J Genet Counsel (2011) 20:270–286
DOI 10.1007/s10897-010-9348-3

ORIGINAL RESEARCH

Why is Everyone So Anxious?: An Exploration of Stress and Anxiety in Genetic Counseling Graduate Students

Chelsy Jungbluth · Ian M. MacFarlane · Patricia McCarthy Veach · Bonnie S. LeRoy

Received: 21 September 2010 / Accepted: 28 December 2010 / Published online: 25 January 2011

Abstract Stress is an inevitable part of daily life. Studies of graduate student stress exist, but none include genetic counseling students. The present mixed-methods study investigated 225 genetic counseling students' stress and anxiety levels using the State-Trait Anxiety Inventory (STAI; Spielberger et al. 1983), frequency and intensity of stressors associated with their graduate experience, positive and challenging aspects of their experience, and their stress management advice for prospective students. Principal axis factor analysis yielded five conceptual factors underlying the stressors: *Professional Uncertainty*, *Personal Life Events*, *Interpersonal Demands*, *Academic Demands*, and *Isolating Circumstances*. Exploratory model fitting using regression yielded four significant predictors accounting for 19% of the variance in state anxiety: (1) trait anxiety, (2) the *Interpersonal Demands* factor, (3) the *Isolating Circumstances* factor, and (4) the interaction between the *Professional Uncertainty* factor and advanced student status. Content analysis of open-ended responses identified several themes. For instance, most students enjoyed what they were learning, interactions with colleagues, and affirmation of their career choice, while certain academic and professional challenges were particularly stressful (e.g., workload, time constraints, clinical rotations). Additional findings, program implications, and research recommendations are provided.

Keywords Genetic counseling students · Stress · Anxiety · Training challenges · Training rewards · Stress management · Coping

Introduction

Anxiety seems to pervade contemporary society. From the fear sparked by current economic difficulties to the angst over warfare around the globe to daily worries such as what to wear to work or where to go for lunch, western culture is saturated with anxiety. Genetic counseling is a challenging profession, requiring extensive knowledge of genetics, excellent communication skills, and the ability to help patients deal with strong emotional reactions in a time limited setting. Genetic counselors in training face the same professional demands without the benefit of clinical experience, and with the added pressures of a demanding academic schedule in a rigorous graduate school environment. As these students complete coursework and provide patient care, their professors and supervisors evaluate how well suited they are for this profession, and they engage in their own self-assessment in that regard. These complex and intense activities likely are anxiety-provoking, but genetic counseling graduate student anxiety has not yet been investigated systematically. The present study surveyed genetic counseling graduate students to explore their experience of anxiety, the types of stressors they encounter while in graduate school, and their recommended strategies for managing these stressors.

C. Jungbluth
Cancer Screening and Prevention Program, Banner Health, Phoenix, AZ, USA

I. M. MacFarlane (✉) · P. M. Veach
Department of Educational Psychology, University of Minnesota, 56 E. River Road,
Minneapolis, MN 55455, USA
e-mail: macf0010@umn.edu

B. S. LeRoy
Department of Genetics, Cell Biology, and Development, Institute of Human Genetics, University of Minnesota, Minneapolis, MN, USA

Distinctions Between Stress and Anxiety

Definitions of "stress" and "anxiety" vary in the academic community. Although these terms sometimes are used interchangeably (as is common in everyday speech), many researchers draw an important distinction between them. One widely-used definition of stress derives from Folkman and Lazarus' (1985) transactional model. They define stress as "a relationship between the person and the environment that is *appraised* [emphasis added] by the person as relevant to his or her well-being and in which the person's resources are taxed or exceeded" (p. 152). Spielberger et al. (1983) developed a well-known definition of anxiety. They characterize anxiety as "subjective *feelings* [emphasis added] of tension, apprehension and worry, and by activation or arousal of the autonomic nervous system" (p. 4). Note the difference highlighted by the italicized wording; stress is a cognitive process related to one's ability to cope, while anxiety is an unpleasant affective state associated with biological responses. This distinction may seem trivial, but anxiety has been linked more directly to professional issues such as quality of service provision and burnout than has stress (e.g., Corrigan et al. 1995; Jiang et al. 2003; Meijer 2001). Thus, anxiety may be a particularly salient phenomenon for empirical investigations of genetic counseling graduate students.

Spielberger et al. (1983) further distinguish between *state anxiety* (defined in the preceding paragraph), and *trait anxiety*, which they define as "relatively stable individual differences in anxiety-proneness" (p. 5), or in other words, how often and how intensely one tends to experience state anxiety. Trait anxiety also represents "the probability that [state anxiety] will be experienced in the future" (p. 5). The authors developed the State-Trait Anxiety Inventory (STAI), a well-known measure for assessing individuals' state and trait anxiety.

Although research on genetic counseling students' anxiety and stress is lacking, these issues have been studied in students from other human service fields. In the following sections, studies are classified as dealing with stress or anxiety based on the assessment done to measure the outcome variable. Thus, while a researcher may have written about stress, if she or he used the STAI to assess this construct, the present review will consider it a study of anxiety.

Research on Student Stress

Numerous studies have explored stress levels of graduate students in mental health and medical fields, often finding higher stress levels than in the general population (cf. Firth-Cozens 2001). Some research demonstrates that students enrolled in graduate programs containing a clinical human service component, such as nursing (Heaman 1995), marriage and family therapy (Polson and Nida 1998), and social work (Dziegliewski et al. 2004), report more stress than students pursuing graduate education in purely academic fields. Studies of graduate students in other fields have also shown women to have higher stress levels than men (cf. Grupchup et al. 2004; Matheny et al. 2005). Higher stress levels among graduate students in mental health and medical fields have been linked to depression (Dahlin et al. 2005; Stecker 2004), time management difficulties (Hudson and O'Regan 1994; Morton and Worthley 1995; Mouret 2002), financial concerns (Mouret 2002), lack of sleep, greater negative affect (McKinzie et al. 2006), and being single (Hudson and O'Regan 1994).

Higher stress has been linked to numerous other undesirable outcomes for undergraduate, graduate, and professional students in general, including negative self-perception (Goldman and Wong 1997), diminished immune response (McGregor et al. 2008), presence of depressive symptoms (Stecker 2004), and anxiety (Lindesay et al. 2006; Uskun et al. 2008). It should be noted, however, that research has shown stress can be beneficial to performance in some circumstances, such as in-training exams of emergency medicine students (cf. LeBlanc and Bandiera 2007).

Research on Student Anxiety

As stress has been shown to be related to anxiety, it is not surprising that predictors of anxiety overlap with those of stress. For instance, anxiety has been shown to be more common among female medical students (Toews et al. 1997). Consequences associated with anxiety demonstrate the severity of this uncomfortable and potentially incapacitating emotional state, and intensify the need for increased attention to managing anxiety. Daniels and Larson (2001) found significant differences in state anxiety of graduate students in counseling psychology following negative feedback on performance. While being in a committed romantic relationship has been associated with less anxiety (and stress), some studies have shown an erosion of marital satisfaction in heterosexual couples where one or both partners are experiencing problems with anxiety (Addis and Bernard 2002; Dehle and Weiss 2002). Anxiety has also been linked to general, psychological, and physical fatigue (Jiang et al. 2003), diminished performance of medical procedures (Arora et al. 2010), fear of uncertainty (Cloninger et al. 1991), depression (Stewart et al. 1997), decreased job satisfaction, and burnout (Boyd et al. 2009; Corrigan et al. 1995; Eshel and Kadouch-Kowalsky 2003).

Some research demonstrates that performance on tasks relevant to the delivery of services, such as genetic counseling, can be diminished by anxiety. For instance,

Meijer (2001) studied 185 Dutch teenagers taking math exams and found those with higher trait anxiety have higher state anxiety responses when put in stressful situations, which in turn leads to decreased performance. Gudykunst and Nishida (2001) found that anxiety was detrimental in self-perceived effectiveness of communication with strangers for a sample of 396 undergraduate students.

Purpose of the Present Study

Research in fields which share characteristics with genetic counseling identifies varied sources of stress and anxiety, including gender, relationship status, and clinical service requirements. Prior studies also illustrate the broad range of potential negative consequences of stress and anxiety on self-perception, job satisfaction, mental and physical health, relationship satisfaction, burnout, time management, amount of sleep, and job/academic performance.

The purpose of the present exploratory study was to investigate sources of stress and levels of anxiety experienced by genetic counseling students. Graduate students in genetic counseling were invited to participate in an anonymous online survey regarding their experiences and perceptions of their genetic counseling training. Five major research questions were investigated: (1) What levels of state anxiety and trait anxiety do genetic counseling students experience? (2) What demographic and situational characteristics are significantly related to students' state anxiety? (3) What aspects of their graduate experience do students regard as most rewarding? (4) What aspects of their graduate experience do students regard as most stressful (challenging)? and (5) What advice would current students offer to incoming students about stress management?

Methods

Participants and Procedures

Upon receipt of IRB approval from a university institutional review board, an e-mail invitation was sent to all program directors of American Board of Genetic Counselors (ABGC) accredited genetic counseling programs (N= 33). The e-mail asked directors to forward an invitation to participate in an anonymous study of stress in genetic counseling students to all individuals currently enrolled in their program, with the exception of those students from the researchers' institution who piloted the survey. The invitation included a description of the study and a link to the online survey. If every director forwarded the e-mail, an estimated 330 students received the invitation to participate. After the initial invitation in December, 2008, 144 individuals responded. A reminder invitation was sent 1 month later, after which 81 additional students responded, for a total of 225 participants.

Instrumentation

The survey consisted of 112 items designed by three members of the research team, an advanced genetic counseling student, an experienced genetic counselor and program director, and a licensed psychologist. The survey contained five sections intended to investigate student stress. The first section contained 18 demographic items (e.g., gender, age, relationship status, year in school).

The second section contained a self-report measure, the State-Trait Anxiety Inventory (STAI; Spielberger et al. 1983). The STAI has been shown to have strong reliability and good construct validity (Spielberger et al. 1983). The state and trait subscales of the STAI each consist of 20 items. State items, which assess a participant's feeling at that moment (e.g., *I feel at ease*), are rated on a 4-point scale (1=*Not at all*; 2=*Somewhat*; 3=*Moderately so*; 4=*Very much so*). Trait items, which assess how a participant typically feels (e.g., *I lack self-confidence*), are rated on a 4-point scale (1=*Never*; 2=*Somewhat*; 3=*Moderately so*, 4=*Almost always*). Scores for each subscale are summed and can range from 20–80; larger scores indicate higher anxiety.

The third section of the survey consisted of three items asking participants how they spend their time on a typical day. The first item asked participants to indicate the number of hours they typically spend per day on each of 15 activities (e.g., exercise, sleeping). The next two items were open-ended questions asking participants to identify areas for which they felt they *needed* and *wanted* more time, respectively.

The fourth section asked participants to rate the frequency and intensity of 24 potential sources of stress. These sources were adapted from a similar study of well-being in academic environments (Stecker 2004). Frequency was rated on a 5-point scale (1=*Never/Not a source of stress*, 2=*Rarely*, 3=*Sometimes*, 4=*Often*, and 5=*Very often*). Intensity was rated on a 5-point scale (1=*Not a source of stress*, 2=*Not problematic*, 3=*Somewhat problematic*, 4=*Fairly problematic*, and 5=*Very problematic*). Participants had the option to select *Not applicable* for any of the items, and to list additional sources under an item labeled *Other*.

The final section of the survey consisted of three open-ended items asking participants to elaborate on their experiences with stress. These questions asked about the most rewarding aspect of their experiences as a genetic counseling student (thought to be a possible buffer against stress), the most challenging aspect of being a genetic counseling student, and what advice they would offer to incoming students about stress management.

The survey was piloted on five genetic counseling masters students enrolled in a program at the research investigators' university. Based on their feedback, minor revisions were made to improve clarity of a few questions and flow of the survey.

Data Analyses

Quantitative Analyses

Descriptive statistics (means, standard deviations, percentages) were calculated for responses to survey items. A principal axis factor analysis with promax rotation was used to determine the underlying structure of the 24 stressors from the fourth section of the survey, and thereby create factors which were conceptually similar. An exploratory model fitting procedure using multiple regression was conducted to examine the effects of several predictor variables of state anxiety.

Qualitative Analyses

Responses to the open-ended items were grouped into themes using an interpretive content analysis method (described in Giarelli and Tulman 2003, p. 951). The primary investigator analyzed the content of responses and grouped them based on their conceptual similarity. Each grouping was then reviewed and given a name to reflect the major theme. After each theme was defined, coding was done inclusively, meaning a statement containing multiple themes was counted in each relevant theme. Frequencies for each theme were then tabulated, and verbatim illustrative quotations were selected. Each theme was analyzed by the third author, a licensed psychologist, who served as data auditor. Any coding disagreements were discussed to reach consensus. Modifications and adjustments were made until both agreed on the best representation of the data.

Results

A total of 225 students returned the survey. Since it is unknown how many students received the e-mail invitation, opened it, and chose not to participate, a conservative estimated response rate was 68.2% (225/330).

Descriptive Statistics

A summary of student demographic characteristics is presented in Table 1. The majority identified themselves as female (95%) and Caucasian/White (87%). The mean

Table 1 Demographic characteristics of genetic counseling student participants

Variable	n	%	M	SD	Mdn	Range
Gender						
Female	214	95.1				
Male	11	4.9				
Age			25.2	4.25	24	21–50
Ethnicity						
Caucasian	195	86.7				
Asian/Pacific Islander	11	4.9				
African American/Black	6	2.7				
Bi-racial	6	2.7				
Chicano/Hispanic/Latino	4	1.8				
Other	3	1.3				
Relationship Status						
Committed relationship	77	34.2				
Single	71	31.6				
Married	44	19.6				
Engaged	26	11.6				
Domestic Partner	4	1.8				
Separated/Divorced	2	0.9				
Other	1	0.4				
Have Children						
No	214	95.1				
Yes	11	4.9				
Student Status						
First Year	111	49.3				
Second Year	98	43.6				
Other	9	4.0				
No Response	7	3.1				
Cohort Size						
≤6	106	47.1				
≥7	112	49.7				
No Response	7	3.1				
Program Location						
United States	206	91.6				
Canada	12	5.3				
No Response	7	3.1				
Have Family/Friends Nearby						
Yes (Miles Away)	122	54.2	19.1	28.50	5	0–100
No	94	41.8				
No Response	9	4.0				
Relocated						
Yes	168	74.7				
No	50	22.2				
No Response	7	3.1				
Funding Support (%)						
Loans			43.6	35.12	50	0–100
Family			22.8	29.38	10	0–100
Personal Savings			8.7	17.11	0	0–100
Scholarship			7.4	17.89	0	0–100
Research Assistantship			7.2	21.05	0	0–100
Outside Job			3.3	7.96	0	0–70
Teaching assistantship			2.6	10.70	0	0–75
Other			2.2	8.28	0	0–60
Estimated Debt Prior to Genetic Counseling Program (thousands of $)			–	–	0	0–50+
Estimated Debt Incurred in Genetic Counseling Program (thousands of $)			–	–	35–40	0–50+

age was 25.2 years (SD=4.25). Students were fairly evenly divided between 1st (49.3%) and 2nd year (43.6%). The most prevalent sources of financial support were loans (43.6%) and family (22.8%). Students' median estimated debt prior to entering and accumulated during their genetic counseling program was $0 and $35,000 to $40,000, respectively.

Daily Activities

Descriptive statistics for the amount of time students reportedly spent in various activities, separated by year in the program (due to the common practice of beginning clinical rotations in the 2nd year) are presented in Table 2. The largest time allocation for all students was sleeping (1st year student mean=7.04 h, SD=1.02; 2nd year student mean=6.53 h, SD=1.07). The next largest time allocations are as follows: 1st year students—class (M=4.31, SD=1.39) and studying (M=3.37, SD=1.45); 2nd year students—clinical rotation (M=4.57, SD=2.35) and class (M=2.11, SD=1.70).

The activities for which participants indicated they felt they wanted and needed more time are shown in Table 3. The two most common activities for which students reported *needing* to invest extra time were academic: thesis (21.3%), and homework/study (19.6%). The two most common activities for which students reported *wanting* to invest more time were personal: leisure (20.0%), and exercise (19.6%).

State-Trait Anxiety

Twelve participants did not provide complete responses to the STAI and were removed from analysis, leaving 213 participants with full data. The mean state anxiety score was 45.0 (SD=4.95; Range: 29–57), and the mean trait anxiety score was 44.6 (SD=4.10; Range: 31–57). No significant differences in state or trait anxiety were found between students according to their year in the program. The average genetic counseling student would score at the 81st percentile in state anxiety, and the 85th percentile in trait anxiety as compared to norms provided for women of a similar age to the present sample (age 19–39; Spielberger et al. 1983). Percentile ranks for individual participants ranged from 34th to 94th for state anxiety and 35th to 95th for trait anxiety.

The present sample's mean state and trait anxiety scores were compared to those reported for medical students (Hendryx et al. 1991; Vontver et al. 1980), outpatients with obsessive compulsive disorder (OCD) or generalized anxiety disorder (GAD; Kennedy et al. 2001), and American working adult females (Spielberger et al. 1983) using t-tests (Bonferroni adjusted α=.005). As shown in Table 4, genetic counseling students reported significantly lower trait anxiety compared to outpatient OCD (p=.003, d=−1.08) and GAD (p<.001, d=−1.93) samples and significantly higher trait anxiety than working female adults (p<.001, d=1.22) and medical students (p<.001, d=0.38). Genetic counseling students' state anxiety scores reflected

Table 2 Means, standard deviations, and ranges for reported number of hours spent daily in 15 activities

Activity	1st Year (n=110)			2nd Year (n=91)			Other (n=8)			Total (N=209)		
	M	SD	Range	M	SD	Range	M	SD	Range	M	SD	Range
Sleep	7.04	1.02	4–9	6.53	1.07	2–9	6.13	2.53	0–8	6.78	1.16	0–9
Class	4.31	1.39	0–5	2.11	1.70	0–9	1.00	1.07	0–3	3.22	1.91	0–9
Homework/Study	3.37	1.45	1–8	2.01	1.27	0–6	2.25	2.55	0–8	2.78	1.55	0–8
Clinical Rotation	0.98	1.31	0–5	4.57	2.35	0–9	3.00	2.67	0–8	2.62	2.57	0–9
Transit	1.24	0.80	0–4	1.47	0.97	0–6	1.13	0.64	0–2	1.33	0.88	0–6
Leisure	1.54	0.49	0–4	0.90	0.25	0–4	1.00	1.07	0–3	1.24	1.00	0–4
Maintaining Personal Relationships	1.34	0.83	0–5	1.03	0.71	0–2	1.13	0.83	0–2	1.20	0.79	0–5
Working	1.32	1.47	0–5	0.88	1.48	0–9	2.00	2.78	0–6	1.15	1.55	0–9
Clinic Preparation	0.39	0.59	0–3	1.45	0.96	0–5	0.88	0.99	0–2	0.87	0.94	0–5
Socializing	1.05	0.83	0–4	0.59	0.61	0–2	0.50	0.53	0–1	0.83	0.77	0–4
Thesis	0.15	0.40	0–2	1.19	0.89	0–3	3.75	2.09	0–8	0.74	1.12	0–8
Other	0.65	1.08	0–4	0.47	1.04	0–6	0.50	1.41	0–4	0.56	1.07	0–6
Exercise	0.46	0.55	0–2	0.62	0.57	0–2	0.63	0.52	0–2	0.54	0.56	0–2
Lab	0.11	0.98	0–3	0.04	0.92	0–2	0.00	0.00	0–0	0.08	0.40	0–3
Volunteering	0.06	0.25	0–1	0.07	0.29	0–2	0.13	0.35	0–1	0.07	0.27	0–2

Table 3 Rank order of activities for which participants reported needing and wanting more time (n=225)

Activity	Need More Time			Want More Time		
	n	%	Rank	*n*	%	Rank
Thesis	48	21.3	1	5	2.2	9
Homework/Study	44	19.6	2	7	3.1	8
Exercise	31	13.8	3	44	19.6	2
Sleep	21	9.3	4	15	6.7	5
Working	19	8.4	5	7	3.1	8
Other	14	6.2	6	13	5.8	6
Leisure	11	4.9	7	45	20.0	1
Maintaining Personal Relationships	8	3.6	8	34	15.1	3
Clinic Preparation	4	1.8	9	0	0.0	–
Volunteering	3	1.3	10	12	5.3	7
Socializing	1	0.4	11	24	10.7	4
Clinical Rotation	1	0.4	11	3	1.3	10
Transit	1	0.4	11	0	0.0	–
Class	0	0.0	–	0	0.0	–
Lab	0	0.0	–	0	0.0	–
Not Applicable	4	1.8	–	1	0.4	–
No Response	15	6.7	–	15	6.7	–

the same pattern, with the exception of the OCD patient sample, where the difference was not statistically significant (p=.10, d=−0.46).

Stressors

Descriptive statistics for the frequency and intensity ratings of 24 stressors are presented in Table 5. The sources of stress with the highest mean frequencies were academic course work (M=3.58, SD=0.86), financial strain (M=3.22, SD=1.12), and lack of recreation (M=2.98, SD=1.04). In terms of intensity, the highest mean intensities were financial strain (M=3.06, SD=1.09), academic course work (M=2.80, SD=0.83), and lack of recreation (M=2.67, SD=0.95). Overall, the rankings of frequency and intensity of the stressor were fairly similar. It should be noted that

Table 4 Comparison of genetic counseling students' mean trait and state anxiety scores to means published in other studies

Group	*n*	M	SD	*t*	*p*	Cohen's *d* [95% CI]
Trait Anxiety						
Genetic Counseling Students	213	44.5	4.1	–	–	–
Working Adult Females[a]	451	34.8	9.2	18.98	<.001	1.22 [1.05, 1.40]
2nd Year Medical Students[b]	324	43.0	3.8	4.27	<.001	0.38 [0.21, 0.56]
Outpatient OCD Patients[c]	31	51.0	13.0	−2.76	.003	−1.08 [−0.69, −1.48]
Outpatient GAD Patients[c]	39	55.0	10.0	−6.46	<.001	−1.93 [−1.55, −2.31]
State Anxiety						
Genetic Counseling Students	213	45.0	5.0	–	–	–
Working Adult Females[a]	451	35.2	10.6	16.19	<.001	1.03 [0.81, 1.25]
1st Year Medical Students[d]	110	36.5	10.3	7.83	<.001	1.17 [0.92, 1.41]
Outpatient OCD Patients[c]	31	48.0	13.0	−1.27	.10	−0.46 [−0.08, −0.84]
Outpatient GAD Patients[c]	39	52.0	13.0	−3.32	<.001	−1.02 [−0.67, −1.37]

Possible scores range from 20–80 on each subscale. Higher scores indicate greater anxiety. OCD=Obsessive Compulsive Disorder. GAD=Generalized Anxiety Disorder. [a] Data from Spielberger et al. (1983). [b] Data from Vontver et al. (1980). [c] Data from Kennedy et al. (2001). [d] Data from Hendryx et al. (1991). α=.005 due to Bonferroni adjustment. Twelve participants did not provide complete responses to the STAI and were removed from analysis, leaving 213 participants with full data

Table 5 Means, standard deviations, ranges, and rank order of participants' ratings of frequency and intensity of 24 stressors (n=215)

Stressor	Frequency					Intensity				
	n	M	SD	Range	Rank	*n*	M	SD	Range	Rank
Other[a]	6	4.17	0.41	4–5	–	3	4.00	1.00	3–5	–
Academic Course Work	206	3.58	0.86	1–5	1	204	2.80	0.83	1–5	2
Financial Strain	208	3.22	1.12	1–5	2	201	3.06	1.09	1–5	1
Lack of Recreation	205	2.98	1.04	1–5	3	203	2.67	0.95	1–5	3
School Performance	208	2.78	1.00	1–5	4	201	2.58	1.05	1–5	5
Commuting	205	2.66	1.08	1–5	5	202	2.38	0.90	1–5	7
Sleeping Difficulties	200	2.61	1.12	1–5	6	193	2.53	1.21	1–5	4
Change in Residence	177	2.54	1.07	1–5	7	177	2.22	1.01	1–5	12
Interaction with Supervisors/Faculty	207	2.47	0.95	1–5	8	203	2.36	0.89	1–5	8
Loneliness/Isolation	203	2.40	1.06	1–5	9	192	2.32	1.09	1–5	11
Family Difficulties	206	2.38	1.01	1–5	10	201	2.35	1.02	1–5	9
Competition with Peers	205	2.35	1.02	1–5	11	202	2.04	0.82	1–5	15
Relationship Difficulties	203	2.35	1.00	1–5	12	198	2.40	1.09	1–5	6
Question Qualifications/Competency	203	2.34	1.01	1–5	13	193	2.34	1.01	1–5	10
Inability to Socialize	202	2.26	1.06	1–5	14	193	2.13	0.98	1–5	14
Illness	200	2.06	0.83	1–5	15	187	2.18	0.93	1–5	13
Interaction with Classmates	207	2.04	0.94	1–5	16	202	2.02	0.89	1–5	16
Grief or Bereavement	181	1.90	0.89	1–5	17	161	1.93	0.99	1–5	18
Living Situation	192	1.86	1.00	1–5	18	185	1.96	0.99	1–5	17
Reconsidering Career Choice	195	1.54	0.79	1–5	19	169	1.62	0.95	1–5	19
Dissatisfaction with Career Choice	199	1.44	0.66	1–4	20	178	1.57	0.87	1–5	20
Prejudice	174	1.41	0.77	1–5	21	160	1.42	0.70	1–4	21
Legal Difficulties	136	1.22	0.54	1–4	22	127	1.31	0.71	1–4	22
Alcohol/Drug Use	160	1.16	0.46	1–3	23	155	1.21	0.50	1–3	23

[a] This item was not assigned a rank because it was endorsed by so few participants. Responses were: Religion, Finding a job, Clinic, Lack of communication, Time management, and Guilt over not having enough time to spend with friends and family

Items were rated on a 1 to 5 scale (*Frequency*: 1=Never/not a source of stress, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often; *Intensity*: 1=Not a source of stress, 2=Not problematic, 3=Somewhat problematic, 4=Fairly problematic, 5=Very problematic)

"other" had the highest mean frequency (M=4.17, SD=0.41) and intensity (M=4.00, SD=1.00), yet this option was endorsed by only six and three participants, respectively. Moreover, the descriptions of several of these stressors overlapped with the provided stressors. Due to low endorsement, "other" was not included in any further analyses.

Preliminary internal consistency reliability analyses of the frequency ratings of the remaining 23 items showed a Cronbach's alpha of 0.78. These analyses also indicated internal consistency would be improved by the removal of two items (alcohol/drug use and legal difficulties). Preliminary factor solutions also showed communalities <0.1 for both of these items. For these reasons, the items were removed from further analysis. A second reliability analysis on the remaining 21 items yielded a Cronbach's alpha of 0.84.

Factor Analysis of Stressors

A principal axis factor analysis with promax rotation was conducted on the frequency ratings to determine the underlying structure of the data and create factors which were conceptually similar. Frequency ratings were selected because stressors which happened more often were thought to be better targets for intervention and/or prevention, in that they were expected to be more universal and they focused on the roots of the problem rather than the outcomes. This procedure included only the 127 students who provided responses for all 21 items. A five factor solution, which accounted for a total of 55% of the variance, was selected using visual analysis of the Scree plot (all eigenvalues >1.0) and consideration of the utility and cohesion of the factors. We named these five factors: *Professional Uncertainty*, *Personal Life Events*, *Interper-*

sonal Demands, *Academic Demands*, and *Isolating Circumstances* (See Table 6 for factor loadings and descriptive statistics for factor scores). *Professional Uncertainty* contains four items expressing discontent with one's career choice (e.g., question personal qualifications/competency). *Personal Life Events* contains six items about challenging aspects of daily life (e.g., financial situation, family situation). *Interpersonal Demands* contains three items concerning interactions, or the lack thereof, with others (e.g., interaction with classmates). *Academic Demands* contains four items involving scholastic demands of the program (e.g., school performance). *Isolating Circumstances* contains four items pertaining to a lack of connections with others (e.g., loneliness/isolation). This factor also contained the item "commuting to school/clinic," which had a negative factor loading (indicating a lack of commute contributes to this factor score).

Regression Analysis

Regression was used to predict the state anxiety of the 124 students who had complete stress factor scores and a complete STAI. As trait anxiety, by definition, is predictive of state anxiety, the first model tested included trait anxiety as the sole predictor to ensure the relationship was true for this sample. The resulting model was significant, $F(1,122)=15.03$, $p<.001$, and accounted for 11% of the variance in state anxiety scores (see Table 8).

To determine which other factors predicted state anxiety, an exploratory model fitting procedure was used. This procedure sought to produce a model that best represented the data by maximizing the adjusted R^2 and minimizing the Akaike Information Criterion (AIC). The adjusted R^2 was used to give greater weight to more parsimonious models. The focal predictors were the stress factor scores. The

Table 6 Factor loadings for frequency ratings of 21 stressors and means, standard deviations, and ranges for the frequency and intensity ratings for each factor (n=127)

Stressor	Factor[a]				
	1	2	3	4	5
Reconsider Career Choice	.907				
Dissatisfaction with Career Choice	.862				−.277
Question Personal Qualifications/Competency	.628				.208
Competition with Peers	.365		.214	.246	
Financial Situation		.626		.243	
Relationship Difficulties		.504			.265
Grief/Bereavement		.501			
Family Situation		.495			
Change in Residence		.440		.295	
Illness		.341	.238		
Interaction with Classmates			.756		
Interaction with Supervisors/Faculty			.603		
Inability to Socialize			.413	.257	.204
Academic Course Load				.729	−.211
Lack of Time for Recreation			.223	.605	
Sleeping Difficulties		.255		.490	
School Performance	.260			.345	.322
Loneliness/Isolation					.757
Prejudice			.206		.343
Living/Roommate Situation		.233			.329
Commuting to School/Clinic				.221	−.306
Scale Range	5–20	5–30	5–15	5–20	5–20
Frequency Ratings					
M	7.6	13.7	6.7	11.7	8.1
SD	2.61	3.63	2.25	2.78	2.40
Range	5–19	7–22	5–14	5–20	5–16
Intensity Ratings					
M	7.1	12.9	6.3	10.1	7.6
SD	2.77	4.07	2.11	3.03	2.41
Range	5–17	6–26	5–15	5–19	5–14

[a] Factor names: (1) Professional Uncertainty (2) Personal Life Events (3) Interpersonal Demands (4) Academic Demands, and (5) Isolating Circumstances

Communalities with absolute value <.2 are not displayed

covariates were the trait anxiety score and demographic items identified in the literature as having effects on state anxiety. For the purposes of this analysis, participants who identified as either "2nd year" students or "other" were grouped together as students with advanced status because of similarity in demands of the program. Some variables were not included in the model even though they have been linked to anxiety (e.g., gender) because the sample did not include enough diversity of responses. Interaction terms between trait anxiety scores and the stress factor scores were included because of potential moderating effects on the expression of the stress factors. Interaction terms for advanced status and the stress factors were also included because the addition of clinical rotations in many programs during the 2nd year may change the way stressors affect state anxiety. Bivariate correlations between predictors are presented in Table 7.

The initial model, presented in Table 8, was shown to be significant, [$F(20,103)=2.16$, $p=.006$, adjusted $R^2=.16$]. Predictors were removed individually, such that the variable with the highest p-value was removed as long as the adjusted R^2 increased and the AIC decreased, resulting in the final model, which was also shown to be significant [$F(9,114)=4.11$, $p<.001$, adjusted $R^2=.19$], containing four significant predictors (see Table 7). The predictors in the final model were trait anxiety, the Interpersonal Demands factor, the Isolating Circumstances factor, and the interaction between the Professional Uncertainty factor and advanced status.

Rewarding Experiences: Qualitative Analysis

When invited to describe the most rewarding aspects of their experiences as genetic counseling students, 202 students provided written comments. There were three themes: 1) Academic Rewards, 2) Interpersonal Interactions, and 3) Career and Personal Affirmation.

Theme 1: Academic Rewards (n= 111)

This theme contained comments involving students' realizations that they possessed the requisite knowledge and skills for genetic counseling, they were learning a great deal, and their clinical experiences were very positive. A number commented on being able to apply various portions of the genetic counseling curriculum (e.g., "Getting to use what I learn in the classroom in real life!"). A few students mentioned feeling fulfilled by taking coursework they truly enjoy, and/or being successful in courses (e.g., "Seeing the hard work I have put in pay off. For example, getting an A on a test or doing well at a clinic or in a role play setting."). Three students identified psychosocial knowledge or skills as rewarding (e.g., "Gaining confidence and ability to provide psychosocial support for patients.").

Theme 2: Interpersonal Interactions (n= 103)

The most rewarding experience to date for many participants involved contact with people, specifically, patients, professionals, and classmates. A variety of aspects of patient interactions were rewarding including helping, teaching and supporting them (e.g., "My patients. While some can be problematic, most are very grateful for the information given and very graceful and forgiving about any mistakes that I make. If it weren't for the confidence I get from my patients I would not have been able to finish my program."). Professional interactions included those with faculty, supervisors, counselors, program administration and doctors (e.g., "…Also, the passion and the dedication which I observe in my professors and super-

Table 7 Correlations between predictors of state anxiety (n=124)

Variable	1	2	3	4	5	6	7	8	9	10	11
1. State Anxiety Score	1										
2. Trait Anxiety Score	.33**	1									
3. Advanced Status	−.05	−.13	1								
4. Debt	−.06	.10	−.01	1							
5. In a Romantic Relationship	−.03	.04	−.01	.06	1						
6. Relocated	.08	−.10	.19*	−.06	−.05	1					
7. Professional Uncertainty	−.02	.00	.19*	.12	−.06	−.10	1				
8. Personal Life Events	−.02	−.13	.21*	.20*	.00	−.06	.38**	1			
9. Interpersonal Demands	.03	−.03	.22*	.13	.07	−.04	.48**	.51**	1		
10. Academic Demands	−.16	−.06	.05	.16	−.07	−.04	.53**	.29**	.52**	1	
11. Isolating Circumstances	−.15	−.01	.20*	.11	−.15	.11	.46**	.42**	.52**	.46**	1

*$p<.05$; **$p<.001$

Table 8 Summary of multiple regression analysis predicting state anxiety ($n = 124$)

Variable	R^2	AIC	B	SE B	β	p
Trait Anxiety Model	.11	384.35				
Intercept			28.09	4.30	–	<.001
Trait Anxiety			0.37	0.10	0.33	<.001
Initial Model	.16	393.34				
Intercept			26.84	5.58	–	<.001**
Trait Anxiety			0.39	0.11	0.34	<.001**
Advanced Status			−0.31	0.92	−0.03	.73
Debt			0.00	0.02	−0.01	.90
In a Romantic Relationship			−1.42	0.94	−0.14	.13
Relocated			1.63	1.41	0.11	.25
Professional Uncertainty			0.87	8.51	0.16	.92
Personal Life Events			−3.69	6.81	−0.64	.59
Interpersonal Demands			1.40	7.15	0.25	.84
Academic Demands			6.88	7.04	1.21	.33
Isolating Circumstances			0.18	7.75	0.03	.98
Trait Anxiety X Professional Uncertainty			−0.03	0.19	−0.01	.85
Trait Anxiety X Personal Life Events			0.09	0.15	0.02	.56
Trait Anxiety X Interpersonal Demands			−0.01	0.16	0.00	.95
Trait Anxiety X Academic Demands			−0.16	0.15	−0.03	.31
Trait Anxiety X Isolating Circumstances			−0.06	0.17	−0.01	.74
Advanced Status X Professional Uncertainty			1.65	1.33	0.33	.22
Advanced Status X Personal Life Events			−0.26	1.23	−0.05	.83
Advanced Status X Interpersonal Demands			1.35	1.47	0.27	.36
Advanced Status X Academic Demands			−2.51	1.33	−0.51	.06
Advanced Status X Isolating Circumstances			1.74	1.24	0.35	.16
Final Model	.19	379.89				
Intercept			26.04	4.31	–	<.001**
Trait Anxiety			0.41	0.09	0.37	<.001**
Advanced Status			0.00	0.85	0.00	.99
Professional Uncertainty			−1.61	0.91	0.25	.08
Interpersonal Demands			1.51	0.61	0.27	.02*
Academic Demands			7.81	5.25	1.37	.14
Isolating Circumstances			−1.19	0.57	−0.21	.04*
Trait Anxiety X Academic Demands			−0.18	0.12	−0.04	.12
Advanced Status X Professional Uncertainty			2.95	1.11	−0.60	.01*
Advanced Status X Academic Demands			−1.87	1.14	−0.38	.10

R^2 presented is the adjusted R^2.
*p<.05; **p<.001

visors for this field…"). Many students commented about having formed friendships with their classmates, and valuing their support and understanding (e.g., "I have really bonded with the other students in my course, and have really benefited from the peer support that we all give and receive. We are great friends and it has been wonderful to have that informal but invaluable support.").

Theme 3: Career and Personal Affirmation (n= 65)

Responses in this theme described intrinsic benefits. Some students mentioned feeling reassured about their career choice (e.g., "I have confirmation every day that I have found the career path that is right for me. I love learning about genetic counseling and having a chance to practice my practical counseling skills."). Some commented that their experiences have allowed them to achieve personal growth/goals (e.g., "Seeing what I have been able to accomplish, such as my thesis and the work I do with clients; pushing myself to do things that I never imagined I would be able to do back when I was in high school."). Others described an increase in self-confidence (e.g., "The most rewarding aspect is to realize how far you've come since your first year. Once you're in clinic and actually counseling patients, it's amazing to have that

feeling of "yes, I can do this" compared to being worried about taking a pedigree in the beginning.").

Challenging Experiences: Qualitative Analysis

When invited to share the most challenging or stressful aspects of their experiences as genetic counseling students, 205 individuals provided comments. There were six themes: 1) Academic/Professional Demands, 2) Interpersonal Interactions, 3) Intrapersonal, 4) Financial 5) Isolation, and 6) Miscellaneous.

Theme 1: Academic/Professional Demands (n= 135)

Academic or professional obligations variously included work load/time constraints, course work/grades, program specific challenges, the job search, and clinical rotations. A large number of students identified the limited amount of time to complete expected or requisite activities as a major challenge (e.g., "The fact that there's so much to know, and I can never seem to remember it all, no matter how hard I try. I also always feel like I'll never get caught up with knowledge and it makes me feel inadequate.").

Specific course requirements such as classes, thesis projects, presentations and role-playing were challenging for many students [e.g., "The most stressful aspect has either been the heavy course load during the first semester of first year or my thesis project. The thesis project takes a lot of self discipline, which can be hard when you have so many other things (i.e. clinic, classes, and personal life) going on."; and "The idea that I've worked harder in my first semester than I ever did in undergrad, and I might still get worse grades than I did then. I think grades are intrinsically rewarding for anyone who has made it this far in their education, and I have to remind myself that the learning process is what's important."]. Some challenges likely were unique to the students' programs. For instance, several individuals expressed frustration over the lack of organization, support or guidance within their program.

Some students expressed concerns about job availability and selection (e.g., "I would like to be hired in the city in which I am training. Therefore, I am constantly stressing about my performance at school, in the clinic, and in the lab. I feel I am always being watched, so I want to put my best foot forward at all times, in hopes of being hired at the end of the training."). A few mentioned challenges specific to clinical rotations (e.g., "Presenting a case."; and "Learning how to appropriately provide psychosocial genetic counseling.").

Theme 2: Interpersonal Interactions (n= 59)

Interactions with various types of individuals proved to be challenging for some students. They variously specified personal interactions, professional interactions, classmate interactions, and patient interactions. The majority of challenges posed by personal interactions included leaving behind or not having time for family and friends (e.g., "Most of my stress comes from dealing with factors outside of school, such as family and friends and work, on top of my genetic counseling obligations. The commitment of time and energy required for graduate school has made dealing with the normal stresses of life more difficult then I had anticipated."). Professional interactions included those with faculty, supervisors, counselors, program administrators, and doctors (e.g., "FACULTY. I have met some of the best and some of the worst faculty members in this training program. Training should be training and not a test where if you fail you are humiliated or abused. Dealing with supervisors who have humiliated and literally been abusive has been a very traumatic experience.").

Challenging classmate interactions included personality conflicts and competition [e.g., "I've found it really stressful dealing with my fellow classmates…Also, my fellow students get upset and cry a lot. It's really draining to constantly deal with my own stress (from my classes and personal relationships) on top of their stress."]. A few students mentioned challenges caused by interacting with patients [e.g., "Dealing with patient encounters that involve charged emotions (depression and anger mostly)."].

Theme 3: Intrapersonal (n= 25)

Responses in this theme reflected challenges concerning personal dynamics, especially lack of confidence and inner conflicts. A few students questioned their competence, qualifications, and/or intelligence, in some cases as a result of interactions with supervisors (e.g., "I personally lack confidence in my own abilities, and I have and will continue to struggle with that. I have felt often that I can't be open and honest with the course coordinators or other tutors or supports, because ultimately one day I might be working for them and I don't want to appear weak or incompetent to them. I feel like I am being constantly judged, and that gives me a lot of stress."). Some students described internal conflict such as moral conflict, self-pressure, and pressure to become more empathic (e.g., "sorting through how I personally feel about the ethical issues involved in counseling"; and "…trying to make myself empathetic. It is a quality I lack in a natural sense, so I must work on myself to make myself the best genetic counselor I can be.").

Theme 4: Financial (n= 25)

Comments in this theme described financial concerns and worries about debt [e.g., "The OVERWHELMING debt. I

won't be making that much money when I am done, but I will have a lot of debt. It is guiding my job search (I am more focused on a higher salary rather than necessarily doing something that I am most interested in).”].

Theme 5: Isolation (n= 21)

Feelings of isolation arose for reasons such as lack of time to socialize and moving to a new area and not knowing anyone (e.g., “The fact that my life is completely dedicated to my training at this point in time and that I do not have time for myself or to nurture relationships in my life. Moving far away from my home also increased the amount of loneliness and isolation that I feel and the feeling of being unsupported.”).

Theme 6: Miscellaneous (n= 17)

Responses in this theme variously included comments about commuting stresses, generating thesis ideas, one’s partner being unable to find a job, and managing one’s personal expectations.

Advice: Qualitative Analysis

When invited to provide advice to incoming students about ways to manage stress effectively, 202 individuals provided comments. There were seven themes: 1) Practice Self-Care, 2) Manage Responsibilities, 3) Seek Support, 4) Use Cognitive Strategies, 5) Maintain Realistic Expectations, 6) Optimize Living Arrangements, and 7) Miscellaneous.

Theme 1: Practice Self-Care (n= 114)

Many participants suggested students should/could take care of themselves. Their advice involved finding personal time, developing healthy outlets, including those that do not involve the program and classmates, and maintaining a work/personal life balance [e.g., “Graduate school will take up all the time that you give it, so it’s important to set limits and find things that you like doing.”; “…find things to do outside of the program so you can interact with other people and support other areas you are interested in as well”; and “Prioritize things in your personal and academic life. Strive to create balance, and leave room for personal improvement (exercise, eating well, being in touch with friends).”].

Theme 2: Manage Responsibilities (n= 69)

This theme involved advice on how to handle the various responsibilities associated with one’s graduate program. Many students stressed the importance of time management, prioritization, and personal organization, with an emphasis on keeping up with curricular requirements (e.g., “Dump your bad habits from undergrad—don't put things off till the last minute, it won't work anymore. Learn to take responsibility for everything—this is just like having a job, and people are evaluating you beyond the tests and projects…”). A few students recommended budgeting and planning for financial hardship during school.

Theme 3: Seek Support (n= 57)

Comments in this theme emphasize ways to gather support and reassurance from others. Much of this advice involved maintaining relationships with friends, family, classmates, and supervisors. Also included are suggestions to ask for help or clarification from informal (e.g., classmates) and formal (mental health counselors) sources, and to communicate about problems as they arise (e.g., “Classmates have been the biggest help to me, because they do understand what you are going through. You can all vent about stressful things together.”; and “Seek outside counseling early if you become stressed, it will help calm you down to have someone outside of the program to talk to.”).

Theme 4: Use Cognitive Strategies (n= 42)

This theme contained advice to make an effort to remember the positive aspects/perspective which may be lost in times of stress. Some participants recommended supportive self talk and positive reframing statements (e.g., “If you really focus on learning and gaining experiences for the pure enjoyment and the importance/relevance of the information for your future work, you naturally will find yourself less stressed than students who worry more about ‘making the grades’.”; and “Also, it is important to maintain perspective. Even if things don't seem to be going well, it's important to remind yourself that you are a student and aren't expected to know everything. The purpose of graduate school is to learn, so be patient with yourself.”).

Theme 5: Maintain Realistic Expectations (n= 8)

A few students recommended developing accurate perceptions of time commitments/limitations, financial burdens, and the demands and rigor that are expected of them (e.g., “I would just want to make sure they understand that this is a huge commitment. It isn't like many other Master's programs and will consume most of their time for the two years in which they are enrolled. Knowing that it is going to be tough from the start may help them to ‘stay on the ball’ from the beginning.”).

Theme 6: Optimize Living Arrangements (n= 8)

Some students offered suggestions about who to live with, what to consider when choosing a location, and how to arrange one's living environment (e.g., "Make sure that "home" is as stress free as possible. Get to school early/stay late to get work done so that your time at home with friends/family/significant others can be as relaxed as possible."; and "…Do not room with your classmates—you spend a lot of time with a small group of classmates during the day…").

Theme 7: Miscellaneous (n= 14)

A few responses could not otherwise be categorized. They include specific advice (e.g., not working, and treating school like a job), comments that students were unable to offer advice because they were still trying to figure out their own coping strategies, and suggestions to be strategic when selecting either a genetic counseling program or the field in general (e.g., "When choosing a program, be sure to first delineate that which is most valuable to you, and then attend the program that will most closely preserve these things…"; "…Research the program you are joining well, [do] not just look at the ranking…").

Discussion

In this study, 225 genetic counseling students completed an anonymous, online survey in which they described their state and trait anxiety and frequency and intensity of stressors they experienced, and they also provided advice about stress management for incoming students. The following sections contain a discussion of major findings, study limitations, program implications, and future research recommendations.

Levels of Student State and Trait Anxiety

The state anxiety levels of genetic counseling students indicate they were generally experiencing high levels of stress at the time of this study, so great in fact they were not significantly different than a sample of outpatients diagnosed with obsessive compulsive disorder (Kennedy et al. 2001). Data were collected near the end of the semester, a time when many students juggle final exams, major projects, and family obligations. Therefore, it is unclear how well this one assessment of their state anxiety captures their "typical" experience.

The students in this study also ranked high on the Spielberger et al. (1983) norms for trait anxiety and had significantly higher trait anxiety scores than adult women and medical students (Vontver et al. 1980). While the mean trait anxiety score for genetic counseling students was significantly lower than for patients with anxiety disorders, some students' scores were comparable to those in the outpatient sample. For example, 16% of the current sample had trait scores of 49 or greater (similar to those of the sample of OCD patients), though only 3% had scores of 53 or greater, (similar to the sample of GAD patients). Thus, while genetic counseling programs may be attracting and selecting students with stronger tendencies to become anxious relative to typical working adult females, the majority do not appear to have clinical levels of trait anxiety.

In some ways the finding that anxiety levels are higher than typical adult working women may be beneficial to the profession. For example, an anxious student may be more sensitive to feelings of failure and spend more time studying as a result. Such vigilance may promote strong study habits and thoughtful case preparation. Potential negative effects must also be considered, as some students may become preoccupied with self-doubts. Spielberger et al. (1983) stated that individuals with higher trait anxiety have higher state anxiety in situations in which their adequacy is evaluated, and/or they experience failure, especially when these situations involve interpersonal relationships and threatened self-esteem. Responses to the open-ended items seem to reflect this phenomenon, as a number of individuals identified a lack of confidence, interpersonal challenges, and/or intrapersonal conflict (e.g., self-pressure) as major stressors. Additional research is necessary to identify the effects of anxiety in this population, further refine understanding of its causes, and begin to test specific hypotheses.

Predictors of State Anxiety

Demographic and situational factors were tested to see if they contribute to genetic counseling students' state anxiety. The final model revealed trait anxiety, Interpersonal Demands, the interaction of advanced student status and Professional Uncertainty, and Isolating Circumstances combined to predict 19% of the variance in state anxiety. Generally, students experiencing the most state anxiety tended to have high levels of trait anxiety, to frequently experience challenging interpersonal aspects of their program and doubts about their career paths after their first year, and they tended not to experience isolation frequently. The association between trait anxiety and state anxiety is consistent with previous findings, as well as with the theoretical definition of anxiety (Spielberger et al. 1983). In the present sample, trait anxiety alone accounted for 11% of the variance in state anxiety scores. While this is a sizeable predictor, clearly additional factors contribute to genetic counseling students' state anxiety.

The relationship between Interpersonal Demands and state anxiety was expected, though the qualitative analyses revealed a complex picture of how students perceive interpersonal relationships. Many participants listed interpersonal interactions as the most rewarding aspect of their experience, while others listed interpersonal interaction as the most challenging aspect. These results are not necessarily mutually exclusive, as an experience can be anxiety-provoking and rewarding (e.g., receiving corrective feedback from supervisors). Interpersonal interactions appear to be a particularly salient domain that may buffer and/or contribute to stress, depending on the nature of those interactions. Future studies are needed to clarify which aspects of interpersonal relationships are problematic, particularly relationships between students and faculty/supervisors and those between students and their classmates.

The finding that students in their second or third year would experience more anxiety about Professional Uncertainty stressors makes sense conceptually. As students gain increased knowledge of and experience with the profession, they are able to judge more accurately the "goodness of fit." Moreover, anxiety may increase for advanced students if they feel it is "too late" to change their minds (e.g., they have invested too much time, money, and/or effort).

The finding that the Isolating Circumstances factor was negatively related to state anxiety was unexpected and seems counterintuitive. Perhaps individuals who frequently face isolating stressors have developed strategies for effectively managing their anxiety compared to those or rarely or never experience such stresses. Alternatively, it is possible that students who experience these stressors at high frequencies are so used to the elevated anxiety that their "normal" state anxiety has been reset to a relatively high level. Thus, they do not consider what might objectively be a substantial amount of anxiety as "out of the ordinary." Further research on this factor and its relationship to anxiety is needed.

The Personal Life Events and Academic Demands factors were not significant predictors of state anxiety. Perhaps these stressors are more universal and "expected" among genetic counseling students, making them less informative when it comes to differentiating why some students are more anxious than others. Given the number of predictors in the model, the findings might also be due to a power issue (discussed further in Study Limitations).

The final model accounts for 19% of the variability in state anxiety, but another 81% of the variance was not determined in this study. There likely are additional sources of stress not clearly identified or assessed by the present study. Interviews with genetic counseling students may identify additional sources of stressors and provide further clarity regarding the predictors that were significant.

Specific items regarding clinical experiences (thought to be a potential source of stress) were not included in this survey because most first year students may have limited patient contact, and therefore, inclusion of items about patient interactions might have resulted in an underestimation of their frequency and/or intensity. Some studies of nursing and medical students demonstrate that stress is a result of the time spent in clinical rotations (Tucker et al. 2006), and the amount of time in clinic has been positively correlated to the level of stress in psychology students (Morton and Worthley 1995). It is reasonable to expect genetic counseling students would similarly indicate clinic as a source of stress. Yet only a handful of students mentioned patient interactions when describing challenging aspects of their program. Perhaps the presence of a supervisor during sessions provides a "safety net" (Hendrickson et al. 2002), buffering the stress posed by challenging patients/patient interactions.

Rewarding Aspects of Genetic Counseling Programs

In an investigation of sources of stress, it is noteworthy that the majority of genetic counseling students provided highly positive endorsements of their graduate experiences. Generally, they reported enjoying what they were learning, the individuals with whom they were working, and confirming for themselves how much they enjoy and value the field. The vast majority of comments involved academic or skill-oriented aspects of their graduate experience. These findings indicate students enjoy gaining both scientific knowledge and psychosocial skills. Other prevalent themes concerned their career affirmation, self-growth, and increased competence/confidence. These rewards likely serve as stress buffers.

What Are the Most Challenging Aspects of Genetic Counseling Programs?

A great number of students reported work load and time management as the most challenging aspect of their program. For many, this challenge seemed to affect their opportunities for personal time and relaxation. The information participants provided about how they spend a typical day illustrates these demands. On average, time for sleep and personal pursuits (leisure, maintaining personal relationships, socializing, and exercise) appears to decrease as students progress in the program, while time spent on their professional obligations (class, homework/study, work, transit, clinical, clinical prep, thesis, lab, and volunteering) increases. This seeming trend continues for students beyond the second year. They obviously experience difficulty maintaining a balance of work, relationships, and leisure. Genetic counseling students identified academ-

ic components as both the most stressful and the most rewarding aspect of their experiences, suggesting they are, at least temporarily, willing to relinquish their sleep and personal time. Nevertheless, if they do not find a better balance throughout their careers they may experience feelings of burnout and fatigue.

Participants' Stress Management Advice for Prospective Students

The majority of advice from current students for prospective students concerns the practice of self-care (e.g., making time for themselves, seeking healthy outlets and maintaining balance within their daily schedule). Of the 202 genetic counseling students who provided advice for incoming students, only 8 suggested seeking support from professionals (psychological counselors, supervisors, the program director). Seeking support from classmates, family members, or friends outside of the program, however, was recommended by 48 students. These findings suggest genetic counseling students' tend to prefer informal sources of help to formal ones. Perhaps genetic counseling students are less knowledgeable about the availability of formal support services, would feel stigmatized if they availed themselves of such services, and/or they have been socialized to "solve their own problems." These reasons are highly speculative and require investigation in future studies.

Study Limitations

Several limitations suggest caution in drawing conclusions from the findings of this study. The data are from a non-random sample and participants may differ in significant ways from non-participants. For instance, response bias may have occurred, as it is conceivable students who were the most stressed were unable or unwilling to complete this survey. Findings are self-report and may thus be susceptible to social desirability bias, though self-report anxiety measures have been found to correlate with anxiety measured physiologically (Kantor et al. 2001). Another issue concerns the number of participants removed from the regression analysis because of missing data. It is unclear whether those removed differed in important ways from those included, and thus the results of the analysis must be considered tentative. A post hoc power analysis showed the present sample of 124 students would detect a moderate effect size (f^2=0.15) with a power of .65, but an a priori power analysis showed that with 191 participants, the same effect size would have a power of .90. It also cannot be confirmed that each returned survey was produced by a new individual. Future studies could include access codes or identification numbers to prevent participants from completing the survey more than once.

The STAI scores are dependent on situational circumstances, and state anxiety is expected to vary over time. Although state anxiety did not differ significantly between first year and second year students, students likely vary over time and across different program experiences (e.g., prior to beginning clinical rotations, during rotations, nearing completion of the program). Monitoring student anxiety longitudinally would provide a more complete picture of fluctuations in the types and severity of stressors, as well as students' ability to cope with them. In addition, although a widely used instrument, the STAI has been criticized by some for a lack of differentiation between anxious and depressive symptoms in both clinical (Kennedy et al. 2001) and non-clinical samples (Caci et al. 2003; Endler et al. 1992). Future studies might include a separate measure of depression (Beuke et al. 2003).

The choice to base the stress factors on frequency ratings is another potential limitation. Stress is a complex construct that includes frequency, intensity, prior experiences, physiological reactions, coping strategies, expectations, locus of control, and myriad other concepts. Frequency ratings provided a measure of how *common* stressors were; we judged this to be a more useful dimension in that findings would likely apply more broadly across students. If intensity ratings had been used, the factor structure of stressors may have differed and yielded a different relationship to state anxiety. Intensity ratings may have more strongly emphasized individual differences because they involve *reactions* to stressors.

Genetic Counseling Program Implications

The present results have several potential implications for genetic counseling programs. First, time management and organizational skills are crucial for academic success, professional development, and personal well-being. This is especially true of maintaining time in one's schedule to rest and relax. Although students likely hone these skills as they advance professionally, genetic counseling graduate programs might provide resources to help them learn to better manage their time. For instance, university counseling centers typically offer workshops or consultation on stress and time management. Some students might benefit from pursuing other formal counseling services, particularly if their stress levels are related to problematic performance and/or lowered well-being. Knowledge of these services may be of particular benefit to international students, as studies have shown international students tend to be less aware than their domestic classmates of on-campus support services (Hyun et al. 2007). Genetic counseling programs could include information about formal support services in their orientation materials. Programs may wish to "take it further," providing a support group for students facilitated

by professionals unaffiliated with the genetic counseling program.

Research Recommendations

More studies are needed to assess variables that may account for anxiety and stress in genetic counseling students. Interviews might provide rich information concerning stressors and available supports. Investigations of the use of supportive services such as professional counseling, time management seminars, and relaxation techniques should be done to determine their efficacy. Given the current findings that genetic counseling students have a relatively high average level of trait anxiety, one might speculate that practicing genetic counselors would have similarly high trait anxiety scores. If this is the case, high trait anxiety might predispose certain genetic counselors to experience compassion fatigue (Benoit et al. 2007; Udipi et al. 2008), a phenomenon related to a desire to be in control, perfectionism, wanting to be liked, and the intense nature of the clinical work. Further research on genetic counselor anxiety could provide valuable information about recognizing and managing compassion fatigue. Finally, longitudinal studies would address whether helping students learn coping strategies would result in improved well-being, enhanced clinical performance, increased career satisfaction, and decreased compassion fatigue throughout their careers.

Acknowledgments This study was completed in partial fulfillment of the requirements for the first author's Master of Science degree from the University of Minnesota. The authors would like to thank the students who participated in this study. Dr. Christina Palmer served as Action Editor for this manuscript.

References

Addis, J., & Bernard, M. E. (2002). Marital adjustment and irrational beliefs. *Journal of Rational-Emotive & Cognitive-Behavioral Therapy, 20*, 3–13.

Arora, S., Sevdalis, N., Aggarwal, R., Sirimanna, P., Darzi, A., & Kneebone, R. (2010). Stress impairs psychomotor performance in novice laparoscopic surgeons. *Surgical Endoscapy, 24*, 2588–2593.

Benoit, L., McCarthy Veach, P., & LeRoy, B. (2007). When you care enough to do your very best: genetic counselors experiences of compassion fatigue. *Journal of Genetic Counseling, 16*, 299–312.

Beuke, C. J., Fischer, R., & McDowall, J. (2003). Anxiety and depression: why and how to measure their separate effects. *Clinical Psychology Review, 23*, 831–848.

Boyd, N. S., Lewin, J. E., & Sager, J. K. (2009). A model of stress and coping and their influence on individual and organizational outcomes. *Journal of Vocational Behavior, 75*, 197–211.

Caci, H., Bayle, F. H., Dossios, C., Robert, P., & Boyer, P. (2003). The State-Trait Anxiety Inventory measures more than anxiety. *European Psychiatry, 18*, 394–400.

Cloninger, C. R., Pryzbeck, T. R., & Svrakic, D. M. (1991). The Tridimensional Personality Questionnaire: U.S. normative data. *Psychological Reports, 69*, 1047–1057.

Corrigan, P. W., Holmes, E. P., & Luchins, D. (1995). Burnout and collegial support in state psychiatric hospital staff. *Journal of Clinical Psychology, 51*, 703–710.

Dahlin, M., Joneborg, N., & Runeson, B. (2005). Stress and depression among medical students: a cross-sectional study. *Medical Education, 39*, 594–604.

Daniels, J. A., & Larson, L.M. (2001). The impact of performance feedback on counseling self-efficacy and counselor anxiety. *Counselor Education & Supervision, 41*, 120–130.

Dehle, C., & Weiss, R. L. (2002). Associations between anxiety and marital adjustment. *The Journal of Psychology, 136*, 328–338.

Dziegliewski, S. F., Roest-Martl, S., & Turnage, B. (2004). Addressing stress with social work students: a controlled evaluation. *Journal of Social Work Education, 40*, 105–119.

Endler, N. S., Cox, B. J., Parker, J. D. A., & Bagby, R. M. (1992). Self-reports of depression and state-trait anxiety: evidence for differential assessment. *Journal of Personality and Social Psychology, 63*, 832–838.

Eshel, Y., & Kadouch-Kowalsky, J. (2003). Professional possible selves, anxiety, and seniority as determinants of professional satisfaction of psychotherapists. *Psychotherapy Research, 13*, 429–442.

Firth-Cozens, J. (2001). Medical student stress. *Medical Education, 35*, 6–7.

Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: study of emotion and coping during three stages of a college examination. *Journal of Personality and Social Psychology, 48*, 150–170.

Giarelli, E., & Tulman, L. (2003). Methodological issues in the use of published cartoon data. *Qualitative Health Research, 13*, 945–956.

Goldman, C. S., & Wong, E. H. (1997). Stress and the college student. *Education, 117*, 604–610.

Grupchup, G. V., Borrego, M. E., & Konduri, N. (2004). The impact of student life stress on health related quality of life among doctoral pharmacy students. *College Student Journal, 38*, 292–301.

Gudykunst, W. B., & Nishida, T. (2001). Anxiety, uncertainty, and perceived effectiveness of communication across relationships and cultures. *International Journal of Intercultural Relations, 25*, 55–71.

Heaman, D. (1995). The Quieting Response (QR): A modality for reduction of psychophysiologic stress in nursing students. *The Journal of Nursing Education, 34*, 5–10.

Hendrickson, S. M., McCarthy Veach, P., & LeRoy, B. S. (2002). A qualitative investigation of student and supervisor perceptions of live supervision in genetic counseling. *Journal of Genetic Counseling, 11*, 25–49.

Hendryx, M. S., Haviland, M. G., & Shaw, D. G. (1991). Dimensions of alexithymia and their relationships to anxiety and depression. *Journal of Personality Assessment, 56*, 227–37.

Hudson, S. A., & O'Regan, J. (1994). Stress and the graduate psychology student. *Journal of Clinical Psychology, 50*, 973–977.

Hyun, J., Quinn, B., Madon, T., & Lustig, S. (2007). Mental health need, awareness, and use of counseling services among international graduate students. *Journal of American College Health, 56*, 109–118.

Jiang, N., Sato, T., Hara, T., Takedomi, Y., Ozaki, I., & Yamada, S. (2003). Correlations between trait anxiety, personality and fatigue: study based on the Temperament and Character Inventory. *Journal of Psychosomatic Research, 55*, 493–500.

Kantor, L., Endler, N. S., Heslegrave, R. J., & Kocovski, N. L. (2001). Validating self-report measures of state and trait anxiety against a physiological measure. *Current Psychology: Developmental, Learning, Personality, Social, 20*, 207–215.

Kennedy, B. L., Schwab, J. J., Morris, R. L., & Beldia, G. (2001). Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *The Psychiatric Quarterly, 72*, 263–276.

LeBlanc, V. R., & Bandiera, G. W. (2007). The effects of examination stress on the performance of emergency medicine residents. *Medical Education, 41*, 556–564.

Lindesay, J., Baillon, S., Brugha, T., Dennis, M., Stewart, R., Araya, R., et al. (2006). Worry content across the lifespan: an analysis of 16- to 74-year-old participants in the British National Psychiatric Survey 2000. *Psychological Medicine, 36*, 1625–1633.

Matheny, K. B., Ashby, J. S., & Cupp, P. (2005). Gender differences in stress, coping, and illness among college students. *Journal of Individual Psychology, 61*, 365–379.

McGregor, B. A., Antoni, M. H., Ceballos, R., & Blomberg, B. B. (2008). Short Communiation: very low CD19+ B-lymphocyte percentage is associated with high levels of academic stress among healthy graduate students. *Stress and Health, 24*, 413–418.

McKinzie, C., Altamura, V., Burgoon, E., & Bishop, C. (2006). Exploring the effects of stress on mood, self-esteem, and daily habits with psychology graduate students. *Psychological Reports, 99*, 429–448.

Meijer, J. (2001). Stress in the relation between trait and state anxiety. *Psychological Reports, 88*, 947–964.

Morton, J. R., & Worthley, J. S. (1995). Psychology graduate program retention, completion and employment outcomes. *Journal of Instructional Psychology, 22*, 349–354.

Mouret, G. L. M. (2002). Stress in a graduate medical degree. *The Medical Journal of Australia, 177*, S10–S11.

Polson, M., & Nida, R. (1998). Program and trainee lifestyle stress: a survey of AAMFT student members. *Journal of Marital and Family Therapy, 24*, 95–112.

Spielberger, C., Gorsuch, M. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the State-Trait Anxiety Inventory for Adults: Sampler set.* Mind Garden Consulting Psychologist Press, Inc.

Stecker, T. (2004). Well-being in an academic environment. *Medical Education, 38*, 465–478.

Stewart, S. M., Betson, C., Lam, T. H., Marshall, I., Lee, P. W. H., & Wong, C. M. (1997). Predicting stress in first year medical students: a longitudinal study. *Medical Education, 31*, 163–168.

Toews, J. A., Lockyear, J. M., Dobson, D. J. G., Simpson, E., Brownell, A. K. W., Brenneis, F., et al. (1997). Analysis of stress levels among medical students, residents, and graduate students at four Canadian schools of medicine. *Academic Medicine, 72*, 997–1002.

Tucker, B., Jones, S., Mandy, A., & Gupta, R. (2006). Physiotherapy students' sources of stress, perceived course difficulty and paid employment: comparison between Western Australia and United Kingdom. *Physiotherapy Theory and Practice, 22*, 317–328.

Udipi, S., McCarthy Veach, P., Kao, J., & LeRoy, B. S. (2008). The psychic cost of empathic engagement: personal and demographic predictors of genetic counselor compassion fatigue. *Journal of Genetic Counseling, 17*, 459–471.

Uskun, E., Kisioglu, A. N., & Ozturk, M. (2008). Stress and its effects on depression and anxiety among undergraduates. *Primary Care & Community Psychiatry, 13*, 73–82.

Vontver, L., Irby, D., Rakestraw, P., Haddock, M., Prince, E., & Stenchever, M. (1980). The effects of two methods of pelvic examination instruction on student performance and anxiety. *Journal of Medical Education, 55*, 778–85.