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Assessing Awareness of the Genetic Information Nondiscrimination Act of 2008 (GINA) among Nurse Practitioners: A Pilot Study

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Abstract

Background: Nurse practitioners (NPs) need be aware of the ethical and social implications of diagnosing, testing and managing genetic diseases in their patients. Before the start of the Human Genome Project, the degree of protection in state laws in the United States against genetic discrimination varied broadly. Thus, a federal law, the Genetic Information Nondiscrimination Act of 2008 (GINA) was passed in 2008. Previous research studies have assessed awareness of GINA among physicians, genetic counselors and consumers, however there is no published research assessing awareness of GINA in the nursing profession.

The purpose of this study was to assess awareness of GINA among NPs in South Carolina (SC). A cross-sectional descriptive pilot research study, using a sample of 65 NP volunteers from two SC nurse practitioner associations, used an online questionnaire that was developed using Rogers' Diffusion of Innovations (DOI) Theory, to assess awareness of GINA among NPs. Thirty-four percent of NPs volunteering for the study were aware of GINA. Fisher exact and chi square statistics revealed that awareness of GINA in NPs was not statistically associated with the NP's terminal academic nursing degrees, the NP's clinical specialty, years of NP clinical practice, or the age of the NP. Awareness of GINA among NPs was not statistically associated with adopter categories from the DOI Theory: innovator, early adopter, the early or late majority of adopters or traditionalist/laggard. Effect-size analysis revealed that NPs, aware or not aware of GINA, use similar communication channels to gain information concerning GINA. Further research into awareness of GINA among a larger sample NPs throughout the United States as well as further development on the online questionnaire used for this study.

Keywords

Roger's Diffusion of Innovation Theory, Germline genetic testing, Genetic information, Adopter category, Communication channels

Introduction

Genetic testing is used to predict risk for future disease, to detect mutations associated with genetic conditions, and to guide treatment decisions [1,2]. Test results may not only reveal genetic information to symptomatic and asymptomatic individuals, but genetic test results may lead to discrimination by health insurers and employers [3]. Since the Genetic Information Nondiscrimination Act of 2008 (GINA)was enacted in 2009, health care professionals need to be aware of GINA's provisions and limitations to assist patients and families in making informed decisions regarding genetic testing [4]. The enactment of the Patient Protection and Affordable Care Act of 2010 (PPACA), does not amend GINA's provisions and limitations, but complements GINA as it guarantees health insurance for all individuals who request it, including patients with pre-existing genetic conditions [5,6].

Nurse practitioners (NPs), are well-positioned to integrate GINA's protections into their clinical practice. NPs conduct comprehensive health assessments, diagnose, and treat individuals and their families possessing actual or potential genetic health problems. As facilitators/change agents, NPs transmit new knowledge to nurses at the bedside as well as to their patients and families [7].

Historically, genetic/genomic content has not been routinely integrated into master's level nursing education curricula. Since GINA became enacted in 2009, genetics and genomic content, including didactic knowledge and skills, are required to be incorporated in graduate nursing curricula [8]. NPs need to possess awareness and knowledge of GINA and its applicability to clinical nursing practice. Therefore, the purpose of this research study is to empirically assess the extent to which NPs possess awareness of GINA.

A review of the literature supported the need for this research study. Three unpublished master's theses measured awareness of GINA among consumers, genetic counselors and primary care physicians [9-11]. Two published articles and two abstracts of articles pending publication surveyed consumers and physicians about their awareness and attitudes about GINA [12-15]. Table 1 describes the research studies conducted to study awareness of GINA in consumers and healthcare personnel. No studies identified utilized a theoretical framework to conduct their studies. More importantly, no study was identified that assessed awareness of GINA among the nursing profession.

Research Questions

Research questions that guided this study were:

Is there a relationship between terminal academic degrees

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Table 1: Research studies assessing awareness of GINA.

Author & Date	Population	Instrument/Method	Study Purpose	Findings
Allain, Friedman, & Senter [12]	1,699 members of a Hereditary Breast and Ovarian Cancer Syndrome advocacy group	Anonymous online questionnaire, 34 items	Examine awareness and attitudes about GINA	45.7% were aware of GINA before taking the survey p ≤ 0.0001
Fusina [9]	56 physicians affiliated with Mount Sinai School of Medicine	Anonymous online survey, 19 closed-ended questions and one open- ended question	Examine awareness of GINA by physicians	42.9% were aware of GINA p = 0.0004
Garrison [10]	1,076 members of FORCE, (Facing Our Risk of Cancer Empowered) advocacy group and clients of Ohio State's Clinical Cancer Genetics Program	Anonymous online survey, 33 multiple- choice questions	Evaluate consumer knowledge and attitudes of GINA	52.1 % of respondents were aware of GINA before the study p < 0.02
Laedtke, O'Neill, Rubinstein, & Vogel [13]	401 members of American Academy of Family Physicians	Mailed/online survey. Number of items on survey not reported	Evaluate physician's awareness/ knowledge of GINA	45.5% aware of GINA.10.3% self- reported knowledge of GINA, p < 0.001
Huang, Huston, & Perri [14]	295 general population panel of U.S. citizens, ages 18-64	17-item survey, included 2 questions to measure awareness/knowledge of GINA	Evaluate consumer awareness of genetic discrimination and GINA	8.8% were aware of GINA, 3.4% knew GINA prohibits improper use of genetic information, p value not reported
Pamarti [11]	257 genetic counselors from National Society of Genetic Counselors	32- item online survey, adapted from previous surveys	Assess knowledge about the scope of GINA and genetic discrimination in clients	56% aware of general provisions of GINA, 99.3% knew about GINA's health insurance protections p < 0.05
Qurehi, Warda, Rahaghi, Ferrer, Ramirez, Rahaghi [15]	41 physicians at Cleveland Clinic/ Florida	Questionnaire - number of items and type not reported	Evaluate personal practice of ordering lab tests and awareness of GINA	39% aware of protections offered by GINA. 99% wanted to find out more about GINA, p value not reported

Table 2: Constructs and concepts derived from DOI Theory.

Awareness- Knowledge	Innovation	Communication	Time	Social System
Cognition	Relative Advantage	Mass media	Innovators	Demographics
How-to knowledge	Complexity	Interpersonal	Early adopters	Practice setting
Principles knowledge	Compatibility		Early majority	Clinical specialty
	Trialability		Late majority	Highest nursing degree attained
	Observability		Laggards/ Traditionalists	Year highest nursing degree attained
				Genetic education included in most recent nursing curriculum

(Master versus PhD and DNP) and awareness of GINA?

Does awareness of GINA differ among NPs in clinical specialties where germline (inherited) genetic testing is common versus those NPs in clinical specialties where germline genetic testing is uncommon?

Is there a difference in awareness of GINA depending on years of NP clinical practice?

Is there a difference in awareness of GINA depending on the age of the NP?

Is there a relationship between awareness of GINA and the adopter category of the NP?

What communication channels do NPs, who are aware of GINA, use to find information related to their clinical practice?

Theoretical Framework

Everett Rogers' Diffusion of Innovations theory (DOI) guided this pilot study [16]. The DOI theory has been applied in education, public health, communication, economics and marketing disciplines. Most recently this theory was used as the framework to establish essential genetic and genomic nursing competencies for nurses seeking baccalaureate degrees [8,17]. Rogers' theory is based on diffusion, a special type of communication where messages that concern a new idea, or innovation, are conveyed between individuals. Diffusion of an innovation is defined as, "the process by which an innovation is communicated through certain channels over time among the members of a social system" [16]. To diffuse an innovation, the potential adopter must first possess "awareness-knowledge" of the innovation; however, awareness alone does not lead to the adoption or rejection of the innovation. Rogers' identified five concepts; relative advantage, complexity, compatibility, trial ability, and observability of the innovation that may influence the rate of diffusion of the innovation. Also, the time frame that an individual takes to adopt an innovation, as compared to time taken by other members in their social system, affects diffusion of the innovation.

Five constructs were identified from the theory that may affect the diffusion ofGINA among NPs. These five constructs include:

Awareness-Knowledge

Innovation

Communication

Time

Social System

Constructs and their concepts, derived from the DOI theory, used in this study are summarized in Table 2.

Methods

Design and study sample

This cross-sectional descriptive pilot research study employed an online questionnaire, using pre-selected constructs and concepts from Rogers' Diffusion of Innovation Theory. The dependent variable was "awareness" under the Awareness-Knowledge construct and independent variables under the Social System construct: NP terminal academic degree, NP specialized clinical practice setting, years of NP clinical practice, age of the NP and adopter category of the NP, as well as type of communication channels NPs use to find information related to their clinical practice.

According to a Kaiser Family Foundation report [18], there are 3,687 licensed nurse practitioners in South Carolina (SC). E-mail

Table 3: Questionnaire development steps.

Step	Purpose	Methods
1. Determine what is to be measured	Select and study a well-grounded theory to develop hypotheses, constructs and concepts related to the phenomenon being measured	Review of Rogers' Diffusion of Innovations theory which explains characteristics that influence a NP to have awareness-knowledge of GINA. Theoretical components to be synthesized into constructs/ concepts in order to generate questionnaire items.
2. Generate an item pool from review of literature	To propose self-report/response data collection items that facilitate responses representing variables that influence awareness of GINA.	Draft items for scale responses according to constructs/concepts of the theory. asking level of importance by dissertation committee members in assessing awareness-knowledge of GINA in NPs
3. Determine the format for measurement	To determine what scales are most compatible with the theory: constructs and concepts	Occurs simultaneously with generation of questionnaire items so that the two steps are compatible
4. Initial questionnaire item pool reviewed by experts	To establish content validity	Nine nurse practitioners with genetic expertise scored the questionnaire items for content validity index to prepare questionnaire for transfer to Qualtrics® survey software for field testing
5. Consider inclusion of validation items/field test revised questionnaire	Test reliability in a small sample Interact with subjects regarding readability, item burden and testing problems	Refined questionnaire items on Qualtrics® survey software. Utilize ten Clemson University NPs, not possessing genetic expertise and not included in the sample population, to identify questionnaire administration problems.
6. Administer final revised online questionnaire to pilot sample	To evaluate for construct validity and reliability	Utilize pilot sample to include members of two SC NP associations
	Use findings to evaluate future development steps	Cronbach's alpha for reliability Descriptive statistics for construct validity

Table 4: Questionnaire items.

Construct	Concept	# of Items
Awareness-Knowledge	Awareness cognition	1
	How-to-knowledge	8
	Principles knowledge	3
Innovation	Relative Advantage	1
	Complexity	4
	Compatibility	4
	Trialability	2
	Observability	5
Communication	Communication Channels	6
Time	Innovativeness Inventory	20
Social System	Demographics	18

addresses for NPs were unavailable from the SC State Board of Nursing and the SC American Nurses Association, therefore NP memberships from two South Carolina nurse practitioner associations were used as convenience sample used for this study. Volunteer NP participants learned of the study by an e-mail communication from their association's president a few days before receiving an e-mail invitation with the link to the online questionnaire from the researcher. No individual incentives were offered for participation; however, NPs who completed the questionnaire were entered into a drawing where four members of each NP association would have their 2014 annual dues paid.

Instruments

To answer the research questions for this study, a new questionnaire was developed, using the DOI theory [16]. The process of development of this online questionnaire, including field testing and pilot testing, was based on DeVellis's guidelines for scale development [19] and are summarized in Table 3. The final questionnaire were distributed to nine genetic content experts for clarification and for scoring content validity; follow-up with each expert was done to establish face validity. Questionnaire item content validity was 0.78 with overall questionnaire content validity of 0.64. Inter-rater reliability was scored only for the first three constructs (Awareness-Knowledge, Innovation and Communication) with a score of 0.64. The Time construct was measured using the Individual Innovativeness Scale with an established Cronbach's alpha of 0.94, and was used with permission [20]. The final questionnaire version was field-tested by ten Clemson University NPs to determine questionnaire logistics; readability, item burden and ease of administration.

Questions included in the questionnaire were mainly true/false and 5-pointLikert- type scales, ranging from "strongly agree" to "strongly disagree". Participants were encouraged to complete the entire questionnaire. Table 4 shows the breakdown of questionnaire items according to constructs and concepts operationalized from the DOI theory.

Human subjects and research approval procedures

The study protocol received approval from the Clemson University Institutional Review Board (IRB). Participants were informed, bye-mail invitation, of the study's purpose and included an informed consent. NPs who were involved in development of the questionnaire were excluded from participation.

Data Collection Procedures

A convenience sample of 239 nurse practitioners, taken from the two nurse practitioner associations' membership, was invited by to participate in the study. The online, self-administered questionnaire was activated using Qualtrics® survey software. Data collection spanned from October 28, 2013 to November 18, 2013. E-mail reminders were sent weekly to the sample population for two additional weeks. Also postcards, that contained the study's purpose and Qualtrics® link, were distributed during the data collection time period at the two SC NP associations' monthly meetings. Data were collected and stored in a password-protected file only accessible to study personnel.

Data Analysis

Data were exported from the Qualtrics® questionnaire into Microsoft® Excel 2013 and IBM SPSS® 21 software. Fisher exact and chi-square analyses assessed NP's awareness of GINA with the study variables of interest to answer the research questions. Demographic statistics for categorical and continuous data included means, standard deviations, and frequencies. Missing data occurred for a few demographic questions, such as gender (N = 2) and for the specialized practice setting question (N = 9). The missing data did not affect the statistical results. All p values are two-tailed and presented without adjustment. Statistical significance of comparison was set at $p \leq 0.05$.

Results

The final sample of 65 NP participants submitted completed questionnaires for a 27.20% response rate. Participants were 97 % female and 3% male. Mean age of the participants was 43.2 years with a standard deviation of 16.2 years. Mean years as an NP was 8.51 years with a standard deviation of 2.57 years. Participant demographic and clinical setting characteristics are presented in Table 5.

Awareness of GINA and NP education preparation

NPs' awareness of GINA was compared to NP terminal education preparation, using Fisher's exact test. Of the 22 participants who were aware of GINA, 19 possessed a master's degree in nursing as their

Table 5: Participant demographics of the study sample (N = 65)

Variable	N	%
Gender		
Male	2	3%
Female	61	97%
Age (categories)		
26-35 years	11	17%
36-45 years	12	18%
46-55 years	23	35%
56-65+ years	19	30%
Race/Ethnicity		
Asian American	1	2%
Black, non Hispanic	2	3%
White, non Hispanic	61	94%
Other-not specified	1	2%
Years of experience as an NP 0-5 years		
0-5 years	25	38%
6-10 years	8	12%
11-15 years	16	25%
16-20+ years	16	26%
Employment Status		
Full time (≥ 40 hrs./week)	49	75%
Part time (< 40 hrs./week)	13	20%
Retired	1	2%
Seeking employment	1	2%
Not seeking employment	1	2%
Employment Setting		
Ambulatory/outpatient/primary care office	36	55%
Retail clinic (e.g., Walgreen's, CVS)	4	6%
OB clinic	1	2%
Emergency Department	4	6%
Employee health clinic	2	3%
Extended/long-term care facility	1	2%
Skilled nursing facility	2	3%
Intensive care/acute care	1	2%
In-patient hospital unit/hospitalist	7	11%
Occupational health	3	5%
Educational	1	2%
Non-traditional setting	2	3%
Other setting	1	2%
Site		
Urban area (> 50,000 population)	47	73%
Urban cluster (2,500 to < 50,000 population)	15	23%
Rural (< 2,500 population)	2	3%

terminal nursing preparation, compared with three respondents who possessed either a PhD or DNP degree. One NP participant had a NP certificate as a terminal nursing degree but was not aware of GINA, so that participant was excluded from the cross tabulations of statistics. Although percentages indicate that NPs with a PhD or DNP included a higher percentage of NPs aware of GINA, the Fisher's exact test yielded a p-value = 0.6837, thus there was not a statistically significant relationship between awareness of GINA and NP terminal academic preparation (Table 6).

Awareness of GINA and clinical specialty practice

Responses to the question about "specialized practice setting" were divided into two groups by the researcher and a genetic epidemiologist: those specialized practice setting where germline (inherited) genetic testing is common, compared with settings where germline testing is uncommon.

Specialized NP clinical practice settings where germline genetic testing is common included: genetics, neonatal, pulmonary, and cardiovascular (including cardio-thoracic), gastroenterology, and psychiatric, internal medicine, oncology (including surgical and hematological oncology). Uncommon NP clinical specialty practice settings included renal, family practice, adult/gerontology, neurosurgery, infectious disease, orthopedics, urology, hospice, retail outpatient, clinical trials, emergency room, young adult, college, and military practice settings.

Table 6: Comparison of awareness of GINA and NP terminal academic preparation (N = 64*).

NP Terminal Academic Preparation				
Awareness of GINA	**Master**	**PhD or DNP**	**Total**	**Fisher's Exact p-value**
Yes	19	3	22	0.6837
No	38	4	42	
*n = 1 missing, certificate education preparation excluded				

Table 7: Comparison of awareness of GINA and NP clinical specialty practice with common vs. uncommon use of germline genetic testing (N = 56*).

NP Clinical Specialty Practice with Common vs. Uncommon Use of Germline Genetic Testing					
Awareness of GINA	**Common**	**Uncommon**	**Total**	**x^2**	**p-value**
Yes	6	13	19	0.1275	0.7211
No	10	27	37		
*n = 9 missing					

Table 8: Comparison of awareness of GINA and years of NP clinical practice (N = 65)

Years of NP Clinical Practice					
Awareness of GINA	**≤ 5 years**	**≥ 6 years**	**Total**	**x^2**	**p-value**
Yes	7	15	22	0.6201	0.431
No	18	25	43		

Table 9: Comparison of awareness of GINA and age of the NP (N = 65).

Age of the NP in Years							
Awareness of GINA	**26-35**	**36-45**	**46-55**	**56-65+**	**Total**	**x^2**	**p-value**
Yes	3	6	8	5	22	2.101	0.552
No	8	6	15	0	43		

Percentages for NPs in specialty clinical practice awareness of GINA versus those NPs in specialty clinical practice not aware of GINA were similar. Chi-square analysis for this comparison resulted in $x^2 = 0.1275$ with an associated p-value = 0.7211 indicating no statistical significance between awareness of GINA and their clinical specialty area (Table 7).

Comparison of awareness of GINA and years of NP clinical practice

Since GINA was enacted in 2009, this study explored whether NPs who started clinical practice as an NP in the last five years might have an increased awareness of GINA than their peers who have been in NP clinical practice six or more years. The results indicated that 28% of those who were aware of GINA had been in NP clinical practice less than 5 years. However, those in NP clinical practice six or more years, 37.5% were more aware of GINA. Results from this comparison were not statistically significant with an $x^2 = 0.6201$ with p = 0.4310 (Table 8).

Comparison of awareness of GINA and age of the NP

Age of the NP participants was measured in age intervals. There were no participants who were younger than 26 and there was one participant who was older than 65 and was collapsed in the 56-65+ interval range. Results indicated that the 36-45 years of age interval had the highest percentage of NPs aware of GINA (50%) and also held the lowest percentage of NPs (50%) not aware of GINA. There was not statistical significance that age of the NP played a role in the NP's awareness of GINA, since $x^2 = 2.101$ and p = 0.552 (Table 9).

Comparison of awareness of GINA and time (adopter category of the NP)

The Time construct in the DOI theory concerns itself with innovativeness, operationalized as the degree to which a NP in South Carolina was relatively earlier in awareness of GINA than other NPs

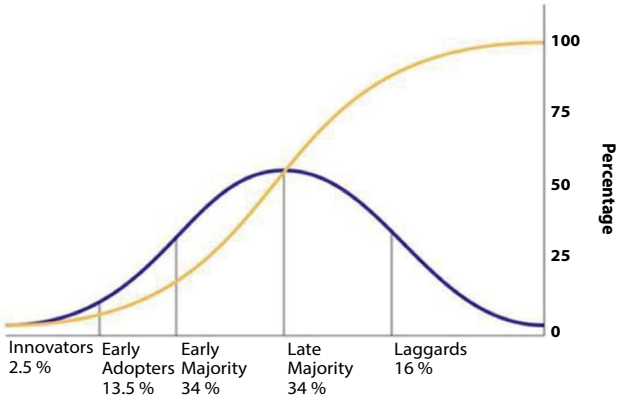

Figure 1: Adopter of innovation category with diffusion of innovation over time adopter category, percent of population (blueline). Diffusion of innovation over time (yellowline) adapted from rogers [16].

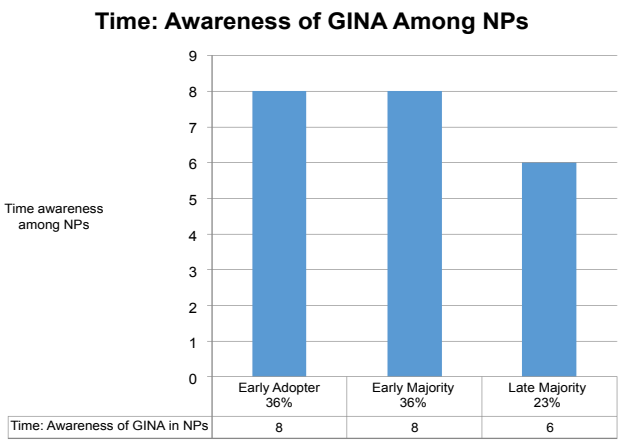

Figure 2: Time-Awareness of GINA among NPs.

in South Carolina. The willingness of an individual, within a social system, to adopt a new idea over time, can be categorized into five adopter categories or groups: innovators, early adopters, early majority, late majority and laggards or traditionalists [16].

According to the DOI theory, innovators are typically adventurous and like trying out new ideas. Early adopters follow the innovator's decision to reject or adopt the innovation. The early majority, usually the largest adoption section, is followed by the late majority and the last group, laggards or traditionalists [16]. The overall process of diffusion of an innovation may be represented by an S-shaped curve distribution [16]. Variations in "S" slopes have been shown to be dependent on the length of time it takes members of a social system to fully adopt an innovation [16]. The S-shaped diffusion curve increases dramatically, when 10-20 percent of an innovation is diffused and adopted by a social system. This typically occurs when communication channels of a social system are fully activated [16] (Figure 1).

The Time construct for this study was measured using the Individual Innovativeness Scale with an established Cronbach's α =0.94 [20]. The adopter category was scored for each NP participant who was aware of GINA, per the scales' guidelines [20]. The results from this pilot study identified a similar reliability measure with a Cronbach's α = 0.86.

Of the 22 NPs who are aware of GINA, 72% of NPs either scored in the "early adopters" or in the "early majority", while 24% scored in the "late majority" category. There were no NPs who scored in the "innovator" or "laggard" category. The "early adopters" and "early majority" categories were collapsed into one category (due to the small numbers of participants) that represents the left half of a bell curve, while the "late majority" category represented the right half of the bell curve based on Rogers' DOI theory.

Table 10: Comparison of awareness of GINA and time (adopter category of the NP) (N = 65).

Adopter Category of the NP					
Awareness of GINA	Early	Late	Total	x^2	p-value
Yes	16	6	22	1.8	0.185
No	24	19	43		

Although not statistically significant with an $x^2 = 1.759$ for a p = 0.185, the adoption of the innovation curve by this small sample of NPs that were aware of GINA, may be more similar to the DOI theory's adoption of the innovation curve if a larger sample of NPs had participated in the study (Figure 2) (Table 10).

Communication channels used to gain more information about their clinical practice

Which mass and interpersonal communication channels do the NP participants use to find information to guide their clinical practice? Could these same communication channels also be used to find information concerning GINA? Rogers' DOI theory implies that information about an innovation, in this case GINA, rarely comes from the most common communication channels that NPs routinely access; that information about GINA most likely is actively sought by NPs who may be aware of GINA's existence [16].

In this study, mass media communication channels, the Internet and online websites/search engines were the most favored forms of mass communication channels used by NPs aware of GINA (both at 68.2%), followed by a peer-reviewed journal (59%). The favored mass communication channels for NPs who were not aware of GINA were the same mass communication channels used by aware NP participants: Internet (69%), online website/search engine (64.3%) and peer-reviewed journal (46.7%).

The two interpersonal communication channels used by the NPs, in both the aware and unaware groups, to find more information about GINA included attendance at professional meetings (81.3%) followed by face-to-face workshops or lectures (70.3%).

Effect size was determined for all communication channels used by NPs, to quantify the size difference between utilization of mass media and interpersonal communication channels by both the aware and unaware of GINA NP groups. The effect size statistic used for this study result was the phi coefficient (φ), serving as a function of both chi-square (x^2) and total sample size (N = 65). Effect size statistics for communication channels between the aware and not aware NP groups range from -0.311 to 0.115, (with a phi coefficient (φ) = 0 indicating independence) between communication channels used and awareness of GINA by NPs [21]. Thus the effect size for both the mass media and interpersonal communication channels used by NPs who were aware of GINA versus NPs who were not aware of GINA is not statistically significant (Table 11).

Discussion and Conclusions

Limitations for this study are that the data was collected from a small, self-selected, convenience sample size. Another limitation is that pilot research studies have inherent limitations: the small sample may not be representative of the NP population in South Carolina, the number of questions in the questionnaire may have deterred some NPs from participating in the study and NPs may have felt intimidated by their lack of awareness of GINA, so they self-selected themselves from participation in the survey. A questionnaire to assess awareness of GINA using a theoretical framework was not found in the literature, so the online questionnaire that was developed for this study requires further development, not only for reliability and validity, but also for more complex multivariate statistical analyses.

However, this study does possess the following strengths:

A new theory-based conceptual approach for examining the awareness of GINA in the nurse practitioners is introduced.

The newly-developed online questionnaire uses a well-known,

Table 11: Communication channels used by NPs to gain more information about their clinical practice.

Communication Channels Used by NPs to Gain Information	NPs Aware of GINA	NPs Not Aware of GINA	Effect Size	Total # of Participants
	N %	N %	(Phi coefficient)	N %
	(N/Total N)	(N/ Total N)	φ	
Mass Media	15/68.2	29/69.0	-0.009	44/68.8
Internet On-line website/search engine	15/68.2	27/64.3	0.039	42/65.6
Peer-reviewed journal	13/59.0	20/47.6	0.109	33/51.6
Genetic association website	9/40.9	15/35.7	0.051	24/37.5
Association website/newsletter	5/22.7	6/14.3	0.115	11/17.2
Interpersonal				
Professional meeting	18/81.8	34/81.0	0.011	52/81.3
Workshop/lecture	17/77.3	28/66.7	0.11	45/70.3
Face-to-face communication	8/36.4	13/31.0	0.055	21/32.8
Formal education class	8/36.4	16/38.1	-0.017	24/37.5
Pharm/medical sales rep	0/0	10/23.8	-0.311	10/15.6
Texts from peers	0/0	2/4.76	-0.13	2/3.13
E-mail from peers	2/9.09	5/11.9	-0.043	7/10.9
Total	22	42	-0.313	64*

well-researched theory, Rogers' Diffusion of Innovations Theory

The study draws upon previous research assessing awareness of GINA in consumers, genetic counselors and physicians.

Initial results data from this study can be used to determine sample size calculations for studies assessing awareness of GINA among NPs with larger sample sizes.

The pilot study did reveal that the majority of NPs composing the sample group in South Carolina are not aware of GINA. There may exist clinically and statistically significant relationships between awareness of GINA and recently graduated NPs with Master's degrees and those NPs employed in specialized clinical settings; however, undue significance of the study's results cannot be made without formal power calculations, as the research sample population was too small to draw any statistically significant conclusions.

Awareness of GINA was not shown to be statistically significant when compared to age of the NP and their adopter category. However, the data indicate that NPs in the 36-45 years of age interval were more aware of GINA than other age groups. Also, although no NPs who were aware of GINA scored in the "innovator" category, neither did any of the NPs score in the "laggard" or "traditionalist" category.

Lastly, NPs those aware and unaware of GINA, use similar mass media and interpersonal communication channels to gain information about GINA. The effect sizes of these communication channels indicate that awareness of GINA is not dependent on the communication channel the NPs chooses to utilize. Thus, in planning to disseminate information of and about GINA to NPs, mass communication channels (the Internet, online website/search engines and peer-reviewed journals) should include information about GINA. Interpersonal channels NPs used the most (professional meetings and workshops/lectures) are the best way to diffuse information about GINA.

Future research opportunities include the need to conduct a research study among NPs with a larger sample and geographical location nation-wide. The questionnaire developed using Roger's DOI theory requires revision of the questionnaire to yield more sensitivity and specificity and more rigorous methods to measure its reliability and validity. Additionally, other constructs found in Roger's DOI Theory, such as antecedent and adoption factors may be significant for the diffusion of GINA among NPs and should be included in subsequent studies on this topic. Lastly, assessing awareness of GINA should be expanded to including other nurses with advanced degrees, such certified registered nurse anesthetists (CRNA), clinical nurse specialists (CNS) and certified nurse midwives (CNM).

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