafter referred to as Amish) are a distinct culture that lives primarily in rural regions in 28 states and the province of Ontario, Canada (Elizabethtown College [The Young Center for Anabaptist and Pietist Studies], 2010). The current Amish population in the U.S. totals over 249,000, with two thirds of all Amish living in Pennsylvania, Ohio and Indiana, respectively (Elizabethtown College, 2010). While the Amish are the fastest growing rural group in the U.S. and are expected to double in population in 14 years (Armer & Radina, 2002; Elizabethtown College, 2010), there is no known research about CVD prevalence in this population.

**Amish culture.** The Old Order Amish are more than a conservative religious group, they are a culture, a community and a patriarchal society steeped deeply in tradition (Hostetler, 1993). The Amish live by the unspoken principle of *Gelassenheit*, which means yielding to God’s will and the will of the church and community (Kraybill, 2001). By submitting individualistic pursuits in favor of doing what is best for others, the entire Amish community is made stronger (Kraybill, 2001).

While on the surface there appears to be little variation in the Amish people, there are distinct variations between those living in different Amish settlements. Each church district has a set of unspoken and ‘understood’ rules, called the *Ordnung*, that govern the daily life and behavior of its members. These strict rules specify what is worldly or sinful and thus needs to be avoided (Hostetler, 1993). For example, these rules address the type of employment that may be sought outside of the home, the style of clothing or head coverings permitted, the use of technology, and specific requirements with horse-
drawn transportation (Nolt & Meyers, 2007). Following the *Ordnung* demonstrates faithfulness to the Amish community and the will of God (Kraybill, 2001). Failure to follow the *Ordnung* may result in discipline from the church. Discipline can range from public confession, to remind members of the value of submission, to more rarely, excommunication and shunning. Being forced to leave the church and then to have no contact with friends and family is “a silent deterrent that prods those who think about breaking their baptismal vows to think twice” (Kraybill & Bowman, 2001, p. 110).

**Education.** Amish children continue their formal schooling through eighth grade or until they turn 14 years old (Johnson-Weiner, 2007). The reluctance to allow children to attend school for a longer period of time stems from the belief that the practical skills of reading, writing and arithmetic are taught by eighth grade (Meyers & Nolt, 2005). In addition, advanced schooling may lead a child to question his faith and/or culture through prolonged exposure to the outside world (Meyers & Nolt, 2005). When children finish their formal schooling, they continue informal training at home with parents who prepare them for the skills needed for adulthood and eventually making a contribution in the Amish community.

Amish children may attend Amish-run parochial schools or public schools, depending on school availability and parental preference. Nolt and Meyers (2007) determined that 60 – 80% of Amish children in Indiana are educated in Amish-run schools (p. 35). Teachers in the Amish schools are usually members of the Amish community who have completed an eighth grade education (Fisher & Stahl, 1986; Kraybill & Bowen, 2001). Typically, they are young women who enjoy working with children and can maintain discipline in an orderly classroom (Meyers & Nolt, 2005).
They are dedicated to teaching and consider it a labor of love and a service to their community (Fisher & Stahl, 1986). According to Johnson-Weiner (2007), the curriculum in Amish schools includes language arts, mathematics, geography, history, health, and German. Religion is not taught specifically in the Amish schools; it is thought that religion should be taught in the home and church and reinforced in the school through teaching to do what is right. Science is not taught in Amish schools (Clark, 2010; Huntington, 1994; Johnson-Weiner, 2007) for fear that too much modern education may be at odds with the traditional beliefs of the Amish culture, which may eventually lead the youth away from the church in pursuit of “the wisdom of the world” (Kraybill, 2001, p. 174).

Until recently, textbooks used in the Amish parochial schools were primarily outdated public school texts from the 1950’s (Schwartz, 2002). Textbooks used in the classroom are limited to those considered “morally wholesome” (Fisher & Stahl, 1986). The current health textbook for 7th and 8th graders includes chapters on each of the body systems; basic nutrition and cooking; safety and first aid; and mental health. While the book gives an overview of many topics, some instruction may be considered simplistic in view of today’s knowledge on certain subjects. The chapter on the circulatory system notes:

Many ailments are blamed on the heart which really have nothing to do with the heart. Fatigue and dizzy spells often come with ear infections. Many chest pains are merely gas pains. Pain from the heart very often comes after undue exertion. It may induce a feeling of great pressure in the chest, or a crushing pain which may extend into the arms. Cardiac, or heart, pain is usually under the breastbone. (Mankind Marvelously Made, 2008, p. 62)

Because of the limited worldly exposure that the Amish have to other potential educational resources, e.g. the computer and the television, they may have limited
opportunities later in life to obtain further education about their heart. Lack of cardiovascular knowledge may be a significant hindrance to cardiovascular health promotion.

**Use of alternative treatments.** The Amish consider good health a gift from God, and equivocate being healthy to having the ability to work hard and contribute to the family and the Amish community (Armer & Radina, 2002). They simultaneously use modern medical services, alternative treatments, and folk care (which have been passed down from the older generations) in an effort to “first do all you can to help yourself” (Wenger, 1995, p. 12). Folk care may involve the use of salves, poultices, and herbal supplements (Schwartz, 2002). The Amish frequently use what some may consider mainstream alternative health providers, such as chiropractors, massage therapists and herbalists (Wenger & Wenger, 2008). In addition, they see providers not traditionally sanctioned by Western medicine, such as iridologists (practitioners who examine the iris to diagnosis diseases), reflexologists, and traditional Amish healers, who may be called powwowers (Hostetler, 1993, Kriebel, 2007; Wenger & Wenger, 2008). The Amish are likely to use alternative and complementary medicine as a first attempt at resolving health issues and may be reluctant to discuss these treatments if they perceive “English” health care providers (i.e. non-Amish) may not be open to these alternative treatments (Graham & Cates, 2006; Sharpnack, Griffin, Benders, & Fitzpatrick, 2010; Wenger, 1995). Previous studies have confirmed that complementary and alternative medicine use in the Amish is higher than in comparable groups (Carter, 2008; Reiter et al., 2009).

**Medical/financial issues.** Traditionally, the Amish do not have commercial health insurance and do not accept help from the government, including Medicaid and
Medicare. Typically, all health-related services and hospitalizations are paid out of pocket. This practice leaves the Amish vulnerable to costly medical bills that could easily deplete a family’s entire savings. There is a strong tradition of mutual aid and communal reliance throughout the Amish community (Hostetler, 1993). The Amish church leadership has been proactive in controlling these costs by participating in mutual aid organizations that negotiate lower medical costs with local health care providers. Various churches participate in Amish Church Aid, in which the larger Amish community contributes to help a needy family that is unable to pay an outstanding medical bill in full (Ferrara, 2003).

**Use of technology.** Historically, the Amish have lived in rural communities in which men have engaged in agriculture as their primary employment. However, tough economic times and a dwindling amount of affordable, available farmland have necessitated the Amish to diversify to support large families. The Amish men are being forced into mainstream manufacturing jobs to support their families. This shift away from the family farm is the biggest change that has occurred in the Amish culture in the last century (Kraybill, 2003).

Contrary to popular belief, the Amish are not opposed to technology; they maintain their separateness by keeping technology at a distance and only using it selectively (Kraybill, 2003). This helps to preserve culture and heritage and ensures that values are passed on to the next generation. The Amish do not have electricity or telephones in their homes. Often times, there is a telephone booth that is shared with neighbors and located in a central location. The church district in the area of this research has allowed members to use cellular telephones when they are needed for
business (Pratt, 2004). Controlling telephone usage allows the Amish to have contact with the outside world, within their own terms, while preserving the fellowship of face-to-face communication as the primary form of communication (Kreps, Donnermeyer, & Kreps, 1997). They rely on the “English” to transport them when horse and buggy transportation is impractical.

**Literature Review**

An integrated review of the literature was conducted to examine the current state of knowledge of CVD and associated risk factors (obesity, physical inactivity, smoking, hypertension, hyperlipidemia, type II diabetes mellitus [when directly linked to CVD], and family history) in the Amish (Gillum & Staffileno, *in press*, located in Appendix A). Twenty five articles met the inclusion criteria; all articles were quantitative, including 23 descriptive (of which 19 were correlational and 1 was longitudinal) and 2 quasi-experimental. No randomized control studies or qualitative studies were found that addressed CVD in the Amish. Table 1 summarizes these articles.

The Amish are an attractive population for genetic cardiovascular research. They are similar socially and culturally, their genealogical lines are well documented from the early 1700’s, they have large families, and they have avoided most modern day conveniences that have increased cardiovascular risk factors. These attributes are thought to make this population more genetically homogenous than most present-day populations (Platte et al., 2003), explaining the genetic focus found in the current Amish CVD research. Unfortunately, all published CVD genetic studies have used participants from one Amish settlement in Lancaster County, PA.
The Amish Research Clinic located in Strasburg, PA has been the principal site of the majority of recent research regarding the Amish. The studies have been conducted on the Lancaster County Amish by a team of researchers from the University of Maryland. The clinic is well established within the community and has a large number of Amish that have participated in extensive medical testing and data collection. Three of their primary studies, the Amish Family Diabetes Study (AFDS), the Amish Family Calcification Study (AFCS) and the Heredity and Phenotype Intervention (HAPI) Study, have led to the majority of CVD related articles (Bielak et al., 2008; Hsueh, Mitchell, Aburomia et al., 2000; Mitchell et al., 2008).

As can be seen from Table 1, cardiovascular research on the Amish has focused on genetic characteristics and the Amish in Pennsylvania. Genetic studies have led to the identification of specific genes that influence blood pressure (Hsueh, Mitchell, Schneider et al., 2000; McArdle, Dytch et al., 2007; McArdle, Rutherford et al., 2008) and obesity (Hsueh, Mitchell, Schneider et al., 2001; Platte et al., 2003; Rampersaud et al., 2008; Steinle, Hsueh et al., 2002; Steinle, Pollin et al., 2005; Wang et al., 2009). In addition, these primary studies have found that lipid levels (Pollin, Damcott et al., 2008; Pollin, Hsueh et al., 2004; Roberts et al., 2007), prolonged QT intervals (Post, Shen et al., 2007) and arterial calcification (Post, Bielak et al., 2007; Rampersaud, Bielak et al., 2008; Shen et al., 2007) are heritable in the Amish. Bielak et al. (2008) compared Amish from Lancaster County, PA, with a non-Hispanic white population and found that the Amish, after adjusting for cardiovascular risk factors, had a 66% greater coronary artery calcification than their comparison group.
Only two studies published in the last ten years examined CVD and its risk factors in the Amish outside of Pennsylvania. Bassett et al. (2004) characterized the level of physical activity in the Amish of Ontario, Canada, and found the population, who were primarily farmers, was very active and had lower rates of being overweight or obese than the general population. Ferketich et al. (2008) determined tobacco use in the Amish of Holmes County, Ohio, was significantly lower than the general population as confirmed with salivary cotinine levels (17.6% vs. 38.8%).

Previous research examining the Amish and CVD has had sufficient depth, but little breadth. Published studies have concentrated on the Amish in Lancaster County, PA, and have primarily examined how genetics affect CVD and its risk factors. There was no known research of the Amish located outside of Pennsylvania that explored the prevalence of CVD and its risk factors. It was unknown if the Amish of Indiana differed significantly from the Amish in Pennsylvania. Furthermore, the types of traditional or alternative treatments used to prevent/treat CVD had not been explored. The literature review demonstrated a need for further exploratory studies to determine Amish knowledge, beliefs, and preventive cardiovascular health practices.

Preliminary Study

In an effort to document that CVD was a health concern in the Amish of northern Indiana, a preliminary retrospective chart review was conducted to determine the prevalence of CVD and its associated risk factors in this population. A secondary aim was to describe the types of medical and alternative treatments used to prevent and treat CVD (Gillum, Staffileno, Schwartz, Coke, & Fogg, 2010, submitted for publication, located in Appendix B). This retrospective patient chart review was conducted at a
Table 1 Review of the Literature

<table>
<thead>
<tr>
<th>Authors, Year</th>
<th>Purpose</th>
<th>Design Type</th>
<th>Population</th>
<th>Variables</th>
<th>Outcome</th>
<th>Strengths/Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bassett et al. (2004)</td>
<td>• Characterize the physical activity levels in Amish farming community  • Measure adipose levels  • Examine influence of modern technology on physical activity levels</td>
<td>• Descriptive  • Correlational</td>
<td>• n=98 OOA  • Ages 18-75  • Southern Ontario  • 53 M, 45 F  • 78% farmers  • Sample represented 42% of an Amish community  • Convenience sample</td>
<td>• Activity  • Ht/ Wt/ BMI  • % Body Physical Fat</td>
<td>• 25% M/ 27% F overweight  • 0% M/ 9% F obese  • M = 18,425 steps/day  • F = 14,196 steps/day  • M = 10 hrs vigorous activity/ 42.8 hrs in moderate activity/ 12 hrs walking/week  • F = 3.4 hrs vigorous activity/ 39.2 hrs moderate activity/ 5.7 hrs walking/week</td>
<td>• Pedometer possible false steps during bumpy activities  • Questionnaire adjusted to be culturally specific  • No comparison group  • No dietary intake measures  • Only evaluated during planting season (busy season)</td>
</tr>
<tr>
<td>Bielak et al. (2008)</td>
<td>• Compare differences in CAD prevalence &amp; the presence &amp; quantity of CAC between OOA and another non-Hispanic white population</td>
<td>• Descriptive  • Correlational  • Cross-sectional</td>
<td>• n=519 OOA  • Lancaster Co., PA  • Age &gt; 40  • 217 M, 302 F  • AFCS participants  • Rochester, MN (rural comparison) n=630, Age &gt; 40  • 290 M, 340 F; Participants in community based Epidemiology of CAC (ECAC) study  • Convenience sample</td>
<td>• CAC  • Ht/ Wt/ BMI  • Lipid panel  • SBP/DBP  • Smoking  • Anti-hypertensive meds  • Lipid lowering meds  • OOA  • Other rural non-Hispanic sample</td>
<td>• OOA had ↓ abdominal obesity, ↓ cigarette smoking but ↑ lipid profile risk  • 36% of ECAC use lipid lowering or antihypertensive meds compared to &lt; 10% OOA  • OOA consume a diet high in energy, saturated fat, cholesterol and salt  • CAC presence &amp; quality higher in OOA after adjusting for CAD risk factors</td>
<td>• Excluded all participants with cardiac hx  • No gender specific analysis  • Rochester, MN group close to Mayo (?affect healthcare)  • Used 1 cardiologist and 1 diagnostic radiologist throughout</td>
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<td>Authors, Year</td>
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<td>Design Type</td>
<td>Population</td>
<td>Variables</td>
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<td>Cruz et al. (2001)</td>
<td>• Determine if mild salt wasting seen in Gitelman’s Syndrome reduces blood pressure &amp; protection from HTN</td>
<td>• Within family design</td>
<td>• n=199 OOA</td>
<td>• BP</td>
<td>• Gitelman’s Syndrome patients have ↓ BP's than unaffected relatives</td>
<td>• Limited description of participants</td>
</tr>
<tr>
<td>de Souza Batista et al. (2007)</td>
<td>• Determine the impact of omentin levels on obesity dependent insulin resistance in lean, overweight &amp; obese individuals</td>
<td>• Descriptive</td>
<td>• n=20 omentin gene expression (2M/18F)</td>
<td>• Omentin gene expression</td>
<td>• ↓ omentin levels marker for leanness</td>
<td>• Healthy sample</td>
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<td></td>
<td>• Evaluate the association of omentin levels with measures of obesity, insulin resistance related to visceral obesity</td>
<td>• Correlational</td>
<td>• n=94 plasma omentin levels (40M/54 F)</td>
<td>• Omentin plasma levels</td>
<td>• Women have ↑ circulating level of omentin</td>
<td>• Only 2 males in sample</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• AFDS participants</td>
<td>• BMI</td>
<td>• Omentin I ↓ plasma levels &amp; adipose tissue with obesity</td>
<td>• Small sample size</td>
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<td></td>
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<td></td>
<td>• Lancaster Co, PA</td>
<td>• Waist circumference</td>
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<td>• Minimal description on AFDS sample</td>
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<td>• Healthy OOA</td>
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<td></td>
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<td>• Ages 24 - 73</td>
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<tr>
<td>Ferketich et al. (2008)</td>
<td>• Estimate tobacco use in OOA of Holmes Co, OH</td>
<td>• Descriptive</td>
<td>• n=134 OOA</td>
<td>• Self-reported tobacco use</td>
<td>• Prevalence of smoking/total tobacco use significantly ↓ among OOA men (17.6% vs. 38.8% [non-OOA in county] &amp; 32.2% US whites)</td>
<td>• Self-report data confirmed with biochemical marker</td>
</tr>
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<td></td>
<td>• Estimate misclassification of tobacco use in the OOA</td>
<td>• Prevalence</td>
<td>• 62M/72 F</td>
<td>• Salivary cotinine levels</td>
<td>• No Amish women reported current tobacco use &amp; 2 reported former use</td>
<td>• This study was a F/U to a cancer incidence study (?) effect</td>
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<td></td>
<td></td>
<td>• Comparative</td>
<td>• Age M 52.4 ± 13.8 W 52.9 ± 15.1</td>
<td>• Misclassification of tobacco use</td>
<td>• No OOA women and 2 males under-reported tobacco use</td>
<td>• Self-reports not always confidentially obtained (other family in room)</td>
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<td></td>
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<td></td>
<td>• Comparative groups: non-OOA from Holmes Co, OH and national data for non-Hispanic whites</td>
<td></td>
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<td>• Saliva samples collected from 86 OOA</td>
</tr>
<tr>
<td>Authors, Year</td>
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<tr>
<td>Hsueh, Mitchell, Schneider, St. Jean et al. (2001)</td>
<td>• To identify genetic determinants of typical obesity</td>
<td>Descriptive, Correlational</td>
<td>• n=672 OOA &lt;br&gt;• AFDS participants &lt;br&gt;• Lancaster Co., PA &lt;br&gt;• 2º data analysis &lt;br&gt;• Age 47.2 ± 15.7 &lt;br&gt;• 298 M/ 374 F</td>
<td>• BMI &lt;br&gt;• Waist circ. &lt;br&gt;• % body fat &lt;br&gt;• Serum leptin levels &lt;br&gt;• genotypes</td>
<td>• Mean BMI, waist circ., % body fat &amp; leptin levels † women &lt;br&gt;• Leptin level strongly correlated with BMI &amp; % body &lt;br&gt;• Amish F ≥ 40 have a mean BMI 1-2 kg/m² † than U.S. white F of same age (no difference in M/ F &lt; 40) &lt;br&gt;• BMI-adjusted leptin levels are heritable, suggesting a genetic influence</td>
<td>• Minimal discussion of subject descriptions</td>
</tr>
<tr>
<td>Lee et al. (2001)</td>
<td>• Determine if there is a biochemical pathway that regulates net dietary cholesterol absorption through refining the genetic mapping of sitosterolaemia</td>
<td>Descriptive, Correlational</td>
<td>• n=143 (28 pedigrees,17 families, &lt;br&gt;2 Amish/Mennonite) family members with identified probands associated with sitosterolaemia</td>
<td>• Family pedigree with proband &lt;br&gt;• Genomic DNA</td>
<td>• Uncovered a founder effect in Amish/Mennonite population, was brought to the U.S. by the 1º Amish settlers &lt;br&gt;• Homozygosity detected in probands &lt;br&gt;• Gene localization narrowed</td>
<td>• Very little description of families &lt;br&gt;• Results limited to those affected by this rare recessive autosomal inherited disorder</td>
</tr>
<tr>
<td>Authors, Year</td>
<td>Purpose</td>
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<td>Outcome</td>
<td>Strengths/Weaknesses</td>
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<tr>
<td>McArdle, Dytc et al. (2007)</td>
<td>Perform a genome wide homozygosity mapping scan to explore for BP related traits</td>
<td>Descriptive</td>
<td>n=166 OOA</td>
<td>SBP</td>
<td>Results indicated after accounting for age, gender &amp; meds, the residual variance of SBP is almost entirely under genetic control</td>
<td>Limited description of participants or how obtained sample</td>
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<td></td>
<td></td>
<td>Correlational</td>
<td>Lancaster Co, PA</td>
<td>DBP</td>
<td>Suggest BP related traits may have a gender specific architecture, particularly with chromosomes 2, 4, 18</td>
<td>Article added results from the AFDS study to further support their evidence that linked the Q arm of chromosome 2 with BP regulation</td>
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<td></td>
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<td>Ages 18-93 (mean 47.4)</td>
<td>Age</td>
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<td>Large sample sizes</td>
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<td></td>
<td></td>
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<td>280 M/ 336 F</td>
<td>Gender</td>
<td></td>
<td>No participants used with hx of HTN</td>
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<td></td>
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<td>BMI mean 27.3</td>
<td></td>
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<td>Confirmed results with 2nd OOA data set</td>
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<td>2° data analysis</td>
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<tr>
<td>McArdle, Rutherford (2008)</td>
<td>Assess the role of genetic variations in 3 subunits of nicotinic acetylcholine receptor on chromosome 2q, a region linked to BP</td>
<td>Descriptive</td>
<td>Principle sample n=24 (from AFDS study-identified genetic variations)</td>
<td>Genotypes</td>
<td>Identification of a minor allele associated with ↑ SBP in OOA &amp; FHS populations</td>
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<td></td>
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<td>Correlational</td>
<td>2° Analysis w/AFDS cohort n=1,189 OOA, then replicated from FHS (n=1,759)</td>
<td>SBP</td>
<td></td>
<td>Supported the hypothesis that fetal genotype development influences susceptibility to adult chronic diseases</td>
</tr>
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<td></td>
<td>Variants associated with BP in AFDS and FHS study were genotyped with a 2nd set of OOA</td>
<td>DBP</td>
<td></td>
<td>Identified a possible role in the nicotinic acetylcholine receptor in SBP regulation</td>
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<td>participants in the HAPI study; n=851</td>
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<td></td>
<td>Lancaster Co, PA</td>
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<td>AFDS 45.3% M</td>
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<td>FHS 49.6% M</td>
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<td>HAPI 53.2% M</td>
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<td>Authors, Year</td>
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<td>Outcome</td>
<td>Strengths/Weaknesses</td>
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<tr>
<td>Miller et al. (2007)</td>
<td>• Estimate the prevalence of behaviors &amp; exposures that may lead to adverse pregnancy outcomes</td>
<td>Descriptive</td>
<td>n=288 F OOA</td>
<td>BMI</td>
<td>OOA F had ↓ avg. BMI than women in general population</td>
<td>• Self-reported data</td>
</tr>
<tr>
<td></td>
<td>• Assess genetics of OOA CV response to controlled short term changes that mimic long term exposures that affect CV health</td>
<td>Correlational</td>
<td>Lancaster Co, PA</td>
<td>Physical &amp; mental health perceptions</td>
<td>OOA F had ↑ prevalence of thyroid problems (12.8% vs. 6.6%) &amp; blood clots (3.1% vs. 1.1%) while ↓ prevalence of anxiety or depression (10.2% vs. 28.9%), HTN (7.6% vs. 10.8%) &amp; hyperlipidemia (4.5% vs. 9.7%)</td>
<td>• Moderate sample size</td>
</tr>
<tr>
<td></td>
<td>• Determine relationship of response phenotypes to baseline CVD traits</td>
<td>Population-based survey</td>
<td>Participants in the PA Women’s Health Study</td>
<td>Self-esteem</td>
<td>OOA F had fewer sources of stress</td>
<td>• General survey without specifics</td>
</tr>
<tr>
<td></td>
<td>• Identify genes influencing phenotypes</td>
<td>Ages 18-45, median = 30</td>
<td>Random sample</td>
<td>Social support</td>
<td>OOA have a ↑ amount of social support</td>
<td>• Instruments with established reliability &amp; validity</td>
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<td></td>
<td></td>
<td>Compared to women in central PA (n=2,002)</td>
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<tr>
<td>Mitchell et al. (2008)</td>
<td>• Assess genetics of OOA CV response to controlled short term changes that mimic long term exposures that affect CV health</td>
<td>Quasi-experimental</td>
<td>n=868 OOA</td>
<td>SBP, DBP</td>
<td>Great inter-individual variations in responses to the same standardized interventions</td>
<td>• Study is in network of 4 complementary studies assessing the genetics of CV response</td>
</tr>
<tr>
<td></td>
<td>• Determine relationship of response phenotypes to baseline CVD traits</td>
<td>4 interventions (high fat challenge, CPT, dietary salt intervention, low dose ASA tx)</td>
<td>Lancaster Co, PA 460 M, mean 42.2 ± .6 408 F, mean 45.4 ± .7</td>
<td>Post prandial triglycerides Platelet aggregation</td>
<td>Significant differences between M/F with the triglyceride response to fat challenge No gender differences in other responses</td>
<td>• Culturally appropriate</td>
</tr>
<tr>
<td></td>
<td>• Identify genes influencing phenotypes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Not all interventions performed in all</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>• Good methodology explanation</td>
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<td></td>
<td>• Little discussion w/ results (in future reports)</td>
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<tr>
<td>Platte et al. (2003)</td>
<td>• To examine BMI in the OOA &amp; perform genome scan to identify traits of BMI</td>
<td>• Descriptive</td>
<td>• n=157 OOA</td>
<td>• Phenotypes for 21 traits (including ht, wt, BMI, BMI %, waist &amp; hip measurements, BP, glucose, insulin &amp; leptin levels, age, gender, physical activity)</td>
<td>• Genetic area (chromosome 7q) identified that may be partially responsible for BMI variation in OOA</td>
<td>• Not all phenotype traits listed in article</td>
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<tr>
<td></td>
<td></td>
<td>• Correlational</td>
<td>• Obese</td>
<td></td>
<td></td>
<td>• No description of participants</td>
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<td></td>
<td></td>
<td></td>
<td>• 7 large nuclear (2-3 generation) OOA families</td>
<td></td>
<td></td>
<td>• ? location</td>
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<td></td>
<td></td>
<td></td>
<td>• ? Pennsylvania</td>
<td></td>
<td></td>
<td>• Small sample size</td>
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<td></td>
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<td>• Not able to compare generalizability</td>
</tr>
<tr>
<td>Pollin, Dammott et al. (2008)</td>
<td>• To identify genetic factors contributing to fasting triglycerides &amp; the post-prandial triglyceride dietary response</td>
<td>• Descriptive</td>
<td>• n=809 OOA</td>
<td>• Fasting/ Postprandial triglycerides Genome studies Gender/ Age BMI/ Waist circ Lipid panels Fasting glucose Insulin levels</td>
<td>• APOC3 deficiency is cardioprotective by leading to a favorable lipid profile (↑ triglyceride, ↑ HDL, ↓ total cholesterol)</td>
<td>• No gender specific results</td>
</tr>
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<td></td>
<td></td>
<td>• Correlational</td>
<td>• Lancaster Co, PA</td>
<td></td>
<td></td>
<td>• No difference in BMI, waist circ, glucose or insulin levels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• HAPI participants</td>
<td></td>
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<td></td>
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<td>• 445 M/ 364 F</td>
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<td></td>
<td></td>
<td></td>
<td>• Age mean 44 ± 14</td>
<td></td>
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<tr>
<td>Pollin, Hsueh et al. (2004)</td>
<td>• To conduct a genome-wide analysis of serum lipid levels to determine inheritability</td>
<td>• Descriptive</td>
<td>• n=612 OOA</td>
<td>• Genotypes Lipid profiles BMI</td>
<td>• Serum lipid levels are heritable in the OOA No genetic loci identified at a significant level</td>
<td>• No details given of study design</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correlational</td>
<td>• 28 families from AFDS 273 M/339 F Ages M 47.0 ± 15.2; F 47.3 ± 15.5 Lancaster Co., PA 2e data analysis</td>
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<td>Authors, Year</td>
<td>Purpose</td>
<td>Design Type</td>
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| Post, Bielak et al. (2007)    | • Characterize & contrast risk factors for CAC & AC, and to estimate the genetic contribution to their variation  
• To test for homogeneity of risk factor effects  
• Assess for genetic contributions to calcifications with CAC & AC | Descriptive | • n=614 OOA                                     | • AC  
• CAC (thoracic & upper abdominal)  
• Age  
• Gender  
• BP  
• Lipid panel  
• Smoking  
• Fasting glucose | • CAC prevalence rate ↑ in M than F (55% vs. 41%)  
• No gender differences in AC prevalence (M 51 vs. F 56%), but age is more strongly associated with AC prevalence  
• CAC & AC have similar risk factors  
CAC & AC share common genetic and environmental factors | • Did not include any subjects with hx of CVD, so unknown predictability between AC & CAC |
| Post, Shen et al. (2007)      | • To evaluate and replicate the association between the NOS1AP and the QT interval in the OOA and to estimate its heritability | Descriptive | • N=763 OOA                                     | • QT interval  
• Genotypes  
• Age  
• Gender  
• Heart rate | • QT interval is a moderately heritable trait (h² = 0.50 ± 0.09) in the OOA  
• Validated the association between the NOS1AP gene and QT interval | • Limited description of participants  
• Continued analysis of same sample as other studies |
| Rampersaud, Bielak et al. (2008) | • Characterize and estimate the genetic & environmental contributions of CAD risk factors, CAC quantity & CIMT  
• Characterize the relation between CAC quantity & CIMT  
• To compare & contrast CAD risk factors | Descriptive | • n=478 OOA                                     | • CAC  
• CIMT  
• Age  
• Gender  
• SBP/DBP  
• Ht/Wt/BMI  
• Waist circ  
• Lipid levels | • Results suggest the same genes influence variations in CAC & LDL, whereas a different set influence variations in CIMT & waist circ.  
• ↑ CAD quantity & CIMT associated w/ ↑ age, male gender  
• ↑ cholesterol & LDL strongly associated w/ ↑ CAC, but ↑ BP associated w/ ↑ CIMT | • Genetically heterogeneous sample  
• Measured only common CIMT  
• Only examined M > 40, F > 50 |
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<th>Outcome</th>
<th>Strengths/Weaknesses</th>
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<tbody>
<tr>
<td>Rampersaud, Mitchell et al. (2008)</td>
<td>• To determine if <em>FTO</em> gene variants are associated with BMI in OOA &amp; to determine if the detrimental association of <em>FTO</em> gene variants can be ↓ by increasing physical activity</td>
<td>Descriptive • Correlational</td>
<td>n=704 • Healthy OOA • HAPI participants • Lancaster Co, PA • Convenience sample • 373 M/331 F • Mean age = 43.6 • M: 54% overwt; 10.1% obese • F: 63.7% overwt; 30.5% obese</td>
<td>• BMI • Genotype • Physical activity • Age • Gender</td>
<td>Study replicates the association of variants in the <em>FTO</em> gene &amp; obesity-related traits • Strong moderating effect of physical activity on the deleterious effects of <em>FTO</em> variants</td>
<td>• Analyzed the gene variations w/BMI and activity level • Limited demographic data • Objective documentation of physical activity</td>
</tr>
<tr>
<td>Roberts et al. (2007)</td>
<td>• Explore the relationship between <em>SCARBl</em> receptor gene &amp; lipid levels in OOA to assess for gender &amp; age differences</td>
<td>Descriptive • Correlational</td>
<td>n=919 OOA • AFDS participants • Lancaster Co, PA • 428 M/491 F • Ages M 46.8 ± 15.8 • F 47.1 ± 16.2</td>
<td>• Lipid panel • Genotypes • Ht/Wt/BMI • Blood glucose • Gender • Age</td>
<td><em>SCARBl</em> associated with ↑ levels of HDL-C in women, especially &gt;50 years • HDL ↑ in OOA F &lt; 50 yrs who carry the rs5888, indicating a significant interaction between estrogen and <em>SCARBl</em>—no difference with LDL</td>
<td>• Large sample • Continued analysis of the same sample participants as many other studies</td>
</tr>
<tr>
<td>Roy-Gagnon et al. (2008)</td>
<td>• Examine heritability of phenotypes measuring BP reactivity &amp; recover from CPT • Investigate how genes influence baseline, reactivity &amp; recovery of BP</td>
<td>Quasi-experimental</td>
<td>n=835 OOA • Lancaster Co, PA • Convenience sample • 2° data analysis • 448 M/387 F • No subjects on anti-hypertensive meds • HAPI participants</td>
<td>• SBP • DBP • Genotypes</td>
<td>BP recovery from cold pressor test is heritable • Additive genetic effects account for 12-25% of total variance in BP response</td>
<td>• Largest family study of BP response to cold pressor test to date • Used multiple measures (before/during/after) with CPT • No participants with HTN</td>
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<td>Authors, Year</td>
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| Shen et al. (2007) | • Assess the heritabilities of CAC, AC & BMD to determine if variation in traits was influenced by a common set of genes  
• Measure BMD & extent of CAC & thoracic aorta to determine the relationship between BMD & vascular calcification | Descriptive  
Correlational |  
• n=682 OOA  
• AFCS participants  
• M 301/ F 381  
• Ages M 54.1 ± 13.0  
• F 54.8 ± 13.2  
• Lancaster Co., PA  
• 2° data analysis |  
• CAC  
• AC  
• BMD  
• Genetic analysis |  
Significant heritability detected for BMD of femoral neck & spine and of CAC & AC, although the same genes do no influence both BMD & vascular calcification.  
Subjects with hx of CVD events had significantly ↓ BMD at the femoral neck compared to those without a hx of CVD  
No evidence for shared genes affecting the joint distribution of bone & vascular calcification |  
• All bone densities scan read by a single certified individual to ↓ variability  
• Only included individuals > 30 yrs old that were enrolled in AFCS |
| Steinle, Hsueh et al. (2002) | • Evaluate the association between eating behavior & obesity phenotypes  
• Estimate heritability of eating behavior  
• Genome-wide linkage analysis to identify chromosomal regions that contain genes that regulate eating behavior traits | Descriptive  
Correlational |  
• n=624 OOA  
• 28 families (relatives of people diagnosed with diabetes, but not diabetic themselves)  
• AFDS participants  
• Lancaster Co., PA  
• 286 M/ 338 F  
• Ages M 46 ± 15  
• F 45 ± 15 |  
• Restraint  
• Disinhibition  
• Hunger  
• Waist to hip ratio  
• BMI  
• Skinfold thickness  
• Lipid panels  
• Lipin level  
• OGGT |  
Restraint F > M  
Obesity associated with high restraint scores  
OOA ↓ individual stigmatization of obesity  
Disinhibition had strongest association with obesity  
Eating behavior is familial  
Found links of specific chromosomal regions to eating behavior traits |  
• No established validity with instruments on OOA  
• Large sample size  
• Excluded diabetics |
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<th>Outcome</th>
<th>Strengths/Weaknesses</th>
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<tbody>
<tr>
<td>Steinle, Pollin et al. (2005)</td>
<td>• Determine if mutations in the ghrelin gene influences eating behavior &amp; risk for metabolic syndrome, obesity and diabetes</td>
<td>• Descriptive</td>
<td>n=856 OOA</td>
<td>• Ht/ Wt/BMI</td>
<td></td>
<td>Mutations in the GHRL gene may be linked to a higher risk for metabolic syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Correlational</td>
<td>AFDS participants</td>
<td>• Waist circ.</td>
<td>• No plasma ghrelin levels collected</td>
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<td></td>
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<td></td>
<td>Lancaster Co., PA</td>
<td>• Lipid panel</td>
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<td></td>
<td>402 M/ 454 F</td>
<td>• Insulin level</td>
<td></td>
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<td></td>
<td>Ages M 46.2 ± .9 F 45.5 ± .9</td>
<td>• Leptin level</td>
<td></td>
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<td></td>
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<td></td>
<td>T2DM: 17.2% M/ 30.4% F</td>
<td>• Ghrelin genotypes</td>
<td></td>
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<td></td>
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<td>Metabolic Syndrome: 9.8% M/ 15.2% F</td>
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<tr>
<td>Wang et al. (2009)</td>
<td>• To identify common essential HTN susceptibility genes</td>
<td>• Descriptive Confirmed association with a meta-analysis with 4 non-Amish Caucasian samples</td>
<td>n=542 OOA</td>
<td>• Genotype</td>
<td></td>
<td>Variants in a serine/threonine kinase gene (STK39) may influence BP by altering renal Na+ excretion &amp; is consistent across OOA &amp; non-Amish samples</td>
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<td>AFDS</td>
<td>• SBP</td>
<td></td>
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<td></td>
<td>2º data analysis</td>
<td>• DBP</td>
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<td></td>
<td></td>
<td></td>
<td>Lancaster Co., PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ages 54.8 ± 13.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>239 M/ 303 F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M=male; F=female; BP=systolic blood pressure; DBP=diastolic blood pressure; Ht=height; Wt=weight; OGTT=oral glucose tolerance test; BMD= bone mineral density; T2DM=type 2 diabetes mellitus; AC=aortic calcification; CAC=coronary artery calcification; AFDS=Amish Family Diabetes Study; AFCS=Amish Family Calcification Study; ALS=Amish Longevity Study; HAPI= Heredity and Phenotype Intervention Heart Study; CIMT=carotid artery intima-media thickness; LDL=low density lipoprotein; HDL= high density lipoprotein
primary health clinic in a large Amish settlement in northern Indiana. Two hundred charts were selected randomly for analysis if the client was Amish, 18 years or older and was seen within the past two years at the clinic. The study’s demographic information can be found in Table 2. The gender and age distributions were appropriate to reflect various subgroups.

Table 2  *Demographic Characteristics*

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Male (n = 105)</th>
<th>Female (n = 95)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 - 30</td>
<td>43.35 ± 18.34</td>
<td>47.83 ± 20.14</td>
</tr>
<tr>
<td>31 - 40</td>
<td>29 (27.6%)</td>
<td>27 (28.4%)</td>
</tr>
<tr>
<td>41 - 50</td>
<td>20 (19.0%)</td>
<td>13 (13.7%)</td>
</tr>
<tr>
<td>51 - 60</td>
<td>17 (16.2%)</td>
<td>11 (11.6%)</td>
</tr>
<tr>
<td>61 - 70</td>
<td>12 (11.4%)</td>
<td>13 (13.7%)</td>
</tr>
<tr>
<td>71 &amp; Older</td>
<td>17 (16.2%)</td>
<td>18 (18.9%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Business</td>
<td>42 (40.0%)</td>
<td>15 (15.8%)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>35 (33.3%)</td>
<td>5 (5.3%)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>17 (16.2%)</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>Construction</td>
<td>10 (9.5%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Religion</td>
<td>3 (2.9%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Homemaker</td>
<td>0 (0.0%)</td>
<td>71 (74.7%)</td>
</tr>
<tr>
<td>Teaching</td>
<td>0 (0.0%)</td>
<td>2 (2.1%)</td>
</tr>
<tr>
<td>Not Stated</td>
<td>6 (5.7%)</td>
<td>1 (1.1%)</td>
</tr>
</tbody>
</table>

Data are presented as Mean ± SD or n (%)

8 males reported more than one type of employment

Descriptive statistics were used to determine prevalence rates of CVD, risk factors, and types of medical and alternative health treatments. Prevalence rates of CVD were compared to the 2009 white prevalence rates of the American Heart Association (AHA, 2010). As evidenced in Table 3, the overall CVD self-reported prevalence was higher among Amish men (n = 105) and women (n = 95) when compared to white men and women (38.1% and 44.2% vs. 37.2% and 35%, respectively). CHD was lower than national rates (-7.3% in males and -1.8% in females), but this may be due to a lack of receiving expensive diagnostic testing that would accurately diagnose this specific
disease. Without medical insurance to pay for diagnostic tests, expensive testing which may be considered routine, is cost prohibitive in the Amish. Additionally, lower than comparative rates of known myocardial infarctions (-7.5% males, -1.8% females) may have represented a lack of diagnosis with electrocardiograms or other diagnostic tests, but may have indicated the possibility that the Amish do not arrive at the hospital in time to be treated for myocardial infarctions. Their distance from a local hospital, their lack of quick transportation, and lack of easily accessible telephones to call for emergency transport delay help in reaching someone experiencing signs of an infarct.

**Table 3 Prevalence and Comparative Data**

<table>
<thead>
<tr>
<th></th>
<th>Male (n = 105)</th>
<th>Female (n = 95)</th>
<th>Male (whites &gt; 20 yrs)</th>
<th>Female (whites &gt; 20 yrs)</th>
<th>Male</th>
<th>Female</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD</td>
<td>40, 38.1%</td>
<td>42, 44.2%</td>
<td>37.2%</td>
<td>35.0%</td>
<td></td>
<td></td>
<td>+0.9%</td>
</tr>
<tr>
<td>CHD</td>
<td>2, 1.9%</td>
<td>4, 4.2%</td>
<td>9.4%</td>
<td>6.0%</td>
<td>2.4%</td>
<td>2.7%</td>
<td>+2.4%</td>
</tr>
<tr>
<td>CVA</td>
<td>5, 4.8%</td>
<td>5, 5.3%</td>
<td>32.5%</td>
<td>31.4%</td>
<td>1.0%</td>
<td>1.9%</td>
<td>+0.9%</td>
</tr>
<tr>
<td>HTN</td>
<td>24, 22.9%</td>
<td>30, 31.6%</td>
<td>16.1%</td>
<td>18.2%</td>
<td>-1.8%</td>
<td>-1.8%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>24, 22.9%</td>
<td>23, 24.2%</td>
<td>2.8%</td>
<td>2.1%</td>
<td></td>
<td></td>
<td>+0.6%</td>
</tr>
<tr>
<td>CHF</td>
<td>1, 1.0%</td>
<td>3, 3.2%</td>
<td>9.4%</td>
<td>6.0%</td>
<td>6.7%</td>
<td>6.0%</td>
<td>-1.9%</td>
</tr>
<tr>
<td>MI</td>
<td>2, 1.9%</td>
<td>4, 4.2%</td>
<td>6.7%</td>
<td>6.0%</td>
<td></td>
<td></td>
<td>+0.6%</td>
</tr>
<tr>
<td>DM II</td>
<td>5, 4.8%</td>
<td>5, 5.3%</td>
<td>32.5%</td>
<td>31.4%</td>
<td>-1.8%</td>
<td>-1.8%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Depression</td>
<td>20, 19.0%</td>
<td>21, 22.1%</td>
<td>16.1%</td>
<td>18.2%</td>
<td></td>
<td></td>
<td>+12.9%</td>
</tr>
<tr>
<td>Anxiety</td>
<td>12, 11.4%</td>
<td>14, 14.7%</td>
<td>3.6%</td>
<td>6.6%</td>
<td>24%</td>
<td>20%</td>
<td>+7.8%</td>
</tr>
<tr>
<td>Smoker</td>
<td>10, 9.5%</td>
<td>2, 2.1%</td>
<td>5.1%</td>
<td>5.1%</td>
<td></td>
<td></td>
<td>+3.5%</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>9, 8.6%</td>
<td>19, 20.0%</td>
<td>5.1%</td>
<td>5.1%</td>
<td></td>
<td></td>
<td>+3.5%</td>
</tr>
<tr>
<td>CV Surgeries</td>
<td>5, 4.8%</td>
<td>4, 4.2%</td>
<td>...</td>
<td>...</td>
<td></td>
<td></td>
<td>...</td>
</tr>
</tbody>
</table>

Regarding CVD risk factors, there was a higher prevalence of hyperlipidemia in males and females when compared to AHA prevalence rates (22.9% and 24.2% vs. 16.1% and 18.2%, respectively) but a lower prevalence of Type II diabetes mellitus (4.8% and 5.3% vs. 6.7% and 6.0%) and smoking (9.5% and 2.1% vs. 24% and 20%). Obesity was prevalent in 73.7% of males (n = 19) and 100% (n = 11) of the women were overweight or obese. Body mass index (BMI) was only calculated on 30 of the charts (19 males and 11 females) due to absence of height measurements in the remaining charts.
Depression and anxiety rates in this sample were much higher than comparison samples. With depression rates of 19% in males and 22.1% in females, this was much higher than Probst et al. (2008) study that reported the prevalence rate of depression in rural Americans at 6.11%. Anxiety was significantly higher at 11.4% (males) and 14.7% (females) than Wittchen (2002) reported as a 3.6% prevalence in males and 6.6% in females; while Young et al. (2008) further confirmed the prevalence rate of persistent anxiety at 4.7%. It is unknown why the depression rates and anxiety levels were so high. These results were collected at the beginning of the economic downturn in the U.S. and this study location was later to have some of the highest unemployment rates in the nation. These results may have indicated the anxiety and concern over possible changes in the economy.

Smoking prevalence (9.5% males and 2.1% females) was much lower in the Amish than in the general population (CDC, 2009). While this finding may be limited with only self-reported data, it was consistent with findings from Holmes County, OH (Ferketich et al., 2008) which confirmed low tobacco use. The low prevalence of smoking may indicate a strict Order against the use of tobacco.

The BMI for the males ranged from 17.3 to 42.3 kg/m$^2$ with a mean of 28.8 kg/m$^2$, and the females ranged from 25.1 to 43.2 kg/m$^2$ with a mean of 35.1 kg/m$^2$ (see Table 4). Compared to the World Health Organization guidelines (2009) only 26.3% (5/19) of the males were considered underweight or of normal weight (BMI ≤ 24.9), while 26.3% (5/19) were considered overweight (BMI ≥ 25 and < 30) and 47.4% (9/19) were considered obese (BMI ≥ 30). The BMI rates for females were even greater, with no females at normal weight, 27.3% (3/11) were overweight and 72.7% (8/11) were considered obese.
Table 4  Body Mass Index Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Male (n = 30)</th>
<th>Female (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI: kg/m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RANGE</td>
<td>17.3 - 42.3</td>
<td>25.1 - 43.2</td>
</tr>
<tr>
<td>MEAN BMI</td>
<td>28.8</td>
<td>35.1</td>
</tr>
<tr>
<td>MEDIAN BMI</td>
<td>29.5</td>
<td>36.1</td>
</tr>
<tr>
<td>NORMAL WT</td>
<td>5 (26.3%)</td>
<td>0</td>
</tr>
<tr>
<td>OVERWEIGHT</td>
<td>5 (26.3%)</td>
<td>3 (27.3%)</td>
</tr>
<tr>
<td>OBESE</td>
<td>9 (47.4%)</td>
<td>8 (72.7%)</td>
</tr>
</tbody>
</table>

BMI = Body Mass Index

Study findings indicated that hyperlipidemia was a health concern, but few Amish took prescriptive medications to lower their lipid levels. Even though hyperlipidemia prevalence was 6.8% higher in males and 6.0% in females than AHA (2009) national rates, only 4.5% of the Amish were taking prescribed lipid lowering agents. Alternative treatments, such as red yeast rice, grape seed, flax seed oil and green tea, which have been reported anecdotally to improve cholesterol levels, were used, but there was little documentation of laboratory follow-up to ensure improvement of lipid levels. Documentation was noted in the charts of nutrition education that was culturally acceptable, which included instructions on eating more fresh fruits and vegetables, increasing fiber and whole grains, and decreasing oil and butter use when cooking. This education was directed at those with hyperlipidemia and those who were considered overweight.

The Amish self-prescribed many alternative herbal medications. Their medical charts did not indicate the intended purpose for taking the herb, and little is known about their effects in the body or their interaction with other prescription or alternative medications. These alternative herbal medications ranged from common vitamins to more obscure treatments heavily promoted by alternative drug companies.
This preliminary study was unique as prevalence rates of CVD and its associated risk factors had not been previously reported in the Amish setting in northern Indiana Amish. This study indicated that CVD and its risk factors are health concerns in this population. This group of Amish self-prescribed many alternative treatments in addition to using a wide range of prescription medications.

The knowledge of this population's cardiovascular health care practices was limited by the data found in the retrospective chart review and that some data was self-reported. It is unknown if a health care provider had actually diagnosed all of the diseases documented in the clients' records or if the Amish had made assumptions about diseases they may have had. In addition, although the BMI results were interesting, finding only 30 records that had documentation of both height and weight was disappointing. Obtaining this information from a larger sample would have provided stronger statistical data.

While many alternative treatments were noted in the chart, the anticipated effects of these alternatives were not noted. In addition, it was not known if the Amish perceive CVD as a health problem in their culture. The results of this study indicated the need for further studies to thoroughly investigate the cardiovascular health promotion practices of the Amish of northern Indiana.

Purpose

Based on the preliminary data findings, the purpose of this research study was to conduct an exploratory ethnographic study to explore the cardiovascular knowledge, beliefs and healthcare practices in the Amish of northern Indiana.
Chapter 2: Design and Methods

Overview

This chapter describes the research design, theoretical framework, and operational definitions of the study. Entrance into the community, sampling technique, and setting information are detailed. Protection of human subjects, data collection techniques and data analysis are discussed. This chapter concludes with a description of how trustworthiness was established.

Design

The purpose of this study was to explore cardiovascular knowledge, beliefs and health care practices of the Amish of northern Indiana. As indicated by the review of the literature, a qualitative methodology was appropriate due to a lack of published research that has explored this topic. A mini-ethnographic exploratory research approach was used with this study. As described by Roper and Shapira, “Ethnography is … learning about people by learning from them” (2000, p. 1). The ethnographic method provides a way to gain cultural knowledge by exploring health beliefs, values, practices, ideals and cultural controls that influence lifestyle (Burns & Grove, 2005; Germain, 2001). Ethnography increases understanding of a culture so that the knowledge gained can be used later as an impetus to create change (Germain, 2001). Leininger (1985) described a mini-ethnography as a “smaller scale ethnographic study that focuses on a specific area of inquiry” (p. 35). This type of study allows focus on specific research questions that have practical applications in the health care setting (Leininger, 1985; Roper & Shapira, 2000). To obtain data with this ethnographic study, indirect and direct observations, interviews, and reviewed written sources of information were used.
Theoretical Framework

The guiding theoretical framework for this study was Leininger’s Culture Care Diversity and Universality Theory. The aim of this theory is to guide researchers in conducting culture care studies that facilitate health care that is culturally congruent and beneficial to people from varying cultures (Leininger, 2006). Care is defined as the actions, attitudes, and practices that are embedded in the culture that assist others towards well-being (Leininger, 2006, p. 12). Culture is defined as “the learned, shared, and transmitted values, beliefs, norms, and lifeways of a particular culture that guides thinking, decisions, and actions in patterned ways and often intergenerationally” (Leininger, 2006, p. 13). Leininger stressed the importance of gaining perspectives from both emic and etic viewpoints and examining cultural and social factors that influence care. Consideration must be given to the ethnohistory of the culture, which is the past events that help to explain lifestyle (Leininger, 2006).

Leininger’s Sunrise Enabler to Discover Culture Care (see Appendix C) provides a visual depiction of the various influences that affect transcultural care. Generic or folk care is impacted by seven broad factors (technological; religious and philosophical; kinship and social; cultural values, beliefs and lifeways; political and legal; economic; and educational) which then influence and lead to transcultural care decisions and actions (Leininger, 2006, p. 25). These can ultimately lead to maintaining, negotiating or restructuring health care practices to maintain culturally congruent care (Leininger, 2006).

Leininger’s theory has been previously used in studying the Amish’s high culture context (Wenger, 1988) and the health care beliefs, values and practices of Amish women with breast cancer (Schwartz, 2002). Because this theory considers the effect of many
cultural factors that impact healthcare practices, it was ideal to guide this research study that explored the healthcare practices of the Amish. The Amish are a high-context culture (Wenger, 1991) guided strongly by their knowledge, values, and beliefs about technology, religion, family, health, and their culture.

**Operational Definitions**

For the purpose of this study, the following operational definitions were used throughout the study:

- **Knowledge** was defined as the participants' awareness of information about the heart. No *a priori* definitions of heart function or cardiac disease were given to the participants.

- **Beliefs** were defined as Amish values or ways of life that influence cardiovascular health as described by the participants.

- **Preventive cardiovascular healthcare practices** were described by the participants as all health actions that are taken with the intent of influencing the prevention, development or impact of cardiovascular disease.

- **Amish** was defined as those who self-identified as a member of the Old Order Amish culture.

- The location of Northern Indiana was limited to studying those Amish in Elkhart, Lagrange and Noble Counties.

**Methods**

*Access to the community.* Original entry into the Amish community was made through another nurse who had conducted research in this community. Although there had been years of previous informal participant observation with this culture prior to
doctoral studies, the author engaged in formal participant observation of this Amish settlement for three years prior to data collection. The author frequented Amish shops and bookstores and talked to owners, visited health food/supplement stores to talk to the proprietors about what to use for the heart, cared for Amish patients in both outpatient and inpatient settings, interviewed an older Amish female with CVD (in another settlement), attended a sales demonstration promoted as an educational session (which endorsed a pyramid scheme for selling ‘natural’ medical remedies) and attended an Amish wedding. There was an introduction at a regular steering committee meeting of approximately 40 bishops, deacons and wives, which provided the local church leadership with knowledge of the author. Strong contacts were established at the local Amish health clinic during a summer spent providing over 100 hours in primary healthcare as a Family Nurse Practitioner to a wide variety of Amish patients, including those with a history of CVD and those who were leaders in the local church districts. Establishing recognition in the community was the first step in gaining trust. Additionally, the Amish hold nurses in high regard (Wenger & Wenger, 2008), and with the author identifying herself as a nurse to the church leadership and the research subjects, this facilitated access in this closed community.

A suggestion given to the author by a formal gatekeeper regarded how to approach potential participants. An introduction should include an explanation that the researcher was a nurse who was trying to learn more about heart disease in the Amish. Keeping the language simple was necessary. Additionally, it was suggested that the author should not voluntarily inform participants that she was finishing her PhD, going to school for too long was considered “too high and mighty.” The author dressed modestly
during the interviews, which included a dark skirt, low heel shoes, and minimal jewelry. The demeanor remained friendly and approachable throughout the interview.

**Sampling.** This cross-sectional study used convenience and purposive snowball sampling to obtain 15 participants. The two initial participant contacts were obtained through an informal Amish gatekeeper in the community. Adequate representation of varying age groups, gender and history of CVD was obtained with an occasional request for a referral to the next participant who could meet a gap in the sample demographics, such as a younger female or a middle aged male without CVD. Data saturation occurred with the 15 participants, and this sample size was consistent with other mini-ethnographies that explored cardiac issues (Littrell, 1996; Preston, 1997).

Inclusion criteria included participants who were Amish, over the age of 18 years, lived in the three county geographical area, and were willing to discuss their cardiovascular healthcare knowledge, beliefs, and healthcare practices. Since the Amish do not have phones in their homes, the author used an Amish directory to obtain the addresses of those who were recommended and approached the participants without prior notification. Everyone approached agreed to participate immediately and agreed to follow-up visits for clarification and confirmation of the interviews. Participants received a $25 gift card to Wal-Mart at the conclusion of the first visit. One participant declined the gift card, stating he was happy to talk, and no gift card was necessary.

The sample included 7 females with a mean age of 56.43 (range 34-74) and 8 males with a mean age of 65 (range 31-93). Nine participants were born and lived their entire lives in the three county area, 3 were born in Ohio, 2 in Michigan and 1 in a different Indiana county. Thirteen of the 15 were married and currently living with their spouses, one had never married and one was widowed. Ten had attended public schools
while five had attended Amish parochial schools. Thirteen had 8th grade educations, one attended school until 9th grade, and another left school after 10th grade and obtained a GED. This individual served in the Army National Guard for one year during Rumspringa, the years of 'sowing wild oats' before the young adults decide to join the church (Helmuth & Schwartz, 2008). None were current smokers, although seven had smoked for a few years in their early 20's. All remembered that health had been taught in school. Primary employment included working in a factory (n = 4), farming (n = 3), construction (n = 1), small business (n = 2), and housewife (n = 5). One participant was also a deacon in the Amish church. Five answered affirmatively when asked if they had ever been told they had heart trouble, and 7 answered that they did not have heart disease. Four said they had never been told they had heart trouble, but with further interviewing it was discovered that 1 had hypertension, 1 had congestive heart failure, 1 had a history of a mitral valve replacement secondary to rheumatic fever and another participant had rheumatic fever when younger. Thirteen of the fifteen had first degree relatives with 'heart trouble'.

**Setting.** All 15 participants were obtained from the designated three counties in northern Indiana. According to the 2007 Indiana Amish Directory for this area, the total Amish population was 18,423, which included 3,900 different families, and a total of 131 church districts. Participants from this study were obtained from 13 different church districts that were dispersed throughout the Amish settlement.

The interviews were completed in the winter and early spring of 2010. All interviews were conducted at the convenience of the participants. Interviews took place either in the home (family room or kitchen) or in the shop adjacent to the home. The shops included 2 workshops and a nutritional supplement store. If non-family members
were present in the shop, the author would wait until the customers were taken care of before resuming the interviews. In four instances, a participant requested that a spouse be present at the initial interview to help assist them with their memory. If this occurred, the spouses were welcomed, but only the primary participant was considered as part of the research study. All interviews took place during the day while there was sufficient natural light to take notes in the home or shop; this helped to avoid the busy evening family time and the necessity of using a kerosene lamp to write notes. Participants were approached for interviews after the morning chores were completed and meal times were avoided.

**Protection of human subjects.** Approval for this research study was obtained from the Institutional Review Board, Research and Clinical Trials Administration Office, Rush University Medical Center (ORA No. 09120204). All study participants signed written informed consents and HIPAA forms to participate in the study (see Appendixes D and E). The informed consent was at a ninth grade reading level due to the limited formal educational level of the Amish. The author verbally read the informed consent and the HIPAA form at the participant's request or if the participant appeared to struggle or look confused while reading the paperwork. Each participant received an additional copy of each, which additionally contained contact information for the author. All participants were assured that confidentiality would be maintained at all times. All data collected would only be identified by code numbers and not with names or other identifying information. In addition, verbal permission was sought from each participant to take hand-written notes during the interview.

**Procedure for data collection.** The intent of this research was to speak to the Amish regarding their non-Amish perspective of cardiovascular knowledge, beliefs, and
healthcare practices. The participants shared their knowledge willingly, and those who were reticent at the beginning of the initial interview were talkative by halfway through the initial interview and in subsequent interviews. All interviews started with initial 'small talk' so that the author and the participant were comfortable with each other before the interviewing occurred. The author found that the participants looked forward to the meeting again, and had often set information aside to show the author during the follow-ups.

A codebook was kept with the names and addresses of all participants. Code numbers were assigned to each participant and all transcribed interviews and coding were only identified with this number. Notes were taken during the interview after receiving verbal permission from each participant. A stenographic notebook was used as suggested by Leininger (1985); one column was used for answers to specific questions, while the other side was used for observations, reactions, and author thoughts. Notes were taken on the personal data sheet, which included demographic data, personal and family history of CVD (see Appendix F). The author followed an open ended interview guide with each interview to ensure that all topics were covered with all participants (see Appendix G).

The author kept a field journal to record events and personal reflections during the research process. This journal served as the impetus for additional discoveries (Spradley, 1979), either in thought processes or with realizations of the Amish culture. It provided a means to record observations or experiences which may have been discussed with the research mentors as needed.

In subsequent interviews, results from previous interviews were compared and contrasted. Each participant was asked to review notes from previous interviews to ensure accuracy. Corrections were made if needed. If the author needed clarification of
a response from a previous interview, it was sought in these subsequent interviews. Further elucidation occurred during these follow-up interviews.

*Data entry and analysis.* All handwritten interview notes were combined after the interview and were transcribed into Microsoft Word 2003 and then later transferred into NVIVO 8 (Qualitative Solutions and Research, 2008) for analysis of the data. After the interviews were transcribed, all interviews were compared to the author’s notes to ensure accuracy. Corrections were made as needed. All transcriptions occurred within 24 hours of the interview, and no further interviews were conducted until the previous interview had been transcribed. The author did not interview more than two participants per day.

After the data was entered into NVIVO, the author, along with assistance from a research mentor, sorted the data according to the three primary themes (knowledge, beliefs, healthcare practices). Data were then coded into nodes and tree nodes within the NVIVO program. This process continued with the identification of further subthemes until no further division was possible. Subthemes were identified for each primary theme.

*Establishing trustworthiness.* The four criteria noted by Lincoln and Guba (1985) to establish trustworthiness of qualitative data include: credibility, dependability, confirmability and transferability. Trustworthiness of this study was established in a number of ways.

Credibility was established by spending extended time in the Amish community to learn and understand the culture from a wide range of people so that questions and statements could be clarified during the interviews. More than three years were spent in formal participant observation learning more about the culture prior to the initiation of
this research. This time allowed the author to develop trust within the community. In addition, participants were given the opportunity to assess and confirm the adequacy and accuracy of the data and corrections were made when necessary. Results were found to be credible when triangulated with healthcare providers of the Amish and Amish herbal books (one of which [Rector-Page, 1992] was given to the author by a participant).

Dependability was ascertained by verifying the data obtained during follow-up interviews. Interview transcripts were reviewed during subsequent interviews and feedback was received from the participants to ascertain accuracy. In addition, a research mentor assisted in verifying results during analysis. This external audit (Lincoln & Guba, 1985) helped to establish confirmability. Confirmability was verified by interviewing numerous members of the Amish culture and corroborating the general results with healthcare providers in the area. Transferability was provided through a sufficient description of the research methods and results. This thick description allows researchers of other Amish subpopulations to sufficiently evaluate the data to determine if the findings can be applied to other Amish communities.
Chapter 3: Conclusion and Implications

Overview

This chapter presents a synopsis of the results from the exploratory mini-ethnographic study followed by a synthesis of all manuscripts. A discussion of the implications and limitations follows. The chapter concludes with a discussion of future research direction and clinical implications.

Results of Exploratory Study

The manuscript describing the results of the mini-ethnographic study in more detail is located in Appendix H.

Knowledge. This sample’s knowledge of heart function and heart disease was limited. While cardiovascular knowledge increased if the participants had a personal cardiac experience, only six of fifteen were able to state information that demonstrated basic knowledge, although not always accurately, of the heart. These findings are consistent with previous research which found that those who live in rural settings or have less than a high school education had lower cardiovascular knowledge (Homko et al., 2008; Kayaniyil et al., 2009). This indicates that the Amish, in general, may have limited knowledge of CVD and cardiac functioning.

Even though 60% of the participants responded they had received pamphlets about heart disease in the past, these pamphlets were often viewed suspiciously as a tactic to make money. One participant responded that “they are head hunters—always looking for people.” Four of nine participants who received information found it helpful, but no one who received the information changed their health behaviors based on what they had read. One participant noted “I read them and then put them away and didn’t change anything.” The most powerful influence in the community regarding healthcare was the
local herbalist. This person was often looked to as an important source of information and was trusted more than traditional healthcare providers. Since this herbalist was Amish, there was an understanding of the culture and what the community was willing to do to promote health. These results support previous research, in which it was noted that health education needs to cognizant of cultural needs, motivations and priorities in order to meet the needs of distinct cultures (Fuchs, Levinson, Stoddard, Mullet, & Jones, 1990).

**Beliefs.** The Amish value good health, and believe that God is the source of it. Maintaining cultural traditions within the community was a high priority. It was verbalized that there is peer pressure to eat and act a certain way within the community, which is consistent with the Amish heritage. Participants did not perceive that preventive cardiovascular healthcare practices were taking place or were a high priority in the Amish community. Participants noted that a significant health event would need to occur before heart disease would capture their attention and then behavior change would occur. The Amish see a wide variety of health care providers for their heart and they had a high level of trust for non-traditional healthcare providers. A summary of the types of healthcare providers utilized by this population is located in Table 5. Twelve of the fifteen had seen the same Amish herbalist, who is well respected in providing healthcare in the community. This person was perceived as having the best interest of the Amish as a top concern while suggesting only “natural” herbs and supplements to promote health, which could then be purchased at that clinic.
Alternative care providers were frequently preferred as a first line of treatment. The Amish perceived that “English” healthcare providers were not knowledgeable about using what God provided naturally: herbs and nutrition. This study confirmed the results of previous studies (Graham & Cates, 2006; Sharpnack, Griffin, Benders, & Fitzpatrick, 2010; Wenger, 1995) that “English” healthcare providers are frequently not told of alternative medicines that are self-administered, in part due to a perceived lack of acceptance by “English” providers. “Natural” cures and medicines were considered to be much better than “man-made” medicines.

Practices. While the Amish may report a high intake of fruits and vegetables, they acknowledged eating many foods cooked with butter or lard. One participant with a cardiac history related a story about disagreeing with nutritional teaching from a certified dietician after reading information from a company that sells alternative nutritional supplements. When health teaching occurs in the Amish community, if it was not similar to long established cultural beliefs, the Amish tended to view the information suspiciously and question its validity.

The importance of maintaining body alkalinity was stressed by 26% of
participants. It was stated that increasing the intake of water, green tea, fruits and vegetables, while decreasing the intake of red meat, sugar and white flour, was necessary to keep pH between 7.0 and 7.2. Only one participant out of 15 intentionally exercised; with the remaining participants considering their everyday work/chores enough daily physical activity.

Participants discussed the importance of trying to be as “natural” as possible. Eating foods that were unprocessed and taking supplements and herbs that came from “God’s earth” were considered better than anything that came “from a laboratory, nothing natural can come from there.” Alternative medications were used by every participant, with a total of 45 different alternatives used by just 15 participants. See Table 6 for a list of alternatives that were taken to reportedly improve cardiovascular health. The Amish chose which supplements to take based on advertising in Amish publications, such as The Budget (an Amish weekly newspaper), advice from health care providers and supplement stores, or word of mouth from family and friends. Participants described situations in which some family and friends were involved in pyramid schemes selling health supplements, which led to specific supplement use. One recruiting session was witnessed by the author at a community education session about disease prevention.

Table 6 Alternative Medications for Cardiovascular Health

<table>
<thead>
<tr>
<th>Total per Purpose</th>
<th>Purpose</th>
<th>Specific Alternative (number of participants using)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Thins Blood</td>
<td>Aloe Vera (1), Garlic (1), M-bolus (2), Natokinase (3), Serrapeptase (1), Vinegar (1)</td>
</tr>
<tr>
<td>7</td>
<td>Thickens Blood</td>
<td>Cayenne pepper (5), Chlorophyll (1), Iron (1)</td>
</tr>
<tr>
<td>5</td>
<td>Lowers Cholesterol/Removes Plaque</td>
<td>Artery Care (1), Grape Seed Oil (1), Lysine (1), Red Rice Yeast (2)</td>
</tr>
<tr>
<td>14</td>
<td>Prevents Heart Disease</td>
<td>Cardio Cocktail (3), Co-Q 10 (4), Coral Calcium (1), Hawthorne (2), L-carotin (1), Phyto-omega (1), Pyconogenol (1), Selenium (1)</td>
</tr>
<tr>
<td>3</td>
<td>Lowers Blood Pressure</td>
<td>Celery (2), Cinnamon (1)</td>
</tr>
<tr>
<td>12</td>
<td>Promotes Circulation</td>
<td>Omega-3 (5), Peppermint (1), Vitamin E (6)</td>
</tr>
</tbody>
</table>
This research supported the supposition that there is a need for education regarding heart function and CVD prevention in the Amish community. Additionally, the Amish have distinct cardiovascular beliefs and healthcare practices that affect their diet, activity, choice of healthcare practitioners, and use of complementary and alternative medicine.

Discussion

Throughout this exploration of CVD in the Amish, this doctoral work described the current state of CVD knowledge in this distinct culture and identified known gaps in the literature. In addition, the prevalence of CVD and its associated risk factors in the Amish of northern Indiana was determined, which led to the exploration and identification of cardiovascular knowledge, beliefs and healthcare practices of this culture. This work can impact and have a positive influence on cardiovascular research and cardiovascular care of all Amish.

An extensive review (Gillum & Staffileno, in press) of the Amish cardiovascular research literature showed that the focus of research has been the exploration of the genetic characteristics of CVD of the Amish in Lancaster County, PA. Little cardiovascular research had been conducted on the Amish outside of this geographical area, and there had been little research that explored how their distinct lifestyle impacted their cardiovascular risk. In addition, there were no published reports that described the prevalence of CVD in the Amish, so it was unknown if their lifestyle altered the risk of CVD or if it remained similar to the mainstream culture. The literature review did not reveal any studies that had explored Amish CVD knowledge, beliefs or their preventative health practices for CVD.
This review indicated that there were many opportunities for further research to add to what is currently known about the Amish and cardiovascular disease.

Documenting the prevalence of CVD was needed initially to provide the springboard to document the necessity of future exploratory research.

Through a retrospective chart review (Gillum, Staffileno, Schwartz, Coke & Fogg, 2010) in an Amish clinic in northern Indiana, the physician and self-reported prevalence rates of CVD and many associated risk factors were higher than the comparable 2009 AHA rates. While it may be speculated that coronary heart disease (CHD), myocardial infarction (MI) rates and type II diabetes mellitus rates were lower due to lack of diagnostic testing associated with costly preventive health care, this is unknown and indicates a need for future research. The study did confirm that CVD is a prevalent health problem in this culture, and that the treatment of hyperlipidemia, anxiety and depression need additional attention. While documenting the prevalence of BMI in this sample was difficult due to the low number of charts with documented of both heights and weights, results of the small sample indicated that this is another avenue for documentation and exploration in this culture.

The chart review confirmed that the Amish self-prescribe many alternative herbal medications, with no indication of the purpose or effectiveness of these treatments. The types of alternatives with their intended purposes were further explored in the qualitative study, which showed that these are taken because “natural” remedies are considered better than man-made remedies. Use continued even if the participants did not feel that the alternatives were effective or if the alternatives made them feel worse.

The mini-ethnographic study provided insight into the Amish knowledge level of heart function and CVD. Less than half of the participants demonstrated minimal
knowledge of cardiac function and the Amish were suspicious of receiving educational information from outside sources. No additional educational information received had been adapted to the Amish culture. The Amish are wary of people attempting to take advantage of them, and view attempts to educate as a way for “English” people with ulterior motives to insert their influence into the culture.

Additionally, the mini-ethnographic study confirmed that the Amish value health and firmly believe that it is a gift controlled by God. This cultural belief corresponds with Leininger’s theory of the influence of cultural values on health care. An external locus of control may account for the lack of many preventive cardiovascular healthcare practices. Doing what is considered acceptable within the community was highly valued, and not following the cultural norm risked displeasure from the other families in the church district. The Amish culture strongly influences diet, activity, healthcare beliefs, and practices. Conformity to the status quo is important in the Amish culture, and helps to ensure that Amish life does not change significantly (Hostetler, 1993).

Consistent with Leininger’s Culture Care and Universality Theory, there were many cultural influences that impact the healthcare of the Amish. As demonstrated in Figure 1, limited knowledge leads to the development of Amish beliefs about cardiovascular disease, leading ultimately to their cardiovascular healthcare practices.

The Amish knowledge of heart function and CVD is limited in part by their lack of science education. Amish parochial schools do not include science in the curriculum
Figure 1  Model for Cardiovascular Knowledge, Beliefs and Healthcare Practices

Knowledge

* Little or no science education
* Simplistic health education
* Under developed critical thinking
* Folk care

Beliefs

* External locus of control
* Natural way is God's way
* Highly valued alternatives
* Amish culture precedent

Healthcare Practices

* Use of alternative medications
* Use of alternative providers
* Use traditional medicine last
* Cultural resistance to healthy lifestyle choices
* Healthcare cost containment
* Influence of others
* Lack of disclosure
(Clark, 2010; Huntington, 1994; Johnson-Weiner, 2007), and those who attend public schools only attend through eighth grade. Lack of exposure to science and advanced teaching methods can decrease the Amish children’s ability to think critically, limiting their ability to question the beliefs and practices they are taught by their families and the community (Meyers & Nolt, 2005). When this is combined with current health education that is reminiscent of the 1950’s, there is a great impact in cardiovascular knowledge and preventive healthcare practices. Understanding what having a healthy lifestyle means and how it ultimately impacts cardiovascular health is necessary in preventing CVD.

In addition, folk care that has been passed down from generation to generation continues to maintain a strong influence on current health knowledge. The Amish continue to pass on this knowledge not only through their families, but also through publications that are readily available in Amish-run supplement stores (McGrath, 1998; Quillin, 1995; The Wonder of Amish Medicines, 1996). The combination of limited or no science education, simplified health education, underdeveloped critical thinking and the strong influence of the traditional folk care greatly influences the Amish beliefs about their health.

The Amish have a strong external locus of control (Reiling, 2000; Schwartz, 2002), believing that God’s will is ultimately in control of all. Because of this external locus of control, it may be difficult to motivate the Amish to work on the prevention of heart disease. If a person believes that it does not really matter what they do to take care of themselves because it is out of their hands, convincing them that prevention is imperative can be a challenge.

The Amish culture highly values using natural herbs and alternative treatments. They believe that medicines found in nature are from God, so they are superior to man-
made medicines. The Amish believe that “English” healthcare providers do not know very much about alternatives and that the “English” do not believe or trust alternatives. Due to this perception, they often fail to disclose to “English” healthcare providers when they use alternatives. Amish healthcare beliefs are firmly grounded in cultural precedent. If something has always been done a certain way, why change it? There is peer pressure to behave a certain way within the Amish culture, and any deviation is frowned upon.

The strong influence of culture on healthcare beliefs directly impacts healthcare practices. Due to their lack of trust in “English” healthcare providers, the Amish initially try alternative medications in an attempt to resolve their healthcare issues. These alternatives are often suggested by friends, family and individuals/companies who are selling the alternative products. If this is unsuccessful, the Amish typically seek healthcare from alternative providers first, and only see traditional healthcare providers if the previous attempts fail. Since the Amish do not have healthcare insurance, these initial attempts are perceived as less expensive than resorting to traditional healthcare providers.

Amish cardiovascular knowledge provides the initial link (see Figure 1) to the development of healthcare beliefs. Through their distinctive beliefs, their healthcare practices have evolved. These are unique to this culture and all three of these variables must be taken into consideration when developing any type of healthcare intervention. Failure to do so will greatly influence the effectiveness of any attempts at education or health improvement.

Limitations. There were several limitations to these studies. First, all data was collected from one Amish settlement. While this may limit the transferability of these findings to Amish in other settlements, it provided the author with the opportunity to obtain richer data. A second limitation was being an outsider of this culture. Even
though the author spent extensive time in participant observation and followed up with each participant for two to three sessions, it is possible that the study participants did not fully disclose their knowledge, beliefs and practices. A third limitation was not being able to audio record the interviews. Even though the author took careful and copious notes, it is possible that nuances may have been missed. The small sample size may be considered an additional limitation, although the sample size was consistent with an adequate size for qualitative studies.

**Implications for Research and Clinical Implications**

As discussed in the previous section, there are numerous opportunities for future cardiovascular research within the Amish culture. Continued exploration of the Amish outside of Lancaster County, PA is needed because there is a significant degree of diversity in the *Ordnung* between all Amish settlements (Meyers & Nolt, 2005). Levels of physical activity, diet, and use of alternative providers and medications can vary significantly from one Amish settlement to another. These differences have the possibility of greatly affecting the degree of impact that the Amish culture has on cardiovascular risk factors.

Conducting a research study with a larger sample size to study obesity in the Amish is needed. It was disappointing that BMI’s could only be calculated in such a small portion of the sample from the retrospective chart review. Anecdotally, it was apparent to the author that obesity is a significant problem with this culture when reviewing the charts.

This exploratory mini-ethnographic study was the first known research to examine the cardiovascular knowledge, beliefs and healthcare practices of the Amish. Conducting this study in various Amish settlements and having a larger sample size
would increase what is known about the Amish and cardiovascular care in many Amish settlements.

This research has indicated that there is a special need for cardiovascular education within this culture. This need is accompanied with special challenges. Of initial concern, is the lack of educational material that has been adapted to this distinctive culture. Many pamphlets address issues that do not apply to this culture, such as increasing physical activity by decreasing television and computer use. Pictures in the pamphlets are not similar to the people of this culture, so the Amish are not able to visually identify with those portrayed in the literature. Development of culturally congruent material will involve a collaborative approach to ensure that appropriateness is maintained. This collaboration can help to ensure acceptance of this literature within the culture once it has been developed. If it can be shown that there is no hidden agenda to make money or trick the Amish in any way, then this literature can have an impact on improving cardiovascular health.

Additionally, incorporating acknowledgement of this culture’s frequent use of alternative medicines and providers in educational materials is necessary. By the very nature of the Amish culture, change occurs slowly. Learning to work together with established Amish beliefs and practices can indicate that the “English” are open to learning about alternative care and that they respect the Amish culture’s differing approach to health issues. Ultimately, if healthcare providers can establish trust within this culture and begin to slowly educate the members about the importance of caring for their cardiovascular health, this can improve the quality of their lives and improve the prevalence of CVD. Educating the Amish that making small changes with their lifestyle could have significant impact on improving their health is a challenging task that can
only take place over time. Addressing the potential savings with health care may be the best motivator to improving Amish health.

According to Leininger (2006), "English" health care providers must respect the desire of the Amish to preserve and maintain their cultural values, while attempts at accommodation and negotiation occur with modern healthcare providers. The opportunity to work with the Amish to eventually repattern and restructure some cardiovascular health care practices can enable this culture to maintain the cultural practices that are central to their worldview, while incorporating modern practices that can significantly improve their cardiovascular health. Incorporating the best practices from both traditional and modern worlds will increase the likelihood that significant change will occur that can improve the cardiovascular health of the Amish.
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Appendix A

An Integrative Review of the Current Knowledge of Cardiovascular Disease and Associated Risk Factors in the Old Order Amish

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An Integrative Review of the Current Knowledge of Cardiovascular Disease and Associated Risk Factors in the Old Order Amish

When thinking of the Old Order Amish, many health care workers living near Amish settlements picture plainly dressed individuals, horses and buggies, and a largely agrarian lifestyle that are representative of a time long ago. While on the surface the Old Order Amish (hereafter referred to as Amish) appear homogeneous, few realize “no two Amish groups are alike” (Johnson-Weiner, 2007, p. 12). There are many variations in the Amish lifestyle which are dependent upon the unwritten rules or regulations (Ordnung) that govern each individual church district. It is unknown if these lifestyle variations lead to differences in morbidity or mortality rates in the various Amish communities. Nearly all the medical research has focused on the Amish in Lancaster County, PA. However, the Amish have migrated to at least 27 states and to the Canadian province of Ontario (Elizabethtown College, 2008). With research concentrated in a small subset of the Amish, it remains unknown if the health of the Amish in other parts of North America is comparable to those in Pennsylvania. Expanding the focus of Amish research to different Amish settlements outside of Pennsylvania is necessary to describe the health status, risks and needs of the quickly increasing Amish population.

The purpose of this article is to introduce the Amish culture to the reader and review the published research studies that focus on cardiovascular disease (CVD) and its associated risk factors in the Amish culture. Identification of current gaps in the literature can alert researchers to areas that need further exploration, which can lead to
increased knowledge about cultural variations with CVD and the improvement of culturally competent care to the growing Amish population.

An Introduction to the Amish Culture

The Amish are descendants of the sixteenth century European Protestant Reformation. The Anabaptist movement was founded on the premise that only adults, and not infants, can voluntarily commit their lives to Christ, which is symbolized by baptism. In addition, Anabaptists believe that there should be a separation of church and state, that the church has the right to discipline their wayward members, and those believers should live a life this is reflective of the teachings found in the New Testament, including nonresistance (Hostetler, 1993). During the 1500’s, these beliefs were considered a capital offense against the Catholic Church and led to the persecution and martyrdom of many Anabaptists (Wenger & Wenger, 2008). One group of Anabaptists, the Amish, were followers of Jacob Ammann, an Anabaptist leader who advocated stricter church discipline through the use of the Meidung, or shunning, and Bann, or excommunication, are descendants of the Swiss Brethren (Hostetler). Due to their severe persecution, the Amish immigrated to North America and settled in Pennsylvania in the early 1700’s. There are no Amish residing in Europe today.

The Amish are the fastest growing rural group in the U.S. (Armer & Radina, 2002) and at the current rate will double in population in 12 years (Elizabethtown College, 2008). This is attributed to their high birth rate (most Amish families have up to seven children and many may have 10 or more) and their high recidivism rates (85-95%) that keep the young adults in the community once they become part of the church (Kraybill, 2003).
The largest Amish settlements are located in (listed in descending order): Ohio, Pennsylvania and Indiana. These three states account for 43% of the Amish living in the U.S. (Elizabethtown College, 2008). Determining the exact number of Amish is difficult since the U.S. Census Bureau does not track religious data, but Nolt (2003) determined that in 2000, there were approximately 175,000 living in the Amish communities. A recent Associated Press report (2010) noted the population of the Amish currently in the United States is over 230,000.

The Amish lifestyle is very specific to their culture. They live in rural communities in which traditionally the men have engaged in agriculture as their primary employment. However, tough economic times and a dwindling amount of affordable, available farmland have necessitated the Amish to diversify to support their large families. They take jobs in factories and smaller industries, such as carpentry and home building. The shift away from the family farm is the biggest change that has occurred in the Amish culture in the last century (Kraybill, 2003). Contrary to popular belief, the Amish are not opposed to technology; they maintain their separateness by keeping technology at a distance and only using it selectively (Kraybill). This helps to preserve their culture and heritage and ensures that their values are passed on to the next generation. The Amish do not have electricity or telephones in their homes. Often times there is a telephone booth that is shared with neighbors and located in a central location. This allows the Amish to have contact with the outside world within their own terms while preserving the fellowship of face-to-face communication as the primary form of communication (Kreps, Donnermeyer, & Kreps, 1997). They rely on the “English” (their emic term for the non-Amish) to transport them when the horse and buggy are impractical. Amish children only attend formal school through the eighth grade; after
this, they stay at home and the parents continue their informal education to prepare them for adulthood and making a contribution in the Amish community.

The Amish use three languages in specific cultural contexts (Wenger & Wenger, 2008). The first language Amish children learn is Pennsylvania German (or Dietsch), which is a mixture of German and English (Helmuth & Schwartz, 2008). It is the primary language used in the home and when communicating with members of their own culture. The second language, English is taught formally in schools and is used to converse with the outside world. The third language, Standard High German, is the formal language of the church and is used for reading the Bible and singing out of the Ausbund, the Anabaptist hymnal still in use since the Reformation (Blank, 2001). Children attending Amish schools may receive lessons in Standard High German so they will be able to read the Bible and understand the hymns during the church services (Wenger & Wenger, 2008).

The Amish place a high value on health and equate being healthy to the ability to work hard, and they consider good health a gift from God (Armer & Radina, 2002). They simultaneously use modern medical services, alternative treatments, and folk care (which have been passed down from the older generations) in an effort to “first do all you can to help yourself” (Wenger, 1995, p. 12). According to Hostetler (1993), the Amish lack familiarity with good medical practices, which can make them vulnerable to fantastic claims of natural cures. Amish patients are likely to use alternative and complementary medicine as a first attempt at resolving their health issues and may be reluctant to discuss these treatments with the “English” if they perceive that the “English” health care providers would not be open to these alternative treatments (Graham & Cates, 2006; Sharpnack, Griffin, Benders, & Fitzpatrick, 2010; Wenger). In choosing a health
care provider, the Amish assume competency when the health care provider has been referred by another satisfied patient, and seek to find someone that shows signs of integrity, sympathy, trustworthiness and humility (Fisher, 2002).

Additionally, Amish do not have commercial health insurance and traditionally do not accept help from the government, including Medicaid and Medicare. Typically, all health-related services and hospitalizations are paid out of pocket. Some Amish districts have been proactive by partaking in mutual aid organizations that negotiate lower medical costs with local health care providers or by participating in Amish Church Aid, in which the larger Amish community contributes to help a needy family that is unable to pay an outstanding medical bill in full (Ferrara, 2003).

Providing culturally sensitive care requires health care workers to acknowledge the health beliefs and practices of cultural groups (Fisher, 2002; Helmuth & Schwartz, 2008). Failure to provide care that has been adapted to the needs of a specific culture can lead to lack of relevancy and decreased adherence to needed lifestyle changes. Health care providers must remember that caring for the Amish requires cultural competence that is continually fluid, dynamic, and sensitive to the needs of the culture while remaining focused on the individual, and not on the expectations of the culture. Each person is unique and is the product of their experiences and beliefs, even in a culture that appears on the surface to lack much variability.

Cardiovascular Disease

According to the 2009 update from the American Heart Association (AHA), CVD killed 829,072 Americans in 2005, nearly 2,400 people per day, and averaged 1 death every 37 seconds. CVD affects rural Americans at greater rates than those living in urban areas. According to the 2006 National Health Interview Survey, rural Americans self-
reported higher rates of heart disease (14.1%) than Americans in large or small metropolitan areas (9.3% and 11.8%, respectively) (United States Department of Health and Human Services [USDHHS], 2007). Little has been published about the Amish and how their prevalence of CVD compares with other rural Americans.

Literature Review

Using the keywords “Amish” and “cardiovascular”, literature searches were conducted in the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline and Pubmed databases. The search was limited to the following criteria: published in the last 10 years (1999 through January 2009), adult subjects, and evidence-based research on CVD or its associated risk factors. The inclusion criteria eliminated master’s theses and doctoral dissertations, research on children and adolescents, research over 10 years old, and anecdotal articles not based on evidence-based research. This integrated review detailed the current state of knowledge of CVD and associated risk factors (obesity, physical inactivity, smoking, hypertension, hyperlipidemia, type II diabetes mellitus [when directly linked to CVD], and family history) in the Amish. Twenty five articles met the inclusion criteria. All articles were quantitative, including 23 descriptive (of which 19 were correlational and 1 was longitudinal) and 2 quasi-experimental. No randomized control studies or qualitative studies were found that addressed CVD in the Amish.

The Amish are an attractive population for genetic cardiovascular research. They are similar socially and culturally, their genealogical lines are well documented back to the early 1700’s, they have large families, and they have avoided most of the modern day conveniences that have increased cardiovascular risk factors. These attributes are thought to make this population more genetically homogenous than most present-day populations
(Platte et al., 2003), explaining the genetic focus found in the current Amish CVD research. Unfortunately, all of the published CVD genetic studies have used participants from one Amish settlement in Lancaster, County, PA. Homogeneity of the entire Amish culture cannot be determined from the study of one settlement. The Amish settled in America in two migration waves, the first immigrants were from the Swiss portions of Europe during the early eighteenth century while the second wave came from the Alsace, Lorraine and the Palatinate portions of Europe during the mid-nineteenth century (Hostetler, 1993). For example, the Lancaster County Amish are descendants from the first immigration wave while Indiana and Ohio are descended from the second wave. Hostetler stated that these two groups maintain distinct and distinguishing material cultural traits (p. 66).

The Amish Research Clinic located in Strasburg, PA has been the principal site of a tremendous amount of recent research regarding the Amish. The studies have been conducted on the Lancaster County Amish by a team of researchers from the University of Maryland. The clinic is well established within the community and has a large number of Amish that have participated in extensive medical testing and data collection. Three of their primary studies, the Amish Family Diabetes Study (AFDS), the Amish Family Calcification Study (AFCS) and the Heredity and Phenotype Intervention (HAPI) Study, have led to the majority of CVD related articles. The AFDS was a cross-sectional descriptive study initiated in 1995 with the goal of identifying genetic determinants of type 2 diabetes mellitus in the Amish in Lancaster County, PA (Hsueh, Mitchell, Aburomia, et al., 2000). The study cohort was comprised of 953 Amish adults who had either been diagnosed with type 2 diabetes or were members of their extended family. While Hsueh et al. found a prevalence rate of diabetes in the Amish at approximately half
of the rate of the general Caucasian population, they also discovered a significant familial clustering of type 2 diabetes and its related traits. The AFCS is an ongoing descriptive study that is examining the effect of environmental and genetic risk factors in the development of coronary artery calcification (CAC) in the Amish. A total of 519 participants over the age of 40 years were enrolled in the study between March 2002 and June 2005. Researchers determined that the Amish have significantly higher levels of CAC when compared to another non-Hispanic white population (Bielak et al., 2007). The HAPI longitudinal study was initiated in 2002 to measure the cardiovascular response to interventions affecting cardiovascular risk factors and to also identify the genetic and environmental determinants of these responses. The sample included 868 healthy Amish participants over the age of 20 years (Mitchell et al., 2008). The results suggested that genes can play a significant role in responding to environmental influences that affect cardiovascular response.

**Genetic Studies**

Because of the Amish closed cultural system and their ability to track their ancestral heritage, researchers have discovered that the Amish can provide an ideal control population to examine genetics. One such descriptive study was conducted with Gitelman’s Syndrome, caused by loss of function in the Na-Cl salt balance, to determine if an alteration in the net salt balance alters blood pressure (Cruz et al., 2001). The researchers indicated that an inherited abnormality in the renal system with this salt balance could lower blood pressures in humans, indicating a role of renal function in the development of hypotension. Lee et al. (2001) used two Amish/Mennonite families in their genetic study of sitosterolaemia, a sterol absorption abnormality that results in premature atherosclerotic disease with normal or only mildly elevated cholesterol levels.
While attempting to narrow down the gene responsible for this disease, the researchers uncovered a founder effect in the Amish/Mennonite population, who brought the gene to the U.S. in the 17th century.

The following descriptive genetic studies were conducted on data obtained from AFDS, which allowed these researchers to explore previously unknown effects of genetics on cardiovascular health. Hsueh, Mitchell, Schneider et al. (2000) conducted a genome wide scan that determined there was a genetic influence in systolic and diastolic blood pressures in the Amish, and that blood pressure variations in the Amish had a significant familial component. The results provided evidence of a gene on chromosome 2 that influenced blood pressure variations. The researchers suggested the Amish are ideal participants in blood pressure genetic studies due to a smaller number of genetic variations in the culturally homogenous group making their trait differences easier to detect. Roberts et al. (2007) explored the relationship in the Amish with the \textit{SCARB1} receptor gene, which has been directly linked to lipid levels and BMI, and determined that there was an association (P = 0.04 and P <0.001) between this gene and significantly higher HDL-C levels in women under the age of 50, but not in men or older women. This was potentially attributed to the interaction of estrogen and the \textit{SCARB1} gene. Wang et al. (2009) identified a variant of the \textit{STK39} gene that influenced blood pressure by altering the excretion of sodium. Pollin, Hsueh et al. (2004) discovered that all lipid traits in the Amish exhibited moderate heritability (total serum cholesterol, 0.63 mg/dl ± 0.11; HDL-C 0.54 mg/dl ± 0.08; triglycerides 0.37 mg/dl ± 0.08; LDL-C 0.62 mg/dl ± 0.10; all P < 0.0001), but failed in this study to locate a specific loci at the genome-wide level at a statistically significant level. A follow-up study (Pollin, Damcott, et al., 2008) identified that a deficiency of \textit{APOC3}, which normally inhibited triglyceride hydrolysis,
had been found in 5% of the Lancaster Amish. Those with lower levels of \textit{APOC3} had lower fasting and postprandial triglyceride levels, higher HDL-C, and lower LDL-C, indicating a cardioprotective effect. More studies are indicated to further identify how this finding can impact CVD health.

Platte et al. (2003) examined the gene associated with BMI in the Amish. The researchers calculated the heritability of BMI in the sample ranged from \( h^2 = 0.16-0.31 \) and from \( h^2 = 0.40-0.52 \) for BMI-percentile. The results suggested a region on chromosome 7q that was strongly (\( P \leq 0.001 \)) associated with BMI and the structural locus for leptin, a hormone that regulates appetite that has also been associated with the development of hypertension and atherosclerosis (Yang & Barouch, 2007). Steinle et al. (2005) failed to identify if a mutation in the ghrelin gene influenced eating behaviors, which could result in higher BMI's, but in a study conducted in 2002 (Steinle et al.), it was determined that eating behavior in the Amish was genetically linked (\( h^2 = 0.28 \pm 0.09 \) for restraint, \( h^2 = 0.40 \pm 0.10 \) for disinhibition, and \( h^2 = 0.23 \pm 0.09 \) for hunger [\( P < 0.001 \)].) Rampersaud, Mitchell, et al. (2008) replicated the association of genetic variants and obesity-related traits, but also noted that the findings suggested a strong moderating effect of physical activity on the negative effects of the genetic variants.

Two correlational studies (McArdle, Dytch, et al., 2007; McArdle, Rutherford, et al., 2008) examined the influence of genetics on blood pressure, and results indicated that systolic blood pressure is almost entirely under genetic control. Specific genetic areas were identified on chromosomes 2, 4 and 18 and the role of nicotinic acetylcholine receptors on chromosome 2q indicated a role in systolic blood pressure regulation. These results were replicated with the Framingham Heart Study and a second Amish data set. Roy-Gagnon (2008), as part of the HAPI Heart Study, added to the knowledge of
heritability and blood pressure regulation by indicating that 12-25% of total blood pressure response is attributed to genetic effects. An additional study that resulted from the HAPI Heart Study (Post, Shen, Damcott et al., 2007) was a descriptive replication study that evaluated the association between the NOS1AP gene and the QT interval and estimated its heritability in the Amish. The research indicated that the QT interval is moderately heritable ($h^2 = 0.50 \pm 0.09$) in this culture and validated the association between this gene and the QT interval.

As can be seen, the research conducted on the Amish has added to the depth and quality of knowledge regarding the impact of genetics on CVD and its risk factors. This information provides foundational knowledge that can ultimately tailor treatment therapies for cardiovascular disease and its associated risk factors for all cultures. A limitation to these studies is all were conducted on the same Amish population in Lancaster County, PA. Lack of variability in the Amish research sampling impacts the generalizability of the findings to the remaining Amish population and those outside of the Amish culture. Due to the extended use of nearly the same participants in all of these published reports, most authors provided limited description of their sample demographics and the sampling methods used. Fully understanding these basic components of the research studies requires the reader to locate and read previous articles that provided more detail about these procedures.

*Levels of Physical Activity and Body Mass Index (BMI)*

Bassett et al. (2004) examined the physical activity level of Amish from Ontario, and found that males averaged 18,425 steps/day and had 10 hours of vigorous activity and 42.8 hours of moderate activity/week, while females averaged 14,196 steps/day, and 3.4 hours of vigorous activity and 39.2 of moderate activity/week, indicating activity
levels much higher than the non-Amish. The results also indicated that 25% of males and 27% of females in their study of 98 adults were overweight, while no males and only 9% of females were obese. According to the most recent data published by the CDC (2007), the prevalence of overweight adults (BMI ≥ 25.0 kg/m²) was 66.2% while 32.9% were obese (body mass index [BMI] ≥ 30.0 kg/m²). Steinle, Pollin, et al. (2005) discovered in their study of 856 Amish from Lancaster County, PA, the average BMI of males was 26.5 ± 0.9 kg/m² and the female average was 28.0 ± 0.3 kg/m², while Hsueh, Mitchell, Schneider, et al. (2001) reported that BMI levels in Amish males and in young females were comparable to the overall U.S. white population, while older Amish females, over the age of 40, had mean BMI levels 1-2 kg/m² higher than US white females in the same age group. Steinle, Hsueh, et al. (2002) found that the Amish had a decreased stigmatization of obesity and that being overweight was more likely to be socially accepted within the Amish culture, leading to decreased societal pressure to maintain a lower weight and conform to the accepted social norm.

While three of the four studies that examined physical activity and/or BMI in the Amish were conducted on similar participants from AFDS, the BMI results and the prevalence of overweight and obese Amish differed between studies, and were also different from Bassett et al.’s findings. A difference in employment may account for the difference between the Ontario study findings and the AFDS findings. Ontario’s Amish are employed primarily in farming, while the Lancaster Amish are known as one of the most progressive Amish communities, and have moved towards the greater use of technology (Kraybill & Nolt, 1994) and many are employed in small industries, and not solely farming. In addition, Bassett et al.’s research was conducted during the spring planting season, in which the activity levels of the Amish may have been much higher
than their normal activity levels. Bassett et al.'s descriptive cross-sectional study would have been strengthened by using a comparative group to contrast activity and BMI levels in that region and would have also been stronger by adding an analysis of dietary intake.

Biochemical

Omentin, a secretory protein that is linked with visceral obesity (which is strongly associated with type 2 diabetes mellitus, CVD, hypertension and hyperlipidemia), was studied by de Souza et al. (2007) as part of the AFDS study. It was determined that omentin levels were significantly higher in the lean group (0.37 ± 0.02 μg/ml, n = 39) than in the overweight group (0.31 ± 0.02 μg/ml, n = 30, P = 0.0009) and the obese group (0.31 ± 0.02 μg/ml, n = 22, P = 0.009). Women were discovered to have higher levels of circulating omentin levels than men (0.36 ± 0.03 vs. 0.31 ± 0.02 μg/ml, P = 0.03), but had a wider range of BMIs in this study.

Mitchell et al. (2008) conducted a quasi-experimental study that included exposing the study sample to four interventions (high fat challenge, cold pressor test, dietary salt intervention and low dose aspirin therapy) to determine the body's response to interventions designed to mimic long term exposures known to affect cardiovascular health. The data revealed great inter-individual variations to the same standardized responses when examining postprandial triglycerides, platelet aggregations and blood pressure changes, which could lead to the development of individualized treatment modalities for CVD prevention.

Again, both of these studies were conducted on participants that lived in the Lancaster County, PA area, which may limit the generalizability of the results to Amish who live in other areas of North America. The Mitchell et al. (2008) study was one of the
few interventional studies conducted in this Amish population, which is leading to additional quasi-experimental studies that are in progress.

**Calcification**

The AFCS participants were used to characterize the risk factors for coronary artery calcification (CAC) and aortic calcification (AC). Post, Bielak, et al. (2007) found that the CAC prevalence rate was higher in males than females (55% vs. 41%; P < 0.0001), but no significant difference was found with AC (males 51% vs. females 56%; P = 0.95). It was determined that CAC and AC were both moderately heritable in the Amish ($h^2 = 0.27 \pm 0.17$ [P = 0.04]; and $h^2 = 0.55 \pm 0.18$ [P = 0.0008], respectively). A descriptive correlational study conducted by Rampersaud, Bielak, et al. (2008) sought to estimate the genetic and environmental influence to CAC and carotid artery intima-media thickness (CIMT). The researchers determined that similar genes influence variations in CAC and LDL cholesterol levels, whereas a different set of genes influence CIMT.

When the relationship between vascular calcification and bone mineral density was examined, it was found that the Amish with a history of CVD had a significantly lower bone mineral density in the hip, but not the spine (P = 0.003) (Shen et al., 2007). In addition, Shen et al. did not discover evidence of shared genes that impacted both bone and vascular calcification. Bielak et al. (2008) also did not discover a prevalence difference in CAC between the Amish and a non-Hispanic comparison group. The study by Post et al. is reflective of calcification findings that have been previously published (Dixon, Lawrence, & Mitchell, 1984), but there are no studies about peripheral vascular disease, indicating an area for future research. The Post, Bielak, et al. (2007) and Bielak et al. (2008) studies did not include any subjects with a history of CVD, so there is no known data about the relationship between AC and CAC for those who are most likely to
be diagnosed with it. Rampersaud, Bielak, et al. (2008) limited their examination to men
greater than 40 years old (mean = 59.1 years) and women over 50 years (mean = 63.1
years), which may also limit the generalizability of the findings to a younger sample.
These studies point to many gaps in the research examining arterial calcification in the
Amish, including the study of peripheral vascular disease in the Amish, examining CAC
and AC in those with a history of cardiac disease and those of a younger age.

Lifestyle

Hsueh, Mitchell, Schneider, Wagner, et al. (2000) reported that fewer than 3% of
the Amish smoke, but Post, Bielak, et al. (2007) noted that 20% of men in their study
reported that they were smokers (primarily pipes and cigars). It is interesting that both of
these studies were conducted in Lancaster County, PA. Ferketich et al. (2008) studied
the Amish in Holmes County, OH, and noted that even though the prevalence of smoking
was still significantly lower than the general population (17.6% vs. 38.8%), their findings
were consistent with the findings reported by Post, Bielak, et al. Post, Bielak, et al. also
noted that few Amish reported using blood pressure or cholesterol-lowering medications
(5.7% and 3.6%, respectively); while Miller et al. (2007) stated that only 8.3% of female
Amish use prescription medications (compared to 45.2% of the female general
population).

A population-based study conducted by Miller et al. (2007) on Amish women
under the age of 40 in Lancaster County, PA indicated that Amish females self-reported
higher prevalence of blood clots (3.1% vs. 1.1%) and thyroid problems (12.8% vs. 6.6%)
when compared to their U.S. counterparts, but lower prevalence of anxiety or depression
(10.2% vs. 28.9%), hypertension (7.6% vs. 10.8%) and hyperlipidemia (4.5% vs. 9.7%).
The Amish women also reported fewer sources of stress and higher amounts of social support than other women.

The descriptive lifestyle studies conducted in Lancaster County, PA were based on self-reported data, while the smoking prevalence study conducted in Holmes County, OH results were confirmed with salivary cotinine levels, confirming a higher smoking prevalence than many may have suspected in the Amish population. The Ferketich et al. (2008) study was conducted as a follow-up to a cancer incidence study, which may have led to increased risk awareness which resulted in lowered smoking prevalence in this sample. Another issue with the Ferketich et al. study was not all data was obtained confidentially, occasionally other family members were in the room when the smoking prevalence questions were asked. This may have contaminated the responses given when asked about past tobacco use, especially if the Ordnung of that church district would forbid tobacco use. These findings indicated that smoking and its risk in development of CVD may be underestimated in the Amish (possibly due to an etic cultural assumption that the Amish do not smoke) and the incidence of early cardiovascular disease may be undetected.

**Indications for Future Research**

As can be seen, cardiovascular research on the Amish has focused on genetic characteristics and the Amish in Pennsylvania. Pursuing research on the non-genetic factors that influence CVD and sampling the Amish outside Pennsylvania is needed in future research. The Amish have been used for genetic studies, but few have examined the impact of their distinct lifestyle on their cardiovascular risk. There are no studies available that explore Amish attitudes and preventative health practices for CVD. The Amish use many alternative therapies, including herbal medications, but there are no
published research studies that describe the use of these remedies and the Amish perceptions of their effectiveness. Quantitative and qualitative studies that explore distinct health practices and beliefs are necessary to further understand the Amish culture and identify any health care needs.

Clinical Implications

The cultural distinctness of the Amish provides health care providers with challenges that are different than most other populations. Some health care decisions may be based on the *Ordnung* (which would vary depending on the church district), social support from the community, financial considerations, and perceived trustworthiness of the health care provider (Helmuth & Schwartz, 2008). While the Amish are not adverse to modern health care, they use it with the understanding that God is the healer and they must succumb to God’s will. Health care providers will need to take the Amish cultural context in consideration when assessing, diagnosing, and treating CVD to fit within the Amish socioreligious context (Wenger & Wenger, 2003).

Access to Care

The Amish live in tight communities in rural areas of the country. Their primary means of transportation are the horse and buggy and the bicycle. A trip into town to see the doctor requires a considerable time commitment. If a visit to a specialist or extensive testing is required, then the Amish must find an “English” neighbor to transport them into a major city for the visit. If an emergency occurs in the home, the Amish do not have telephones in their houses, so they must find a phone booth that is located along the roads in Amish country, or they must find an English neighbor that lives close in order to call for help. This delay in their ability to receive prompt medical treatment would have negative consequences during an emergency, such as chest pain. Health care providers
need to keep this in mind when emergency treatment is sought, and consideration of the
difficulties that must have been encountered to even get them to the health care provider
must be remembered. Admonishing the patient or the family for a situation that is out of
their control does nothing to change or improve the situation.

Healthcare Insurance

Most Amish do not accept traditional health care insurance, nor do they
participate in Medicare or Medicaid. In some areas, the Amish have contracted with the
local hospital and health care providers for discounted rates in exchange for payment in
cash. If a single family is unable to pay a large medical bill on their own, the Amish
church leaders will organize the family's church district and other districts to help pay off
the bill entirely. A church leader may decide the portion to be paid by each family in the
district (Helmuth & Schwartz, 2008). The Amish also may conduct fundraisers to help
support a family in need. The Amish feel that they have a moral obligation to help their
neighbors and to share their burdens (Olshan, 1994). Health care providers need to be
cognizant of the expense of health care testing and treatments when they are
recommended to the Amish.

Diet, Activity, Smoking

The Amish diet is high in fat and sweets, with most afternoon and evening meals
consisting of a meat, noodles, bread, vegetable and a dessert. Most families still grow or
raise much of their food, but this trend is changing as farm land is becoming scarce and
the adults are working in industries in town (Wenger & Wenger, 2003). The Amish still
employed in the traditional role in agriculture remain highly active (Bassett et al., 2004),
but those who are working in town are most likely less active, although no research
studies have been conducted that compare those Amish employed in the traditional roles versus those in more modern roles.

While typically the Amish have not been considered smokers, the study by Post, Bielak, et al. (2007) illuminated that 20% of their population reported smoking, similar to the national prevalence rate of 20.8% (CDC, 2008). Health care providers must remember to ask their Amish clients if they smoke and teach them of the risks. Educating about foods and diet needs to be directed towards the females, since this is the primary responsibility of the women in the household. Recommending an abrupt change in the diet will most likely not be heeded, but suggestions of how to change the diet in small ways to make it more healthy can add up to a significant impact on the health of the family. The Amish typically do not exercise to remain healthy, but attain their physical activity from working. If a health care provider knows that a client has changed to a sedentary role, then the client will need to be educated on the benefits of exercise. It is important to remember that the Amish do not have televisions in the home, or access to the many ways that the general population is educated about healthcare issues. It cannot be assumed that the Amish know something that others may consider common knowledge.

Role of Nursing

Nurses must be knowledgeable of the Amish culture, respect their healthcare practices and work within their cultural beliefs in order to establish the trust that will be the cornerstone of the nurse-client relationship. Being the Amish advocate and voice in a health care system that they may be unfamiliar and uncomfortable with will help to establish that trust. Any misperceptions that nurses may have need to be discarded, and nurses must realize there are significant differences in the Amish, even from one
community to another. It is acceptable to ask the Amish what they believe or want in a specific situation because they realize that there are significant differences amongst themselves. Education of the Amish should be a top priority. Consideration of their education level (up to the eighth grade), speaking in common terms, and keeping it culturally relevant will be the only way to have a significant impact on this culture. Targeting cardiovascular disease in the Amish requires that healthcare providers establish trust and respect and provide culturally competent care.
References


Appendix B

The Prevalence of Cardiovascular Disease and Associated Risk Factors
in the Old Order Amish of Northern Indiana: A Preliminary Study

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Abstract

**Background:** The Amish are a culturally distinct religious sect who are the fastest growing rural group in the U.S. Little is known about their prevalence of cardiovascular disease (CVD) and its risk factors of the Amish. The purpose of this study was to determine the prevalence rates, risk factors, and types of treatments used to prevent and treat CVD among a sample of the adult Amish in northern Indiana. **Methods:** A randomized retrospective chart review (n = 200) from a primary healthcare clinic in a large Amish settlement was conducted. Descriptive statistics were used to determine prevalence rates of CVD, risk factors, and types of medical and alternative health treatments. Prevalence rates were compared to white prevalence rates of the American Heart Association (AHA) 2009. **Results:** The overall CVD prevalence was higher among Amish men (n = 105) and women (n = 95) compared to white men and women (38.1% and 44.2% vs. 37.2% and 35%, respectively). Regarding CVD risk factors, there was a higher prevalence of hyperlipidemia when compared to AHA prevalence rates (22.9% and 24.2% vs. 16.1% and 18.2%) but a lower prevalence of Type II diabetes mellitus (4.8% and 5.3% vs. 6.7% and 6.0%) and smoking (9.5% and 2.1% vs. 24% and 20%). Obesity was prevalent with 73.7% of males (n = 19) and 100% (n = 11) of women were overweight or obese. An additional finding was the high prevalence of depression in both Amish genders compared to rural Americans (19.0% and 22.1% vs. 6.1% both genders) and anxiety (11.4% and 14.7% vs. 3.6% and 6.6%). The Amish use a wide variety of vitamins and herbal remedies along with prescription medications to prevent and treat CVD. **Conclusion:** CVD and its associated risk factors are a concerning health problem in the Amish of northern Indiana.

**Key words:** Amish, cardiovascular disease, risk factors, Indiana
The Prevalence of Cardiovascular Disease and Associated Risk Factors in the Old Order Amish of Northern Indiana: A Preliminary Study

The Old Order Amish are a culturally distinct rural population in which little is known about cardiovascular disease (CVD) prevalence. The Old Order Amish (hereafter referred to as the Amish) are the fastest growing rural group in the U.S. (Armer & Radina, 2002) and at their current growth rate of 5% a year, the Amish population is expected to double in 14 years (Elizabethtown College, 2010). There are 427 different settlements located in over 28 states and in Ontario, Canada. The Amish population in the U.S. totals over 249,000, with two thirds of all Amish living in Pennsylvania, Ohio and Indiana (Elizabethtown College, 2010).

The Amish are a closed religious community who live in church districts closely monitored by the local bishop and community members. They typically do not continue formal schooling after the eighth grade, and those educated in parochial schools do not study science. Using natural remedies and seeking care from non-traditional healthcare providers are common in this culture. The Amish are more likely to use alternative and complementary medicine as a first attempt at resolving health issues and only seek modern healthcare if initial attempts fail (Graham & Cates, 2006). They often fall victim to fantastic claims of natural cures by alternative drug companies who target this culture’s desire to remain as ‘natural’ as possible (Schwartz, 2002). The Amish lifestyle is different from other rural Americans due to their resistance to using technology, their reliance on God’s will above all things, and their use of old world health knowledge and remedies (Graham & Cates, 2006; Kraybill, 2003). As a result of these unique beliefs, behaviors and health care practices, the prevalence of CVD amongst the Amish may not be accurately reflected in national statistics.
The Amish resist the use of technology, and do not have electricity or telephones in their homes. They must rely on telephone booths placed in central locations close to other Amish homes to call for assistance. Their primary modes of local transportation are the bicycle and the horse and buggy. The ‘English’ (their emic term for the non-Amish) assist with travel if longer distances are required. The Amish do not obtain commercial health insurance and all health care costs are paid in cash by the family. If the costs are more than a single family can afford, the Amish church district(s) assist with the medical bills. Paying all CVD expenses out-of-pocket can have a significant impact on the health, as well as the finances, of the Amish community. Improving health and preventing long term complications of CVD can significantly impact the entire Amish community.

Little is known about Amish CVD prevalence compared to other rural Americans. Furthermore, there are no known studies that have specifically examined Amish cardiovascular preventative healthcare practices or use of alternative treatments to prevent or treat CVD. There are no known published cardiovascular research studies of the Amish in northern Indiana. Therefore, the primary purpose of this closed retrospective chart review was to determine the prevalence of CVD and its associated risk factors in a sample of Amish in northern Indiana. A secondary aim was to describe the types of medical and alternative treatments used to prevent and treat CVD.

**Literature Review**

To date, most of the published research on the Amish and CVD has been the result of large cross-sectional descriptive studies carried out at the Amish Research Clinic in Strasburg, PA (Bielak et al., 2008; Hsueh, Mitchell, Aburomia et al., 2000; Mitchell et al., 2008). The Amish have been an attractive population for genetic studies of CVD.
They are similar culturally, intermarriage within the culture is the norm, and their
genealogical lines are documented back to the early 1700’s (Platte et al., 2003). They
have large families, and have presumably avoided most of the modern day conveniences
that have increased cardiovascular risk factors. Genetic studies have led to the
identification of specific genes that influence blood pressure (Hsueh, Mitchell, Schneider
et al., 2000; McArdle et al., 2007; McArdle et al., 2008) and obesity (Hsueh, Mitchell,
Schneider, 2001; Platte et al., 2003; Rampersaud, Mitchell et al., 2008; Steinle et al.,
2002; Steinle et al., 2005; Wang et al., 2009). In addition, these primary studies have
found that lipid levels (Pollin et al., 2008; Pollin et al., 2004, Roberts et al., 2007),
prolonged QT intervals (Post, Shen et al., 2007) and arterial calcification (Post, Bielak et
al., 2007; Rampersaud, Bielak, et al., 2008; Shen et al., 2007) are heritable in the Amish.
Bielak et al. (2008) compared Amish from Lancaster County, PA, with a non-Hispanic
white population and found that the Amish, after adjusting for cardiovascular risk factors,
had a 66% greater coronary artery calcification than their comparison group.

Only two studies published in the last ten years examined CVD and its risk factors
in the Amish outside of Pennsylvania. Bassett et al. (2004) characterized the level of
physical activity in the Amish of Ontario, Canada, and found the population, who were
primarily farmers, was very active and had lower rates of being overweight or obese than
the general population. Ferketich et al. (2008) determined tobacco use in the Amish of
Holmes County, Ohio, was significantly lower than the general population as confirmed
with salivary cotinine levels (17.6% vs. 38.8%).

Research examining the Amish and CVD is needed to better understand this
distinct settlement of Amish in northern Indiana. Previous studies have concentrated on
the Amish in Lancaster County, PA and have primarily examined how genetics affect CVD or its risk factors. There is no known research of the Amish located outside of Pennsylvania that has explored the prevalence of CVD and its risk factors. It is unknown if the Amish in Indiana differ significantly from the Amish in Pennsylvania. Furthermore, the types of traditional or alternative treatments used to prevent/treat CVD have not been explored. Therefore, the purpose of this retrospective study was to determine the prevalence rate of CVD and its associated risk factors among a sample of Amish in northern Indiana. In addition, the researchers explored the types of medical and alternative treatments used to prevent and treat CVD.

**Methodology**

**Sample**

This retrospective patient chart review was conducted at a primary health clinic in a large Amish settlement in northern Indiana. Charts were selected for analysis if the client was Amish, 18 years or older and was seen within the past two years at the clinic. Two hundred charts were selected randomly using an electronically generated random number table. If a chart was designated that did not meet the inclusion criteria, it was replaced and the next chart alphabetically was pulled until all inclusion criteria were met.

**Procedure**

Approval was obtained from the appropriate Institutional Review Board and the Medical Director of the clinic prior to data collection. All data was collected in December 2008. Demographic data collected from the charts included: age; gender; type of employment; self-reported family history of CVD; tobacco use; presence of hypertension, anxiety, depression, hyperlipidemia, angina, peripheral vascular disease,
congestive heart failure (CHF), and coronary artery disease; history of myocardial infarction, cerebrovascular accidents (CVA), and types of cardiovascular surgeries. Height and weight were recorded if both were located in the chart. All medications and treatments noted in the chart (traditional and alternative) were recorded. Race and education data were not collected since all Amish in this northern Indiana region are Caucasian and typically have an eighth grade education. Information was self-reported or documented by the health care provider. For classification purposes, CVD included those with a history of CVA, CHF, hypertension and/or hyperlipidemia, while coronary heart disease (CHD) included those with coronary arterial calcification and/or a myocardial infarction.

Data was collected using an instrument developed by the principal investigator and was later entered into an Excel spreadsheet. Data was validated by a comparison between the chart data and the spreadsheet to ensure accuracy. Data was analyzed using descriptive statistics to quantify the demographic data, prevalence of CVD and its risk factors, and the types and quantity of treatments utilized.

Results

The sampling of 200 charts included 105 males and 95 females ages 18 to 89 years (Table 1). The mean age of males was 45.35 ± 18.34 years and females 47.83 ± 20.14 years. The males were primarily employed in manufacturing (33.3%) and small business (40.0%), with only 16.2% with farming as their source of income. The women were mostly homemakers (74.7%).
Table 1. Demographic Data

<table>
<thead>
<tr>
<th>Employment</th>
<th>Male</th>
<th>Female</th>
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<tr>
<td></td>
<td>n = 105</td>
<td>n = 95</td>
</tr>
<tr>
<td>Age (Yr)</td>
<td>45.35 (SD 18.34)</td>
<td>47.83 (SD 20.14)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>35 33.3%</td>
<td>5 5.3%</td>
</tr>
<tr>
<td>Sm Business</td>
<td>42 40.0%</td>
<td>15 15.8%</td>
</tr>
<tr>
<td>Homemaker</td>
<td>0 0.0%</td>
<td>71 74.7%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>17 16.2%</td>
<td>1 1.1%</td>
</tr>
<tr>
<td>Teaching</td>
<td>0 0.0%</td>
<td>2 2.1%</td>
</tr>
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<td>Construction</td>
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<td>0 0.0%</td>
</tr>
<tr>
<td>Religion</td>
<td>3 2.9%</td>
<td>0 0.0%</td>
</tr>
<tr>
<td>Not Stated</td>
<td>3 2.9%</td>
<td>2 2.1%</td>
</tr>
</tbody>
</table>

Body mass index (BMI) was only calculated on 30 of the charts (19 males and 11 females) due to absence of height measurements in the remaining charts (Table 2). The BMI for the males ranged from 17.3 to 42.3 kg/m² with a mean of 28.8 kg/m², and the females ranged from 25.1 to 43.2 kg/m² with a mean of 35.1 kg/m². Compared to the World Health Organization guidelines (2009) only 26.3% (5/19) of the males were considered underweight or of normal weight (BMI < 24.9), while 26.3% (5/19) were considered overweight (BMI > 25 and < 30) and 47.4% (9/19) were considered obese (BMI ≥ 30). The BMI rates for females were even greater, with no females at normal weight, 27.3% (3/11) were overweight and 72.7% (8/11) were considered obese.

Table 2 Body Mass Index Characteristics

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<thead>
<tr>
<th>BMI: kg/m² (n = 30)</th>
<th>Male (n = 19)</th>
<th>Female (n = 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RANGE</td>
<td>17.3 - 42.3</td>
<td>25.1 - 43.2</td>
</tr>
<tr>
<td>MEAN BMI</td>
<td>28.8</td>
<td>35.1</td>
</tr>
<tr>
<td>MEDIAN BMI</td>
<td>29.5</td>
<td>36.1</td>
</tr>
<tr>
<td>NORMAL WT</td>
<td>5 (26.3%)</td>
<td>0</td>
</tr>
<tr>
<td>OVERWEIGHT</td>
<td>5 (26.3%)</td>
<td>3 (27.3%)</td>
</tr>
<tr>
<td>OBESE</td>
<td>9 (47.4%)</td>
<td>8 (72.7%)</td>
</tr>
</tbody>
</table>

BMI = Body Mass Index
A family history of CVD was noted in 34.5% of the charts, hypertension was documented in 32.5% and type II diabetes mellitus in 29.5%. Only 6.5% of the charts documented a family history of hyperlipidemia and another 6% noted a family history of depression, which did not correspond to the actual prevalence rates noted in this sample.

When comparing males to females, CVD was in 38.1% and 44.2% (CI 34.2% to 47.8%) of the charts respectively, while CHD prevalence was only noted in 1.9% and 4.2% (CI 0.6% to 5.4%). CVA’s were documented in 4.8% of the males and 5.3% of the females (CI 2.0% to 8.0%) while hypertension was noted in 22.9% and 31.6% (CI 20.8% to 33.2%), respectively. Hyperlipidemia was reported in 22.9% of the males and 24.2% of the females (CI 17.6% to 29.4%), although CHF rates (1.0% and 3.2%, CI 0.1% to 3.9%) and myocardial infarction rates (1.9% and 4.2%, CI 0.6% to 5.4%) were much lower. Type II diabetes mellitus was found to be at 4.8% prevalence in males and 5.3% in females (CI 2.0% to 8.0%), while hypothyroidism was found in 8.6% and 20% (CI 9.2% to 18.8%), respectively. Smoking rates were low at 9.5% (males) and 2.1% (females) (CI 2.7% to 9.3%). Interestingly, depression was found in 19% of males and 22.1% of females (CI 14.9% to 26.1%), while anxiety was diagnosed in 11.4% and 14.7% (CI 8.3% to 17.7%), respectively. The preliminary prevalence data and comparative statistics are located in Table 3. Various cardiovascular surgeries were noted, including two coronary artery bypass grafts, two pacemakers, and a total of six valve replacements in three patients. In addition, one person had been diagnosed with Marfan’s Syndrome, one with Von Willebrand’s Disease and one with Factor V gene mutation.
This sample of Amish used many low cost prescription and alternative medications. The males used 53 different prescription drugs and 73 different alternative drugs, while the females used 67 different prescription medications and 84 different alternative medications. Hydrochlorothiazide was the most common anti-hypertensive used by both genders, while both groups also commonly used aspirin for cardiac prophylaxis and levothyroxine sodium for hypothyroidism. Many vitamins and herbal supplements were documented without specific purposes noted. The most common taken by males were vitamin C, saw palmetto, flaxseed oil, “Body Balance” and calcium, while the women most commonly used calcium, vitamin E, a multivitamin, glucosamine and flaxseed oil.
Table 3  Prevalence and Comparative Statistics

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>Difference</th>
<th>Men</th>
<th>Women</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amish (n=105) %</td>
<td>National Average %</td>
<td>Difference</td>
<td>Amish (n=95) %</td>
<td>National Average %</td>
<td>Difference</td>
</tr>
<tr>
<td>CVD</td>
<td>38.1</td>
<td>37.2</td>
<td>+0.9</td>
<td>44.2</td>
<td>35.0</td>
<td>+9.2</td>
</tr>
<tr>
<td>CHD</td>
<td>1.9</td>
<td>9.4</td>
<td>-7.5</td>
<td>4.2</td>
<td>6.0</td>
<td>-1.8</td>
</tr>
<tr>
<td>CHF</td>
<td>1.0</td>
<td>2.8</td>
<td>-1.8</td>
<td>3.2</td>
<td>2.1</td>
<td>+1.1</td>
</tr>
<tr>
<td>MI</td>
<td>1.9</td>
<td>9.4</td>
<td>-7.5</td>
<td>4.2</td>
<td>6.0</td>
<td>-1.8</td>
</tr>
<tr>
<td>CVA</td>
<td>4.8</td>
<td>2.4</td>
<td>+2.4</td>
<td>5.3</td>
<td>2.7</td>
<td>+2.6</td>
</tr>
<tr>
<td>HTN</td>
<td>22.9</td>
<td>32.5</td>
<td>-9.6</td>
<td>31.6</td>
<td>31.4</td>
<td>+0.2</td>
</tr>
<tr>
<td>CV Risk Factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoker</td>
<td>9.5</td>
<td>24.0</td>
<td>-14.5</td>
<td>2.1</td>
<td>20.0</td>
<td>-17.9</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>8.6</td>
<td>5.1</td>
<td>+3.5</td>
<td>20.0</td>
<td>5.1</td>
<td>+14.9</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>22.9</td>
<td>16.1</td>
<td>+6.8</td>
<td>24.2</td>
<td>18.2</td>
<td>+6.0</td>
</tr>
<tr>
<td>DM II</td>
<td>4.8</td>
<td>6.7</td>
<td>-1.9</td>
<td>5.3</td>
<td>6.0</td>
<td>-0.7</td>
</tr>
<tr>
<td>Depression</td>
<td>19.0</td>
<td>6.1</td>
<td>+12.9</td>
<td>22.1</td>
<td>6.1</td>
<td>+16.0</td>
</tr>
<tr>
<td>Anxiety</td>
<td>11.4</td>
<td>3.6</td>
<td>+7.8</td>
<td>14.7</td>
<td>6.6</td>
<td>+8.1</td>
</tr>
</tbody>
</table>

CVD = Cardiovascular Disease                                      CHF = Congestive Heart Failure
CHD = Coronary Artery Disease                                      DM II = Diabetes Mellitus Type II
CVA = Cerebrovascular Accident                                     HTN = Hypertension
CV = Cardiovascular                                                MI = Myocardial Infarction
CHF = Congestive Heart Failure

Discussion

The age and gender distribution of this sample were reflective of the general Amish population, which typically has a larger distribution of younger individuals (attributed to large families) and a smaller distribution of those over the age of 65 when compared to the non-Amish population (Hostetler, 1993). With only 16.2% of this
sample working in agriculture, which was in contrast to Bassett’s sample (2004) from Ontario, it indicated that not all Amish communities are homogenous.

As evidenced in Table 3, this study showed CVD is a health concern in the Amish of northern Indiana. When compared to the 2009 AHA prevalence rates for whites greater than 20 years old, the Amish CVD prevalence was found to be higher in males by 0.9% and females by 9.2%. CHD was found to be lower than national rates (-7.3% in males and -1.8% in females), but this may be due to a lack of receiving expensive diagnostic testing that would accurately diagnose this specific disease. Without medical insurance to pay for diagnostic tests, expensive testing which may be considered routine, is cost prohibitive in the Amish. Additionally, lower than comparative rates of known myocardial infarctions (-7.5% males, -1.8% females) may have represented a lack of diagnosis with electrocardiograms or other diagnostic tests, but may have indicated the possibility that the Amish do not arrive at the hospital in time to be treated for myocardial infarctions. Their distance from a local hospital, their lack of quick transportation, and lack of easily accessible telephones to call for emergency transport would delay help in reaching someone experiencing signs of an infarct.

Depression and anxiety rates in this sample were much higher than comparison samples. With depression rates of 19% in males and 22.1% in females, this was much higher than Probst et al. (2008) study that reported the prevalence rate of depression in rural Americans at 6.11%. Anxiety was significantly higher at 11.4% (males) and 14.7% (females) than Wittchen (2002) reported as a 3.6% prevalence in males and 6.6% in females; while Young et al. (2008) further confirmed that the prevalence rate of persistent anxiety at 4.7%. It is unknown why the depression rates and anxiety levels are so high.
These results were collected at the beginning of the economic downturn in the U.S. and this study location was later to have some of the highest unemployment rates in the nation. These results may have indicated the anxiety and concern over possible changes in the economy.

Study findings indicated that hyperlipidemia was a health concern, but few Amish take prescriptive medications to lower their lipid levels. Even though the prevalence was higher than national rates by 6.8% in males and 6.0% in females, only 4.5% of the Amish were taking prescribed lipid lowering agents. Alternative treatments, such as red yeast rice, grape seed, flax seed oil and green tea, which have been reported anecdotally to improve cholesterol levels, were used, but there was little documentation of laboratory follow-up to ensure improvement of lipid levels. Documentation was noted of nutritional education that was culturally acceptable, which included instructions on eating more fresh fruits and vegetables, increasing fiber and whole grains, and decreasing oil and butter use when cooking. This education was directed at those with hyperlipidemia and those who were considered overweight.

The Amish self-prescribe many alternative herbal medications. Their medical charts did not indicate the intended purpose for taking the herb, and little is known about the effects of them in the body or its interaction with other prescription or alternative medications. These alternatives ranged from common vitamins to more obscure treatments heavily promoted by alternative drug companies. Many Amish choose ‘natural’ remedies over man-made remedies.

Smoking prevalence was much lower in the Amish than in the general population (Centers for Disease Control, 2009). While this finding may be limited with only having
self-reported data, it is consistent with findings from Holmes County, OH (Ferketich et al., 2008) which confirmed low tobacco use. The low prevalence of smoking may indicate a strict Ordnung against the use of tobacco.

The Amish of northern Indiana are primarily employed in small business and manufacturing, not in agriculture, such as in Ontario, Canada (Bassett et al., 2004) which may indicate a less active lifestyle. This shift in type of employment and increased BMI may indicate the Amish of northern Indiana may be more progressive and acculturated to the “English” lifestyle than those who live in more traditional Amish communities, which may lead to increased cardiovascular risk compared to traditional settlements.

Conclusion

This preliminary study is unique as prevalence rates of CVD and its associated risk factors have not been previously reported in the Amish setting in northern Indiana Amish. This study indicated that CVD and its risk factors are health concerns. This group of Amish self-prescribed many alternative treatments, in addition to using a wide range of prescription medications. While the literature identified gaps in what is known about CVD prevalence data, particularly of the Amish of northern Indiana, this preliminary study begins to fill the gap and provides direction for research needed in the future.

The knowledge of this population’s cardiovascular health care practices is limited by the data found in the retrospective chart review and that some data was self-reported. In addition, since BMI was only calculable on a small number of charts, this data needs confirmation with a larger sample size. While many alternative treatments were noted in the chart, the anticipated effects of these alternatives were not noted. In addition, it is not
known if the Amish perceive CVD as a health problem in their culture. The results of this study indicate the need for further qualitative and quantitative studies to thoroughly investigate the cardiovascular health promotion practices of the Amish of northern Indiana. This knowledge can lead to the development of culturally specific tailored interventions to improve the cardiovascular health of this Amish population.
References


Retrieved from http://www.sciencemag.org/cgi/content/full/322/5908/1702


Leininger's Sunrise Enabler to Discover Culture Care

Leininger's Sunrise Enabler to Discover Culture Care

Focus: Individuals, Families, Groups, Communities or Institutions in Diverse Health Contexts

Generic (Folk) Care

Nursing Care Practices

Professional Care-Cure Practices

Transcultural Care Decisions & Actions

Culture Care Preservation/Maintenance

Culture Care Accommodation/Negotiation

Culture Care Repatterning/Restructuring

Culturally Congruent Care for Health, Well-being or Dying

Appendix D

Informed Consent

Investigator: Deborah Gillum
Contact Information: [Redacted]
Title of Study: Cardiovascular Disease in the Old Order Amish: Beliefs, Knowledge and Preventive Healthcare Practices
Sponsor: Rush University College of Nursing

Subject Information Sheet and Consent Document

Introduction
This form provides you with information so you can understand the possible risks and benefits of participating in this study; so that you can decide whether or not you want to be a part of this research study. Before deciding whether to participate in this study, you should read the information provided on this document and ask questions regarding this study. Once the study has been explained and you have had all your questions answered to your satisfaction, you will be asked to sign this form if you wish to participate.

Why are you invited to participate in this study?
You are being asked to take part in this study because you are an adult member of the Old Order Amish community in Elkhart, Lagrange or Noble Counties in northern Indiana.

Research studies include only people who choose to take part. Please take your time to make your decision and discuss it with your friends, family and/or physician. Remember that your participation is completely voluntary. There is no penalty if you decide not to take part in this study or decide later that you want to stop participating in this research study.

What is the purpose of this study?
The purpose of this study is to learn what the Old Order Amish believe and know about taking care of their heart and how they try to prevent heart disease. Once more is known about these beliefs and practices, educational materials can be developed that are designed for the Old Order Amish culture.

How many people are expected to take part in the study?
Approximately 15 to 20 people will be asked to participate in this study.

What will you be asked to do?
You will be asked to meet with the researcher 2 to 3 times to answer questions about your medical history and how you care for your heart. The times and location of these
meetings will be at your convenience. The meetings will last approximately 60 to 90 minutes.

**How long will you be in the study?**
You will meet with the researcher 2 to 3 times during the winter and/or spring of 2010.

**What are the possible risks of the study?**
Participation in this study involves minimal risk to you. It is possible that you may experience anxiety when answering questions. If this occurs, the interview may be stopped and rescheduled if you desire.

**Are there benefits to taking part in the study?**
There may be no direct benefit to you for participating in this study. Knowledge learned in this study will help health care workers learn what the Old Order Amish do to keep their hearts healthy, which may improve the healthcare that you and others receive. Eventually, this knowledge can help with the development of educational materials that will be designed specifically for the Old Order Amish community. These teaching materials will teach how to be heart healthy and how to decrease heart disease.

**What other options are there?**
You may choose to not participate in this study. If you decide to participate now and you later change your mind, you may choose to stop at any time without fear of retaliation.

**What about confidentiality of your information?**
Records of participation in this research study will be maintained and kept confidential as required by law. Your name will be kept secret and known only to the researcher. All notes from the interview will be coded with a number only, and not your name or any other identifying information.

Confidentiality and disclosure of your personal information is further described in the attachment to this form. The attachment is entitled HIPAA Authorization to Share Personal Health Information in Research (2 pages).

Your identity will not be revealed on any report, publication, or at scientific meetings.

The Rush Institutional Review Board (IRB) will have access to your files as they pertain to this research study. The IRB is a special committee that reviews human research to check that the rules and regulations are followed.

**Will you be paid?**
If you choose to participate in this study, you will receive one $25 gift card from Walmart that will be given to you after your first meeting with the researcher.

**What happens if you experience a research related injury?**
Rush University Medical Center has no program for financial compensation or
other forms of compensation for injuries which you may incur as a result of participation in this study.

**Whom do you call if you have questions or problems?**
Questions are encouraged. If there are any questions about this research study or if you experience a research related injury, please contact: Deborah Gillum at [redacted].
Questions about the rights of research subjects may be addressed to the Rush Research & Clinical Trials Administration Office at [redacted].

By signing below, you are consenting to participate in this research study. You have read the information given or someone has read it to you. You have had the opportunity to ask questions, which have been answered satisfactorily to you by the study personnel. You do not waive any of your legal rights by signing this consent document. You will be given a copy of the signed and dated consent document for your records.

**SIGNATURE BY THE SUBJECT:**

<table>
<thead>
<tr>
<th>Name of Subject</th>
<th>Signature of Subject</th>
<th>Date</th>
</tr>
</thead>
</table>

**SIGNATURE BY THE WITNESS**
I observed the signing of this consent document.

<table>
<thead>
<tr>
<th>Signature of Witness</th>
<th>Date</th>
</tr>
</thead>
</table>

**SIGNATURE BY THE INVESTIGATOR/INDIVIDUAL OBTAINING CONSENT:**
I attest that all the elements of informed consent described in this document have been discussed fully in non-technical terms with the subject. I further attest that all questions asked by the subject were answered to the best of my knowledge.

<table>
<thead>
<tr>
<th>Signature of the Principal Investigator</th>
<th>Date</th>
</tr>
</thead>
</table>

Append
Name of the Research Study:
Cardiovascular Disease in the Old Order Amish: Beliefs, Knowledge and Preventive Healthcare Practices

Name of the person in charge of the Study: Deborah R. Gillum

The word "you" means both the person who takes part in the research, and the person who gives permission to be in the research. This form and the attached research consent form need to be kept together.

We are asking you to take part in the research described in the attached consent form. To do this research, we need to collect health information that identifies you. We may collect the results of tests, questionnaires and interviews. We may also collect information from your medical record. We will only collect information that is needed for the research. This information is described in the attached consent form. For you to be in this research, we need your permission to collect and share this information. We will protect the information and keep it confidential.

We will share your health information with people at the hospital who help with the research. We may share your information with other researchers outside of the hospital. We may also share your information with people outside of the hospital who are in charge of the research, pay for or work with us on the research. Some of these people make sure we do the research properly. The "confidentiality" section of this form (below) says who these people are. Some of these people may share your health information with someone else. If they do, the same laws that this hospital must obey may not protect your health information.

If you sign this form, we will collect your health information until the end of the research. We may collect some information from your medical records even after your direct participation in the research project ends. We will keep all the information forever, in case we need to look at it again for this research study. If you sign this form, we may continue to share the health information collected for this study with the people listed below, without any time limit. This authorization has no ending date.

Your information may also be useful for other studies. We can only use your information again if a special committee in the hospital gives us permission. This committee may ask us to talk to you again before doing the research. But the
committee may also let us do the research without talking to you again if we keep your health information private.

Some studies ask you to accept one of several drugs or treatments, without knowing exactly which one you are being given (a “blinded” study). If you ask to see your health records during a “blinded” study, and if the researcher does not want to let you know which drug or treatment you are being given at that point in the study, the researcher has filled in answers to the following two questions. If this is not a “blinded” study, this paragraph and the following two questions will be crossed out. We cannot do the research if you do not agree to let the researcher hold back this information until the week or date listed below.

What blinded drugs or treatments are offered?

___ None ____________________________ When (in weeks from the start of the study, or as a date) will you be told about the specific drug or treatment that you were given?

___ N/A ____________________________

You do not have to sign this form. If you decide to NOT sign this form, you cannot be in the research study. We cannot do the research if we cannot collect, use and share your health information.

If you sign this form, you are giving us permission to collect, use, and share your health information. You need to sign this form and the attached consent form (both forms) if you want to be in the research study.

If you change your mind later and do not want us to collect or share your health information, you need to send a letter to the researcher listed above. The letter needs to say that you have changed your mind and do not want the researcher to collect and share your health information. If we cannot collect and share your health information, we may decide that you cannot continue to be part of the study. We may still use the information we have already collected. We need to know what happens to everyone who starts a research study, not just those people who stay in it.

CONFIDENTIALITY

We may share your information with other researchers outside of the hospital. We may also share your information with people outside of the hospital who are in charge of the research, pay for, or work with us on the research. Some of these people make sure we do the research properly. For this study, we will share information with:
Any questions? Please ask the researcher or his/her staff. Their phone numbers appear in the attached consent form. You can also call [redacted] at Rush with general questions about your rights and the research use of your health information. The researcher will give you a signed copy of this form.

SIGNATURE, DATE, AND IDENTITY OF PERSON SIGNING

The health information about __________________________ can be collected and used by the researchers and staff for the research study described in this form and the attached consent form.

Signature: ______________________________ Date: ________________

Print name: ______________________________ Legal authority: ____________

Appendix F

Study 09120204-IRB01  Demographics

Code #

Gender:  M  F

Age:

Place of Birth:

Marital Status:  S  M  W

Whom Living With (list how many if applicable):

<p>| | | | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Alone</td>
<td></td>
<td>Sister</td>
<td></td>
</tr>
<tr>
<td>Spouse</td>
<td></td>
<td>Brother</td>
<td></td>
</tr>
<tr>
<td>Son</td>
<td></td>
<td>Grandmother</td>
<td></td>
</tr>
<tr>
<td>Daughter</td>
<td></td>
<td>Grandfather</td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td>Grandchildren</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td>Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>

Last Grade Completed in School: _________  Public  or  Parochial

Was health taught in school:  Yes  No

Occupation for Greatest Part of Life: ____________________________

Present Employment Status:

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Full-time</td>
<td></td>
<td>Part-time</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td>Retired</td>
<td></td>
</tr>
</tbody>
</table>

Present Occupation: ____________________________

Do you read non-Amish newspapers and magazines?  Yes  No

Have you ever read any pamphlets about heart disease?  Yes  No

If so, where did you obtain these pamphlets? ____________________________

What were these pamphlets about? ____________________________

Did you find these pamphlets helpful? ____________________________
Do you smoke?  Yes  No

Have you ever smoked?  Yes  No  When quit?  How much did you smoke?

Have you ever been told by an English doctor or nurse that you have had heart trouble?  Yes  No
   If so, please describe:

Has anyone else ever told you that you might have heart trouble?  Yes  No
   If so, please describe:

Does anyone in your family have heart trouble?  Yes  No
   If so, please describe:

Have you ever been to the hospital because of heart trouble?  Yes  No
   If so, please describe:

Have you ever had any heart surgeries?  Yes  No
   If so, please describe:

How would you rate your health?  Very good  Good  Fair  Poor  Very Poor
   Please explain:
Appendix G

Guiding Interview Questions

Share with me what you do to try to keep (or get) healthy.

How would you describe your heart (or cardiovascular) health?

How would you describe someone who is healthy?

Has your heart health kept you from doing things you want to do? If so, how?

Share with me what you do to keep your heart healthy.

Describe your physical activity during the average day.

Describe your eating habits.

Describe how you rest during the day and at night.

Who do you see about your heart?

Have they helped?

What treatments have they recommended?

Did you try them? If so, what effect did they have? If no, why not?

What prescription medicines do you take? Do they help?

What ‘natural’ remedies do you use? What are they for? Do they help?
Appendix H

Cardiovascular Disease in the Amish: An Exploratory Study of
Knowledge, Beliefs and Healthcare Practices

Deborah R. Gillum, RN, PhD(c), Rush University, Chicago, IL
Bethel College, Mishawaka, IN
Beth A. Staffileno, PhD, FAHA, Rush University, Chicago, IL
Karon S. Schwartz, RN, PhD, Bethel College, Mishawaka, IN
Lola Coke, RN, PhD, ACNS-BC, Rush University, Chicago, IL
Louis Fogg, PhD, Rush University, Chicago, IL

ABSTRACT

The Old Order Amish population is growing, yet little is known about their cardiovascular healthcare practices. This ethnographic study explored their cardiovascular knowledge, beliefs and healthcare practices. This study showed that the Amish have distinct beliefs and practices which affect their cardiovascular health and that culturally appropriate education is needed.

Key Words: Amish, Cardiovascular, Beliefs, Knowledge, Practices
INTRODUCTION

While there have been studies describing Old Order Amish healthcare beliefs\(^1\) and alternative healthcare practices,\(^2\)-\(^4\) we are not aware of any studies exploring Amish cardiovascular disease (CVD) healthcare knowledge, beliefs or practices. The Old Order Amish (hereafter referred to as Amish) do not typically continue formal schooling after 8\(^{th}\) grade, therefore their knowledge of the heart and CVD may be limited and is unknown. In a preliminary study, it was found that CVD and hyperlipidemia prevalence rates were higher among the Amish when compared to their rural counterparts.\(^5\) Developing an understanding of cardiovascular knowledge, beliefs and healthcare practices of this distinct population is the first step in determining the necessity and direction of future cardiovascular health interventions with this culture that may be at risk for heart disease. Therefore, the purpose of this article is to report on findings of a qualitative study that describes the cardiovascular knowledge, beliefs and healthcare practices in the Amish of northern Indiana.

BACKGROUND AND SIGNIFICANCE

The American Heart Association (AHA) estimated that the direct and indirect costs of CVD in 2010 will reach over $500 billion\(^6\). As a culture that does not participate in commercial health insurance, the costs associated with CVD can have a significant impact on the finances of the entire Amish community. Factors which affect the health of the Amish include self-imposed social and technological isolation from the outside world, educational limitations, dependence on indigenous healing, an external locus of control, and resignation to God's will in all things.\(^7\)-\(^11\) While these factors are essential to the
Amish cultural identity, they also impose challenges to health care providers to provide effective cardiovascular care that is culturally congruent.

The Amish live in rural communities and have traditionally shunned the use of most modern technology that might distract members away from the community. Use of technology is selective and depends on the *Ordnung*, the community’s unwritten rules or regulations that specify what is worldly or sinful. They do not have electricity or telephones in their homes, nor do they drive automobiles. They rely on the “English” (the emic term for the non-Amish) to transport them when horse and buggy travel are impractical but travel is deemed necessary.

Lack of basic cardiovascular knowledge may be a significant hindrance to health promotion. Science is not taught in Amish schools, and until recently, textbooks were primarily outdated public school texts from the 1950’s. Even in the current health book for 7th and 8th graders, the chapter on the circulatory system notes:

> Many ailments are blamed on the heart which really have nothing to do with the heart. Fatigue and dizzy spells often come with ear infections. Many chest pains are merely gas pains. Pain from the heart very often comes after undue exertion. It may induce a feeling of great pressure in the chest, or a crushing pain which may extend into the arms. *Cardiac*, or heart, pain is usually under the breastbone.

As the final heart health information that Amish students receive before they complete their formal schooling, this information is troubling because it is outdated and may be indicative of a simplistic view of heart health.

The Amish simultaneously use modern medicine and alternative treatments, along with traditional spiritual and folk care to treat illnesses. Many Amish may be reluctant to discuss alternative and complementary treatments with the “English” if they perceive health care providers are not open to these treatments. Remedies that come from
nature, and therefore made by God, are preferable to man-made medicines. The Amish live a life of *Galassenheit*, which is submission to God’s will by surrendering individuality and putting God and the Amish community before their own needs. *Galassenheit* encompasses the very culture of being Amish and affects what they believe and guides all of their actions.

While some cardiovascular research has been conducted on the Amish, it has concentrated on exploring the genetic components of CVD in the Pennsylvania Amish. While the results of the genetic studies have been enlightening, Amish knowledge of the heart and heart disease, along with their beliefs and health practices to prevent and treat heart disease remains unknown. Improving cardiovascular care in the Amish requires an exploration of their current knowledge, what they believe and what they are doing to protect their hearts. Until this is assessed, it is impossible to move forward in improving culturally competent cardiovascular care with this distinct culture.

**PURPOSE**

The purpose of this research was to conduct a qualitative study to explore cardiovascular knowledge, beliefs and preventive health care practices of the Amish of northern Indiana. The research questions were: (1) What do the Amish know about the heart and CVD? (2) What do the Amish believe about preventing CVD? and (3) What are the preventive healthcare practices regarding CVD in the Amish?

**THEORETICAL FRAMEWORK**

The theoretical framework for this study was Leininger’s Culture Care Diversity and Universality Theory. The theorist stressed examination of cultural and social factors that influence care, along with the ethnohistory of the culture, which are the past events
that help explain lifestyle. Leininger's Sunrise Enabler to Discover Culture Care is a visual depiction of the dimensions of the theory and it serves to guide the health care provider in considering the various influences that affect transcultural care. Generic or folk care is impacted by seven broad factors (technological; religious and philosophical; kinship and social; cultural values, beliefs and lifeways; political and legal; economic; and educational) which then influence and lead to healthcare care decisions and actions. These can ultimately lead to maintaining, negotiating or restructuring health care practices to maintain culturally congruent care.

Leininger's theory has been previously used in studying the Amish's high culture context and the health care beliefs, values and practices of Amish women with breast cancer. Because this theory considers the effect of the many cultural factors that impact healthcare practices of any population, it was ideal to use in this research. This study explored the healthcare practices of a culture that is influenced strongly by their knowledge, values, and beliefs about the adaptation to technology, their religious beliefs, family ties, cultural beliefs and educational level.

METHODS

Design and sample

A qualitative ethnographic exploratory approach was used for this study. The primary researcher spent extended time in the community working as a health care provider; attending social, cultural and educational events; and was a patient of an Amish healer for two years prior to collecting data. The ethnographic method provides a way to gain cultural knowledge by exploring health beliefs, values, practices, ideals and cultural controls that influence lifestyle. A cross-sectional design that used convenience and
purposive snowball sampling resulted in a sample of 15 participants that were representative of varying age groups, gender and history of CVD. The first two initial contacts were obtained through an informal Amish gatekeeper in the community. Inclusion criteria included participants who were Amish, over the age of 18 years, lived in a three county geographical area, and were willing to discuss their cardiovascular healthcare knowledge, beliefs, and healthcare practices. Since the Amish do not have phones in their homes, the researcher used an Amish directory to obtain the addresses of those who were recommended and approached the participants without prior notification. Everyone approached agreed to participate immediately and agreed to follow-up visits for clarification and confirmation of the interviews. Participants received a $25 gift card to Wal-Mart at the conclusion of the first visit.

The sample included 7 females with a mean age of 56.43 (range 34-74) and 8 males with a mean age of 65 (range 31-93). Nine participants were born and lived their entire lives in the three county area, 3 were born in Ohio, 2 in Michigan and 1 in a different Indiana county. Thirteen of the 15 were married and currently living with their spouses, one had never been married and one was widowed. Ten had attended public schools while five had attended Amish-run schools. Thirteen had 8th grade educations, one attended until 9th grade (was forced to leave by the family for fear of receiving too much education) and another left school after 10th grade and obtained a GED. This individual served in the Army National Guard for one year during Rumspringa, the years of ‘sowing wild oats’ before the young adults decide to join the church. None were current smokers, although seven had smoked for a few years in their early 20’s. All remembered that health had been taught in school. Primary employment included
working in a factory (n = 4), farming (n = 3), construction (n = 1), small business (n = 2),
and housewife (n = 5). One participant was also a deacon in the Amish church. Five
answered affirmatively when asked if they had ever been told they had heart trouble, and
7 answered that they did not have heart disease. Four said they had never been told they
had heart trouble, but with further interviewing it was discovered that 1 had hypertension,
1 had congestive heart failure, 1 had a history of a mitral valve replacement secondary to
rheumatic fever and another participant had rheumatic fever when younger. Thirteen of
the fifteen had first degree relatives with 'heart trouble'.

Data Collection

The data collection tools utilized were a personal data sheet, which included
personal and family history of CVD, and an open-ended interview guide. The interview
guide was developed based on Leininger's theory and was verified culturally by local
experts on the Amish. Examples of the questions were:

- Share with me what you do to try to keep (or get) healthy.
- Can you tell me what you know about your heart?
- How would you describe heart disease?

Prior to beginning the study, permission to conduct the research was obtained by
the Institutional Review Board. All participants signed consent to participate in the study
after written and verbal information about the purpose of the study, the voluntary nature
of their participation, and assurances that anonymity and confidentiality would be
maintained.

Since the Amish culture does not typically accept the making of graven images
with photography or audio and visual recordings\textsuperscript{25} (Exodus 20:4-5) and previous
researchers were not allowed to audio record interviews,\textsuperscript{9,22} no audio recordings were taken. Verbal permission was obtained to take hand-written notes during the interviews. Immediately after leaving the interviews, the author audio recorded personal reflections on the interview and wrote copious notes. All interviews were transcribed within 24 hours and no other interviews took place until the previous interview had been transcribed. The author then returned to each participant two to three times to confirm and clarify the information gleaned in the initial and subsequent interviews.

**Data Analysis**

Data was checked for accuracy as it was transcribed through verification of hand written interview notes, reviewing the audio recordings after the interview, and verifying with the field book. All data was transcribed into N-Vivo for analysis and was reviewed by an expert in qualitative Amish research. The four criteria noted by Lincoln and Guba\textsuperscript{26} to establish trustworthiness of qualitative data include: credibility, dependability, confirmability and transferability. Credibility was established by spending extended time in the Amish community to learn and understand the culture from a wide range of people so that questions and statements could be clarified during the interviews. In addition, participants were given the opportunity to assess and confirm the adequacy and accuracy of the data and corrections were made when necessary. Dependability was ascertained by verifying the data obtained during follow-up interviews. Interview transcripts were reviewed and feedback was received from the participants to ascertain accuracy. Confirmability was established by interviewing numerous members of the Amish culture and corroborating the general results with health care providers in the area.
Transferability was provided through a sufficient description of the results so that the findings can be applied to other Amish communities.

RESULTS

To analyze the data, three primary categories (knowledge, beliefs, healthcare practices) were created based on the study’s research questions. Common themes that continued to appear in multiple interviews were placed into categories under the appropriate major topic. Data analysis continued until all further subcategories were identified.

Knowledge

The Amish’s knowledge of heart function and heart disease was limited. Six of fourteen were able to state information that demonstrated basic knowledge, although not always accurately, of the heart. Three participants stated the following about heart function:

- “The heart circulates the blood which brings the body oxygen.”
- “Heart pumps through the left jugular vein and then returns through the carotid.”

Other responses included:

- “If it doesn’t work right, then you have problems.”
- “My heart beats and keeps me alive—but I guess that sounds kind of dumb though.”

Heart disease knowledge varied greatly, but it increased if the participants had a personal cardiovascular history. Answers that indicated higher knowledge levels of heart disease included:
• “When the heart doesn’t pump forcefully enough. Sometimes there is back up from a valve and the fluid goes backwards.”

• “Lots of people think that heart disease is the same as a heart attack, they are not very educated and they don’t realize everything that can go wrong with the heart.”

• “(It) has something to do with the condition of the arteries. The valves don’t open and close properly.”

Responses that indicated a lack of knowledge and an opportunity for education included:

• “It is a disease like a cancer, it eats on it. Maybe it is a fungus that chews away at the heart.”

• “Someone who has heart disease has heart failure. It is a disease that deteriorates the body, like Alzheimer’s and it only gets worse…”

• “Is it the same as cancer?”

• “80-90% of heart attacks are caused by gas backing up.”

Nine of the fifteen had previously read pamphlets about heart disease; three had received information from a local Amish herbalist who consults, recommends and sells herbs and supplements; three received mailings from local hospitals; one from the American Heart Association (AHA); and one from a local Amish advertising mailer. Topics covered in the information included proper nutrition with supplements (n = 2), exercise promotion (n = 1), screening promotion (n = 1) and symptoms of a myocardial infarction (n = 1). Four other participants stated that the educational materials were “almost always trying to sell stuff”, and one noted the local hospital sent her information but “they are head hunters—always looking for people.” Four of the nine participants who received the information found it helpful, but none changed their health behaviors
based on what they had read. One participant noted “I read them and then put them away and didn’t change anything.”

Beliefs

The Amish value good health, and believe that God is the source of it, as indicated by the following quotes:

- “Being healthy is God’s gift. I thank Him for health—He doesn’t owe it to me, not one bit.”
- “You need to depend on a higher power and not worry about things. You need to count on pure faith.”

Keeping a good attitude and a positive perspective was also believed to be important, as described below:

- “People who are grumpy and grumbling are dissatisfied and are often not healthy.”
- “Being deeply in love helps people be happy.”
- “It is important to stay busy … and never hold a grudge.”
- “To me, if he doesn’t have to take medicines or vitamins, eats right and can do anything physically he wants to and has a healthy attitude, meaning not being worried and putting stuff in slots where they belong, then he is healthy.”

Maintaining cultural traditions within the community was considered to be a high priority:

- “There is peer pressure to eat a certain way in the Amish community.”
- “It is hard to change your lifestyle or people want to live the way they were taught or brought up.”
• "Sometimes people are very allergic to change. If things have always been, why would they want to change it?"

Those interviewed did not believe that preventive cardiovascular healthcare practices were taking place or were a priority in the Amish community. Although one participant responded that they believed smoking had decreased in the community, numerous respondents stated that preventing CVD through lifestyle changes does not take priority in the Amish culture. It was noted that a significant health event would need to occur before change would happen. Other responses included:

• "Not enough people think of prevention."
• "Sometimes what you do doesn’t make too much of a difference."
• "A lot of people aren’t interested in watching their diets. I really doubt that people would want to read info about improving their health. They need to have a stroke or a heart attack first before they will listen. You need a motivator. It takes someone getting sick or passing away, then they think about it."
• "Why repair a bridge if it doesn’t break down? Should you fix it before it breaks? You lose a whole bunch of money with check-ups."

When asked how they prevent CVD, participants responded:

• "Movement—you have to move to keep it working and to keep from getting heart disease."
• "You should live life like you eat ice cream—a little bit it is good, but you can’t have too much."
• "Keep priorities straight—put everything in the proper perspective. Try to keep the stress low."
Participants compared the roles of traditional medical health care providers and non-traditional unlicensed providers:

- "People go to (Amish herbalist) if doctors can't get to the root of the problem."
- "They (Amish herbalists) can tell right away what is wrong, medical doctors have to wait for results."
- "Doctors are not taught about nutrition, they just know about drugs."
- "I'm not trying to knock the doctors; I just don't see handing it (money) all over to the doctors after I make it."

The Amish see many traditional and non-traditional health care providers who provide care for their heart. A summary of the types of healthcare providers utilized by this population is located in Table 1. Twelve of the fifteen had seen the same Amish herbalist, who is well respected in providing healthcare in the community. This person was perceived as having the best interest of the Amish as a top concern while suggesting only "natural" herbs and supplements to promote health, which could then be purchased at that clinic. "Natural" cures and medicines were considered to be much better than medicines that were "man-made" in a factory. One participant described going on an herbal supplement manufacturing tour, "even though they said that what they were putting out was natural, everything coming out of there was coming from a laboratory. Nothing natural can come from a laboratory—it has to come from plants or foods. What they were doing was not natural."

**Practices**

While many participants noted they ate a lot of fruits and vegetables, they also acknowledged eating many foods cooked with butter or lard. One stated that he "eats a
lot of fried food, I’m not supposed to, but I keep on doing it”, while another participant stated that “eating bacon and eggs for 1 day is ok, but if I eat them a 2nd day, it gives me chest pain.”

Some Amish were trying to make a healthy change in their cooking habits, but one participant, who had a cardiac history and received nutritional counseling from a dietician, stated:

- “If I fry my food, I use extra virgin coconut oil, it is a lot better for you than olive oil. The dietician at the hospital said it was bad for you, but she didn’t know what she was talking about.”

When health teaching occurs in the Amish community, if it is not similar to long established cultural beliefs, the Amish tend to view the information suspiciously and question its validity.

Keeping the body alkaline was a recurring theme that was identified as a health practice by four participants. To increase alkalinity, the intake of red meat, sugar, and white flour was limited, while fresh fruits and vegetables were increased. Lemons were added to the diet because “once it is inside the body it is no longer acidic, it makes the body more alkaline.” Drinking up to three quarts of green tea and “lots” of water daily also reportedly increased the body’s alkalinity. “Drinking water is really important—you need to keep your pH between 7 and 7.2. Cancer can’t grow in high pH.”

Only one participant intentionally exercised. She stated that she was not able to do her usual work, so she rode her exercise bicycle 2 miles daily. When others were questioned about exercise, they stated that they were busy enough with their work around the house or their jobs and did not need to exercise, as demonstrated by the following:
"I don’t exercise because I am not able, I always work hard enough to not exercise."

"We should live like Adam and Eve—do you know what God told them? He said to make your living by the sweat of your brow, and that’s what we do."

For those taking prescription medications, monthly medications cost many between $200 and $300. All expressed a desire “to go natural” and stop taking the “drugs” if possible. One participant stated “Prescription medicines can cause side effects, so then you have to take more of those medicines.” One also noted that “prescription drugs make a body more acidic, so I need to get off of them as soon as possible.”

Continued monitoring of blood levels of medications or anticoagulant times was also a challenge. One participant discussed the monitoring of his Coumadin:

"I should read what else I could do to use as a blood thinner. Others ask me why don’t I go natural, and I tried for 5 years without getting my blood checked. I just watched how many bruises I had, when I had too many, I would cut back on the pills. Then I finally made a deal with (the doctor). I told them it had to be their move, and they moved. Now they just charge me for the blood test and not for an office visit at the same time."

Alternative medications were used by every participant. A total of 45 different alternatives were noted when participants were asked what supplements were used for their heart health (see Table 2). The Amish started taking these supplements based on advertising, advice from health care providers and supplement stores, or word of mouth from family and friends. When a participant who sold supplements was asked how she suggested herbs for her clients, she stated that she “tries to find something without any side effects. If it doesn’t make you feel good, then you should not take it. None of these
herbs could kill anybody, they aren’t strong enough.” Three participants described continuing to take supplements even though the supplements were not helping or the supplements were making them feel worse. One stated that when he took one supplement, it made him feel sluggish and gave him a headache, but he continued to take it for a year and a half longer because it had an automatic refill and he had received two extra cases that he had paid for. After he discontinued the supplement, he felt much better. When asking another participant if he tells the doctors what supplements he is taking, he answered “No, they don’t tell me everything, so I don’t tell them everything.”

Another participant used raindrop therapy technique as an alternative treatment to promote heart health, which included massaging essence herbs and oils (clove, nutmeg, goldenrod, cypress and ‘aroma life’) on the back to “create a true balance in the body.” This was performed by someone specially trained in this therapy and was suggested by an herbalist in the community.

DISCUSSION

The present research supports the supposition that there is a lack of knowledge regarding heart function and CVD prevention in the Amish community. Additionally, the Amish have distinct cardiovascular beliefs and healthcare practices that affect their diet, activity, choice of healthcare practitioners, and use of complementary and alternative medicine.

The Amish receive little formal education regarding their heart. Some of what is received is outdated, as demonstrated by reviewing the common textbooks used in the Amish parochial schools. Consistent with previous research studies, participants who live in rural settings and who have less than a high school education are associated with
lower cardiovascular knowledge.\textsuperscript{27-28} This lack of education is reflected in the Amish verbalization of heart function, the causes of CVD, and how to prevent it. Less than half of the participants demonstrated basic knowledge of heart function, although those who had a personal experience with CVD were more likely to be knowledgeable. Even though 60\% of the participants responded they had received pamphlets about heart disease in the past, these pamphlets were often viewed suspiciously as a tactic to make money. No participant adopted a healthier lifestyle based on the pamphlets, which were usually developed by the local hospitals or the AHA and were not specific to the Amish culture. As indicated in previous research, health education needs to take into account specific cultural needs, motivations and priorities to meet the needs of distinct cultures.\textsuperscript{29} The most powerful influence in the community regarding healthcare was the local herbalist. This person was often looked to as an important source of information and was trusted more than traditional healthcare providers. Since this provider was also Amish, there was an understanding of the culture and what the community was willing to do to promote health.

The Amish value health and firmly believe that it is a gift controlled by God. This cultural belief corresponds with Leininger's supposition of the influence of cultural values on health care. An external locus of control may account for the lack of many preventive cardiovascular healthcare practices. Taking supplements and alternatives that were derived "naturally" were considered gifts from God, while man-made medications were not considered "natural" and could do the body more harm than good. The Amish culture strongly influences diet, activity, healthcare beliefs, and practices. Doing what is considered acceptable within the community was highly valued, and not following the
cultural norm could create displeasure from the other families in the church district. Conformity to the status quo is important in the Amish culture, and helps to ensure that Amish life does not change significantly.\textsuperscript{25}

Consistent with previous research,\textsuperscript{2-3,30-31} the Amish used many alternative treatments to care for their hearts. Herbal medications were recommended by the herbalist, friends, family and advertisements. The participants regularly administered the herbs even if they did not feel they were effective or if the herbs made them feel poorly. They appeared to trust the "natural" remedies more and were not as suspicious of the side effects as they were in prescription medications. Intentional exercise was rare, and was considered unnecessary if they kept busy with work around the house or at their employment. Research of the Amish in Ontario, Canada\textsuperscript{32} indicated that the Amish had higher levels of physical activity than typical North Americans.

CVD affects rural Americans at greater rates than those living in urban areas.\textsuperscript{33} The Amish are the fastest growing rural group in the United States,\textsuperscript{34} and at their current growth rate of 5\% a year, the Amish population is expected to double in 14 years.\textsuperscript{35} In 2010, the Amish population in the U.S. totaled over 249,000.\textsuperscript{35} With the current population growth, CVD will have a greater impact on the health of this culture. Understanding differing cultures is imperative to assessing, developing and implementing measures to improve cardiovascular care.\textsuperscript{36}

\textbf{Study Limitations}

Limitations of this study include a small sample size and the convenience sampling method. In addition, the sample was limited to one geographical area.
the author was restricted by cultural taboos, audio recording the interviews may have enhanced lengthy quotes of the participants.

**IMPLICATIONS FOR FURTHER RESEARCH AND NURSING PRACTICE**

To the best of our knowledge, this is the first study to explore cardiovascular knowledge, beliefs and healthcare practices in the Amish. It has indicated the need for cardiovascular education in the Amish community, as well as the need for healthcare providers to understand the impact of culture while providing cardiovascular care to this population. Future research and patient education need to consider the cultural distinctness of the Amish culture prior to development and utilization of educational materials.

Findings of this study demonstrate that healthcare providers within the dominant culture need to provide cardiovascular care to this distinct population differently than many other cultures that they encounter. First, they must understand that basic knowledge of heart function and CVD prevention that may be considered common knowledge may not be present. Culturally appropriate education needs to be provided in a way that is respectful and without assumption. Secondly, distrust of healthcare providers outside of the Amish culture is common. Many Amish will not disclose alternative treatments they have used, and will only see a medical professional once all other treatments have been exhausted without success. Keeping costs as low as possible and treating only when necessary will help to gain the respect of this culture. If the Amish perceive that a healthcare professional is taking advantage of them, word will spread quickly throughout the community and many Amish will avoid this healthcare provider. Third, alternative or complementary treatment use is high and must be
considered when obtaining a history or treating a client. Their disclosure of treatments used may not be complete or may not occur at all, but will be especially difficult to obtain if they feel that the health care provider is not open to these treatments. Keeping an open mind is imperative. Finally, by the very nature of this culture, change takes time. For example, educating about dietary changes is more than just about eating differently, this education impacts how they socialize within their culture at frequent social gatherings. Conformity is valued in this culture, and any change to what is accepted within the community creates a ripple effect that can disturb the status quo within the church district.

Assisting with lifestyle changes in the Amish community will require finesse on the part of health care providers and educators. Developing educational materials that are culturally appropriate should be a priority. Pamphlets with drawings of Amish individuals that contain information that is specific to this culture’s diet preferences and types of activities will be an important first step. Establishing support for this endeavor within the Amish community will be necessary for this endeavor to be successful. Getting formal and informal leaders within the community to support a low cost health promotion that could potentially cut health care costs is very important. As this population continues to grow and the costs of medical treatments continue to rise, providing health education that can help a community be healthier should be a priority of health care providers of the Amish.
References


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<th>Providers</th>
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<tr>
<td>Massage Therapist</td>
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<td>Midwife</td>
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Table 2  Alternative Medications for Cardiovascular Health

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<th>Total per Purpose</th>
<th>Purpose</th>
<th>Specific Alternative (number of participants using)</th>
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<td>9</td>
<td>Thins Blood</td>
<td>Aloe Vera (1), Garlic (1), M-bolus (2), Natokinase (3), Serrapeptase (1), Vinegar (1)</td>
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<td>7</td>
<td>Thickens Blood</td>
<td>Cayenne pepper (5), Chlorophyll (1), Iron (1)</td>
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<td>5</td>
<td>Lowers Cholesterol/Removes Plaque</td>
<td>Artery Care (1), Grape Seed Oil (1), Lysine (1), Red Rice Yeast (2)</td>
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<td>14</td>
<td>Prevents Heart Disease</td>
<td>Cardio Cocktail (3), Co-Q 10 (4), Coral Calcium (1), Hawthorne (2), L-carotine (1), Phyto-omega (1), Pyconogenol (1), Selenium (1)</td>
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<td>3</td>
<td>Lowers Blood Pressure</td>
<td>Celery (2), Cinnamon (1)</td>
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<tr>
<td>12</td>
<td>Promotes Circulation</td>
<td>Omega-3 (5), Peppermint (1), Vitamin E (6)</td>
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