



Introduction

Today the rapid advances in genetics and genomic medicine are perceived by some to present unsettling possibilities and dangerous ideas.¹ Dangerous ideas are about to corrode the prevailing moral order and result in a chain of events which could lead to an outcome recognized as harmful.²

As morals are built on a foundation of religious and/or cultural codes,³ we tried to ascertain what effect, if any, a person's church attendance might have on their knowledge about, and attitudes toward genetics and genetic testing. Church attendance was used as a proxy to assess the role that religion plays in a respondent's life.³

A random-digit-dialing survey of residents in Guilford County, North Carolina was conducted by the Guilford Genomic Medicine Initiative in 2006. This assessment was performed as part of a community educational needs assessment. Our goals were to determine if church attendance is associated with people's attitudes about genetics and genetic testing, and whether it represents a potential barrier to the integration of genomic medicine services into primary care practices in the county.

Methods

- A list of randomly generated telephone numbers, stratified by the number of residents within each zip code, was obtained from Marketing Systems Group, Inc.
- The Trolldahl and Carter table (1964) was used to identify the eligible adult in each household. Eligible participants were English speaking residents of Guilford County, who were 18 years of age or older.
- Each working number was called three times before it was removed from the list.
- A total of 1136 interviews were completed and data was entered into a web-based database.
- An overall knowledge score was created by assigning one point for each correct answer. The highest possible score was 16 points.
- An experience score was created by assigning one point when a respondent said that he/she 1) knew someone who had seen a geneticist or genetic counselor, 2) knew someone with a genetic disorder, or 3) knew about genetic testing for disorders that occur in adults. Zero points were given if their response to all three questions was "no". Therefore the experience score ranged from 0 to 3.
- Respondents were asked how often they attended church in the past 12 months. Responses were collapsed into three categories; never or rarely, one to three times per month, and once a week or more (weekly).
- Descriptive statistics were used to describe the characteristics of respondents.
- Differences were measured by χ^2 tests for categorical data and ANOVA for group means.

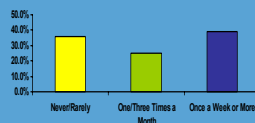
Results

We reached 5195 households. A total of 1136 individuals completed the survey for a response rate of 22%.

Respondents were predominately Caucasian (74%), females (63%), with a mean age of 52 years ($sd = 16.386$, range 18 – 95 years).

Church Attendance

Approximately 38% of respondents reported that they never or rarely went to church, 25% said they went one to three times a month, and 39% said they went to church once a week or more in the past 12 months.



Demographic Data Based on Church Attendance

There was a significant difference in church attendance based on race, age, and gender.

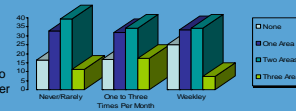
- The percentage of African American respondents who attended church weekly (49.1%) was greater than the percentage of Caucasian respondents who attended church weekly (36.6%; χ^2 , $p < .001$).
- In this group of weekly church goers, 71% were female and 65% were 50 years of age or older. These percentages were significantly greater than the overall rates of 63% and 55%, respectively (χ^2 , $p < .001$).

Knowledge

Respondents who attended church weekly had a mean knowledge score of 9.15 ($sd = 2.06$, $p < .001$). The mean knowledge score of respondents who never or rarely attended church was 9.54 ($sd = 2.094$), and the mean score for those who attended church one to three times a month was 9.79 ($sd = 2.104$). See poster number 24 for more details.

Experience

Almost half (47.4%) of all respondents had experience scores of 2 or 3. However the rates varied based on church attendance. Approximately 42% of weekly church goers, 52% of those who attended church one to three times a month, and 65% of respondents who never or rarely attended church had scores of 2 or 3 (χ^2 , $p < .001$).



Education

Overall, 54% of respondents had a bachelors degree or higher. When broken into groups based on church attendance however, differences were noted. Approximately 50% of weekly church goers and 53% of the people who never or rarely attended church had a bachelors degree or higher. The percent of respondents who attended church one to three times per month who had at least a bachelors degree was 64% (χ^2 , $p < .01$).

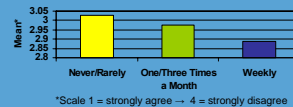
Attitudes

The mean attitude scores for each of the following categories were compared based on respondents reported church attendance.

Discrimination/Privacy Concerns – As a group, weekly church goers were no more likely to be concerned about their risk of discrimination or the privacy of their test results, should they pursue genetic testing, than respondents in the other two church attendance categories.

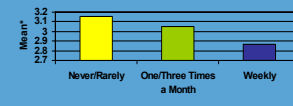
Perceived Usefulness of Genetic Information – As a group, weekly church goers were as likely to agree that the integration of genetics into health care would be good, as respondents in the other church attendance categories.

Anticipated Use of Genetic Information – Respondents who attended church weekly were more likely to agree that genetic tests will become mandatory, and that insurance companies and employers will use genetic test results to set their rates and make hiring decisions in the next 10 years than individuals who never or rarely went to church ($F(2, 1110) = 3.45$, $p < .05$). All standard error of means were (SEM) $< .05$.



*Scale 1 = strongly agree → 4 = strongly disagree

Moral Attitudes – There was a significant correlation between the moral attitudes score and church attendance ($F(2, 110) = 26.38$, $p < .001$). All SEM were $< .05$.



*Scale 1 = strongly agree → 4 = strongly disagree

Questions to Assess Moral Attitudes

Responses to a total of four questions were used to calculate respondent's moral attitudes score regarding genetics and genetic testing. Responses were collapsed into two categories; agreed vs. disagreed. See table

Church Attendance	Agree	
	weekly	other
Genetic testing makes me uncomfortable from a moral standpoint.	16.3%	13.8%
I worry that genetic testing will ultimately lead to human cloning.	30.9%	25.9%
Meddling with genes is like playing God.	42.0%	22.1%
Genetic testing should not be done.	8.0%	4.3%

Attitudes & Education, Experience, and Age

Discrimination/Privacy Concerns – When respondents were asked to rate how worried they were that they would be discriminated against if they had a genetic test, or that people would be able to find out their test results, respondents with some high school education, as a group, reported that they were less worried than respondents with a post-baccalaureate degree ($p < .05$). The respondents with no experience, as a group, reported that they were less worried than respondents with experience in two or three areas ($p < .001$). People under the age of 30 and over the age of 69 also reported that the were less worried about discrimination and privacy based on genetic test results than individuals between the ages of 30 and 69 ($p < .001$).

Perceived Usefulness of Genetic Information – Respondents were asked how likely they thought it was that in the next ten years genetic tests will improve health care, give people more control over their health, and tell people how likely they were to get a common disease. Respondents with more education, more experience, and between the ages of 18 and 29 thought these events were more likely to occur than other respondents ($p < .05$, $p < .001$ and $p < .05$, respectively).

Anticipated Use of Genetic Information – Respondents were asked to rank how likely they thought it was that, in the next ten years, genetic tests will become mandatory, that insurance companies will require a genetic test before deciding how much to charge for health insurance, and that employers will require a genetic test before deciding who to hire. Respondents with less education and experience thought that these things were more likely to occur than people with more education and experience ($p < .001$). There was no difference in responses to these statements based on the respondents' age.

Moral Attitudes – Respondents with less education, and clinical genetics experience, and those over the age of 70, were more likely to agree with the statements on the moral attitude scale ($p < .001$, $p < .001$ and $p < .05$, respectively).

Conclusions

The impact that church attendance, and by inference religiosity, will have on the acceptance and integration of genomic medicine services into primary care is unclear. It appears that respondents who attend church weekly have more moral concerns about genetics than respondents who report going to church less frequently. However, looking at their collective responses to the individual questions on the moral attitudes scale rather than their mean moral attitudes score, it appears that they are more worried about the potential outcomes of genetic technology than they are about testing itself. Respondents who attend church weekly were also more likely to agree with the statement that "meddling with genes is like playing God". They tended to be older, and were less likely to have a college degree. They were also less likely to know people who had seen a genetic counselor, know people with a genetic disorder, or about genetic tests for adults than people in the other two church attendance groups.

The fact that education, experience, and age appear to affect a person's attitudes about genetic testing, leads us to question whether our findings are related to religious observance, the demographics of respondents who make up this group of weekly church goers, or a combination of both. Further research will need to be done to see what, if any, affect church attendance and thus religiosity will have on the integration of genetic services into primary care. Given that the majority of weekly churchgoers who responded to our survey are not opposed to genetic testing, and the fact that were more likely to agree that genetic testing will have positive benefits for health care, it is possible that religious beliefs will not be a barrier to the integration of genomic medicine in primary care practices within our county.

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