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EDITORIAL

Why Do I Do Research? Why Should You Do Research?

I am going to be completely honest there, are many reasons in my life that have led me to be an active researcher. Some of these reasons are self-serving; I would never have been a Full Professor, an Endowed Chair, and perhaps would never have been named Dean if I were not a researcher. Likewise, I doubt that I would have been chosen to be the Editor of the *Journal of Nursing Scholarship*. Yet I don't think the main reason that I conduct research is to have gained any of these positions. My main motivation has not been my own career advancement. Although to be perfectly honest, career advancement is a wonderful secondary outcome.

Certainly, being a successful researcher has meant that I have had lots of grant funding. Grant funding has meant that I have been able to get summer salary, teach fewer courses, and have a newer computer and printer. So, you could think that I was following the money. However, more summer salary really meant I had more summer work. I am someone who likes sitting on a chair outside reading a popular novel as much as the next person; so, I am acutely aware that more salary often means less time. The lure of grant funding was never primarily about increasing my salary. I love to teach so grant funding was never about having the ability to "buy out" of teaching. In fact, nothing bothers me as a Dean quite so much as people who base their budget on how much research they can substitute for teaching rather than how much research they need to commit to doing to ensure excellent science. I personally believe that excellent researchers must be excellent teachers and vice versa. My struggle has always been how to combine practice with teaching and research so that each informed the other. Achieving this balance has been a main motivating factor. (And really, computers aren't that expensive; I can buy one for myself if I want a new computer.) Grant funding is wonderful and enabled me to do research I would not have been able to conduct otherwise. But the funding was always about doing important research not about any personal gain.

I do conduct research for selfish reasons. I have gotten to learn things and go places that I would never have seen or known if I were not an active researcher. I have conducted research in places like Malawi and Uganda and learned so much more about women having babies than I ever could have learned if all my experience happened in

just one country. I have spent sabbaticals in research labs and in hospital units. The generosity of people willing to expand my horizons and teach me has been humbling. In large part I am a researcher because I like learning new things. What is a better way to learn than to create new knowledge?

I do think that I publish research, in part, to leave a legacy of publication, which, is in one sense, about the ethical need to disseminate research that people have agreed to participate in for the common good. If I don't publish, has the public really benefited maximally? Yet I publish for myself also because publication is about academic legacy.

However, at the end of the day I conduct research to inform practice. I love good science. I think we all need to be involved in answering lots of different questions to answer large problems in practice as well as small problems in practice. I think that as a nurse I will do things daily that make a difference, and I will also do things daily that are a waste of time. Only good science helps me to separate out how to spend my time to make the biggest and best difference for my patients.

So yes, I do research to leave a legacy and for some of the career benefits that being a known researcher has brought me. Primarily I do research to change practice and policy. I hope you are doing research because you want to improve practice, inform policy, and because you love good science. I truly hope for the discipline, and for the science, that you are not doing research to become well known, have a great curriculum vitae, flourish academically, have nice research toys, and so on. We need to regularly stop and remember our motivations and think carefully about what we are willing to do with others and for others. Being a scientist is hard work. There is no map as one is forging new paths where others have not gone. While that will always be a challenge, there is no greater joy than knowing that your work has truly made a difference in ways you cannot imagine. I hope you will spend your next quiet moment getting back in touch with why you really want to be a researcher, and then I hope you will find the strength to be an even better researcher. We all need the knowledge you will discover.

Susan Gennaro
Editor



CLINICAL SCHOLARSHIP

Associations of Bullying and Cyberbullying With Substance Use and Sexual Risk Taking in Young Adults

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Key words

Adolescence, bullying, condom use, cyberbullying, drug use, health risk behaviours, smoking, substance use, undergraduate students, young adults

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Abstract

Purpose: This study aims at identifying the sex-stratified associations of involvement in traditional bullying during middle and high school years and in cyberbullying during college years with multiple health risk behaviors in undergraduate students.

Design: This cross-sectional analysis draws on the data of the second wave of the LATO study (Lifestyle & Attitudes in a Student Population) in Greece.

Methods: During November and December 2013, 812 second-year undergraduate students (mean age = 19.3 years; girls = 66.1%) provided data on substance use (smoking, alcohol abuse or drunkenness, illegal drug use including marijuana, hashish, and cannabis) and sexual risk taking (paying for sex and not using condoms) and completed the Cyberbullying and its Effects and the Retrospective Bullying Questionnaires. Logistic regression models performed were adjusted for potential confounders.

Findings: Both male and female late adolescents who were victims of bullying during middle and high school were less likely to use condoms during college years when compared to uninvolved students. Among males, being a bully or victim at school doubled the odds for past month drunkenness and tripled the odds of paying for sex. Greater likelihood to pay for sex was also evident in bullying victims. Cyberbully or cybervictim male students were more likely to report smoking. In female bullying victims, alcohol abuse associations were somewhat conflicting, with decreased lifetime but increased past month likelihood for drunkenness.

Conclusions: Engagement in bullying and cyberbullying is associated with the manifestation of gender-specific health risk behaviors for the different involvement groups in college students.

Clinical Relevance: Involvement in bullying and cyberbullying is a major public health concern due to the associations with multiple health risk behaviors. Nurses and healthcare professionals should adopt multifaceted prevention interventions tailored according to bullying status and gender that extend through all educational levels.

Bullying is any repeated or possibly repeated physical, emotional, or verbal aggressive act by a person or a group of persons that includes an imbalance of power between the victim and the aggressor and differentiates from intimate partner violence or abuse (Gladden, Vivolo-Kantor, Hamburger, & Lumpkin, 2014; Vessey, DiFazio, & Strout, 2013). Although its prevalence is sensitive to different measures and cut-offs, the reference period, and the age of the respondents, bullying is common for a great majority of youth (Vessey et al., 2013). Based on data from different studies, overall occasional and chronic victimization is a reality for around 30% and 12% of students, respectively (Chester et al., 2015), with similar patterns in Greece (Inchley et al., 2016).

Any bullying behavior that is manifested through electronic means is defined as cyber- or electronic bullying (Gladden et al., 2014; Hutson, 2016; Vessey et al., 2013). Again, different measurement methods produce different rates, with cyberbullying frequency in universities varying between 5% and 22.5% (Dilmac, 2009; Schenk & Fremouw, 2012; Zalaquett & Chatters, 2014) and cybervictimization between 19% and 55.3% (Dilmac, 2009; Gahagan, Vaterlaus, & Frost, 2016; Kowalski, Giumetti, Shroeder, & Reese, 2012; Schenk & Fremouw, 2012).

Although the debate whether bullying and cyberbullying represent one unified or two different phenomena with diverse and distinct precedents characteristics is still on (Antoniadou & Kokkinos, 2015; Hutson, 2016), involvement in bullying and cyberbullying is a major public health concern due to the consequences in mental and physical health, as well as in the social life of individuals throughout their lifespan (Niemelä et al., 2011; Vessey et al., 2013).

Involvement in bullying during school years, whether as a bully, a bully-victim, or victim, has been associated with poor psychosocial adjustment, alcohol use, cigarette smoking (Vieno, Gini & Santinello, 2011; Weiss, Mouttapa, Cen, Johnson, & Unger, 2011), lack of self-esteem (O'Moore & Kirkham, 2001), anxiety and depression symptoms, suicidal ideation, antisocial personality disorder (Sourander et al., 2007), and illegal drug and cannabis use (Maniglio, 2015; Valdebenito, Ttofi, & Eisner, 2015). Some of those effects extend into adulthood (Takizawa, Maughan, & Arsenuault, 2014).

Cyberbullying has also been associated with smoking and drinking in teenage bullies and victims (Chan & La Greca, 2016; Vieno et al., 2011), and with illicit drug use and sexual risk behaviors for victimized male and female adolescents (Hertz, Everett Jones, Barrios, David-Ferdon, & Holt, 2015). Engagement in cyberbullying during college is also associated with increased odds of problematic drinking and depression among female students (Selkie, Kota, Chan, & Moreno, 2015) and cybervictimization

correlates to higher depressive symptoms, anxiety, phobic anxiety, and paranoia (Schenk & Fremouw, 2012).

The aforementioned studies share two characteristics: First, although most of them account for gender when evaluating the adverse effects of bullying, they do not make separate gender-based analyses. Gender is a fundamental social construct (femininity and masculinity) that assigns behaviors to individuals based on the "presenting sex" far beyond the different biology between men and women (Johnson & Repta, 2012; Koutra et al., 2014; Syligardou, Philalithis, & Kritsotakis, 2016). As an example, female adolescents value more social bonds and perceive peer victimization of reputational nature more hurtful than do their male counterparts and may internalize and not externalize their distress (Galen & Underwood, 1997). Second, the reports mainly focus on young adolescents, and do not explore whether the adversity of bullying involvement during school years persists during college years in late adolescence and young adulthood. Hence, this study aims at identifying the sex-stratified associations of involvement in traditional bullying during middle and high school years and in cyberbullying during college years with multiple health risk behaviors in undergraduate students.

Methods

Study Design and Participants

This cross-sectional analysis draws on the data of the second wave of the LATO study (Lifestyle & Attitudes in a Student Population), a longitudinal study established in 2012, including all first-year higher education students of the Technological Educational Institute (TEI) of Crete, Greece, at the Heraklion Campus. Data were collected in the context of compulsory courses during November-December of the academic year 2013–2014 using an anonymous, self-administered Internet questionnaire assessing participants' demographic characteristics, health risk behaviors, bullying experiences during the 6 secondary school years, and cyberbullying experiences during the past year. Students were also entered into drawings to receive small gifts, as incentives, based on data they provided in the informed consent forms. Completion of questionnaires lasted from 15 to 35 min for the majority of the students. More details about the study have been reported by Kritsotakis, Psarrou, Vassilaki, Androulaki, and Philalithis (2016). Of the 1,032 mostly second-year students who were approached, 986 agreed to participate in the study (participation rate 95.5%), and 812 had complete data for all health and bullying variables (83.2% of the questionnaires).

Ethical Considerations

The relevant board of the TEI of Crete approved the research protocol. Prior to data collection, students received written and oral information by well-trained research assistants about the aim of the study, their voluntary participation, the possibility to quit at any time, and the confidentiality of their responses.

Measurement Instruments

Health risk behaviors were assessed using questions from the European School Survey on Alcohol and Other Drugs (ESPAD study) and additional questions that had been used previously in university students in Greece (Hibell et al., 2012; Kritsotakis et al., 2016).

The Retrospective Bullying Questionnaire (RBQ; Schäfer et al., 2004) and the questionnaire of the Cyberbullying and Its Effects study (Hickey & Kramer, 2012), which included adapted questions from the Revised Olweus Bully/Victim questionnaire (OBVQ; Olweus, 1996), were also used. Both the RBQ and OBVQ instruments have been shown to be reliable and valid for measuring bullying incidents with stability and accuracy over time and are extensively used in different countries, contexts, and populations (Hamburger, Basile, & Vivolo, 2011; Olweus, 1996; Rivers, 2001; Schäfer et al., 2004; Solberg & Olweus, 2003; Vessey, Strout, DiFazio, & Walker, 2014).

The bullying and cyberbullying questionnaires were translated independently by three different translators and culturally adapted in Greek based on the European Social Survey guidelines and the Translation, Review, Adjudication, Pretesting and Documentation methodology (Dorer, 2012). The translators and one reviewer agreed on one final version of both scales, having in mind to ascertain their linguistic and conceptual equivalence with the original instruments. A pilot study ($n = 30$) was also conducted to establish the clarity and understandability of the questions and the instructions.

Health Risk Behaviors

The questions and the categorization of the responses are listed in the ensuing sections.

Smoking (ESPAD). “How frequently have you smoked cigarettes during the last 30 days?” (Eight response options: “I have never smoked” to “More than 20 cigarettes per day”). Respondents who had never smoked during their lifetime were categorized as non-smokers (reference category 0) and all others as smokers (reference category 1).

Illegal drug use (ESPAD). “On how many occasions in your lifetime (if any) have you used any of the following drugs?” (Marijuana or hashish or cannabis; tranquilizers or sedatives without a doctor’s prescription; amphetamines; LSD or some other hallucinogens; crack; cocaine; heroin; anabolic steroids; drugs by injection with a needle; alcohol together with pills—medicaments—in order to get high; ecstasy; inhalants in order to get high). Students were subsequently dichotomized as users if they had tried any drug at least once (score = 1) and nonusers in all other cases (score = 0).

Alcohol abuse (Drunkenness; ESPAD). “On how many occasions (if any) have you been intoxicated from drinking alcoholic beverages, for example, staggered when walking, not being able to speak properly, throwing up, or not remembering what happened?” (During the last 30 days; in your lifetime). In all categories, responses were dichotomized as “never” and “at least once.”

Condom use. “How many times did you or your partner use a condom during sexual intercourse during the last 12 months?” (*Always, every single time* = 0; *never/sometimes* = 1).

Pay for intercourse. “Have you ever paid for sex?” (*Lifetime, never* = 0; *1+ = 1*).

Retrospective Bullying Questionnaire

The RBQ was constructed by Schäfer et al. (2004) based on the questionnaire used by Rivers (2001). Following a brief description of bullying, we evaluated the experiences of bullying during the 6 secondary school years by measuring six types of victimization and perpetration (two physical: hit or punched, stolen from; two verbal: called names, threatened; two indirect: told lies about, excluded) by the frequency, seriousness, and duration of bullying incidents on 5-point scales. Bully (no victimization and any perpetration of bullying), bully-victim (any victimization and any perpetration), victim (any victimization and no perpetration), and not involved at all (no victimization and no perpetration) categories were created if students responded “sometimes, often, constantly” to at least one subquestion of bullying others and victimization types (Rivers, 2001; Schäfer et al., 2004). The original scale has shown adequate 2-month test-retest reliability in different contexts: primary school, $r = 0.88$; secondary school, $r = 0.87$; trauma, $r = 0.77$. Schäfer et al. (2004) and Rivers (2001) reported adequate consistency in participants’ recalls at a 1-year interval.

Cyberbullying

The questionnaire was used in the Cyberbullying and Its Effects study conducted by the Imperial College, U.K. (Hickey & Kramer, 2012) and included adapted questions from the Revised Olweus Bully/Victim questionnaire (Olweus, 1996; Solberg & Olweus, 2003). Students reported their involvement as cyberbullies or cybervictims for a 12-month period on 5-point scales (*never, only once or twice, two or three times a month, about once a week, several times a week*) for the following: being called mean names or teased in a hurtful way; having rude messages/pictures sent to you; being left out or ignored; having lies or rumors spread about you; having messages/photos/videos about you put online; being threatened; being cyberbullied in another way. A short description of cyberbullying preceded the questions. In agreement with the bullying categorization, if students responded at least “once or twice” to at least one question for cyberbullying and cybervictimization, they were categorized as a cyberbully (no victimization and any perpetration of cyberbullying), a cyberbully–victim (any victimization and any perpetration of cyberbullying), a cybervictim (any victimization and no perpetration), or not involved at all (no victimization and no perpetration of cyberbullying). Internal reliability estimates were very high for the original questionnaire (Spearman-Brown estimates: bully perpetration = 0.88; bully victimization = 0.87; Solberg & Olweus, 2003).

Data Analysis

Categorical variables are summarized as frequencies and percentages (n , %), while continuous variables are presented as means and standard deviations. Prevalence of bullies, victims, bully–victims, and uninvolved students, as well as prevalence of all respective cyberbullying categories, were compared by gender using the chi-squared test. In addition, prevalence of the health risk behaviors was examined in all bullying and cyberbullying groups stratified by gender, again using the chi-squared test. Crude and adjusted logistic regression models were performed with completely uninvolved students as a group of reference to test the associations (odds ratio [OR] and 95% confidence intervals [CIs]) of the different categories of bullying and cyberbullying with different health risk behaviors. In the adjusted models, age (18, 19, 20+ years old); maternal and paternal education as a proxy of socioeconomic status (low level: ≤ 6 years of school; medium level: > 6 years of school but ≤ 12 years that is typically needed prior to attending university; high level: university or technical college degree); current residence (parent/guardian home, on-campus dormitory,

Table 1. Demographic Characteristics of the 812 Participants

	Total	n (%)	
		Male	Female
Sex	812	275 (33.9)	537 (66.1)
Mean age (SD)	19.3 (2.0)	19.6 (2.2)	19.2 (1.9)
School of studies			
Health & Social Welfare	405 (49.9)	51 (18.5)	354 (65.9)
Management & Economics	117 (14.4)	43 (15.6)	74 (13.8)
Engineering	201 (24.8)	137 (49.8)	64 (11.9)
Agriculture, Food and Nutrition	89 (11)	44 (16.0)	45 (8.4)
Place of birth/origin ($n = 691$)			
Greece	636 (92.0)	210 (95.0)	426 (90.6)
Other	55 (8.0)	11 (5.0)	44 (9.4)
Paternal level of education ($n = 793$)			
Low	166 (20.9)	47 (17.3)	119 (22.8)
Medium	471 (59.4)	159 (58.7)	312 (59.8)
High	156 (19.7)	65 (24.0)	91 (17.4)
Maternal level of education ($n = 788$)			
Low	114 (14.3)	25 (9.3)	89 (16.8)
Medium	516 (64.7)	173 (64.3)	343 (64.8)
High	158 (21.1)	71 (26.4)	97 (18.3)
Residence ($n = 805$)			
Parent/guardian home	161 (20.0)	66 (24.1)	95 (17.9)
On-campus dormitory	45 (5.6)	9 (3.3)	36 (6.8)
Off-campus housing	599 (74.4)	199 (72.6)	400 (75.3)

off-campus housing), and place of birth (Greece, other country) were used as confounders. Data were analyzed using SPSS software (IBM Corp., Armonk, NY, USA).

Results

Sample Characteristics

Students (66.1% female) had a mean age of 19.3 ($SD = 2.0$) years and were of diverse backgrounds in terms of parental educational level, current residence status, and place of birth. Their demographic characteristics are presented in **Table 1**.

Bullying and Cyberbullying Prevalence by Gender

Only a third of the participants (34%) had not been involved in bullying, and the majority had not been involved in cyberbullying (64.7%), with no gender differences across bullying and cyberbullying involvement groups (**Table 2**).

Bullying, Cyberbullying, and Health Risk Behaviors

Gender-specific prevalence of the health risk behaviors across bullying involvement groups is presented in

Table 2. Bullying and Cyberbullying Involvement Group Prevalence by Gender in 812 University Students

	n	Total			p value
		Male	Female	%	
Bullying (not involved)	276	34.0	33.5	34.3	.825
Victims	366	45.1	44.0	45.6	
Bullies	35	4.3	5.1	3.9	
Bully-victims	135	16.6	17.5	16.2	
Cyberbullying (not involved)	525	64.7	64.0	65.0	.353
Cybervictims	159	19.6	18.9	19.9	
Cyberbullies	44	5.4	4.4	6.0	
Cyberbully-cybervictims	84	10.3	12.7	9.1	

Note. p values are based on chi-square tests.

Table 3. There were statistically significant differences in lifetime drunkenness for girls (victim = 45.6%; bully = 71.4%; bully-victim = 50.6%; noninvolved = 59.6%; χ^2 test; $p = .016$), pay for sex for boys (victim = 75.4%; bully = 64.3%; bully-victim = 75.0%; noninvolved = 50.5%; χ^2 test; $p = .001$), and not using condoms for both boys and girls (victim = 84.2%; bully = 74.3%; bully-victim = 78.5%; noninvolved = 68.5%; χ^2 test; $p < .001$). For girls involved in cyberbullying, there were statistically significant differences in drug use

(cybervictim = 28.2%; cyberbully = 9.4%; cyberbully-victim = 20.4%; noninvolved = 17.2%; χ^2 ; $p = 0.039$).

Univariate and Multivariate Regression Models

When compared to noninvolvement in univariate analyses (**Table 4**), bullying victimization at school was associated with not using condoms, both for male (OR = 3.273; 95% CI 1.573–6.810) and female undergraduate students (OR = 2.204; 95% CI 1.411–3.442). Among males, being a bully-victim at school doubled the odds for drunkenness (last 30 days; OR = 2.1; 95% CI 1.024–4.319). However, for female bullying victims the odds for lifetime drunkenness decreased (OR = 0.57; 95% CI 0.374–0.860). Moreover, female cybervictimized students had higher odds for drug use (OR = 1.88, 95% CI 1.132–3.110), whilst cyberbully-victim males were more likely to smoke (OR = 3.6, 95% CI 1.303–10.242). Traditional victims and bully-victims had higher odds to pay for sex during their lifetime (victim: OR = 3.00, 95% CI 1.669–5.3990; bully-victim: OR = 2.935, 95% CI = 1.356–6.350).

With the exception of drug use (OR = 1.88, 95% CI = 0.888–3.981), all unadjusted associations remained significant in multivariate regression models. Furthermore,

Table 3. Gender-Specific Prevalence of Multiple Health Risk Behaviors and Association With Bullying and Cyberbullying Involvement Groups in 812 University Students in Greece

	Prevalence	Bullying				p value	Cyberbullying				p value
		Not involved	Victim	Bully	Bully-victim		Not involved	Victim	Bully	Bully-victim	
Smoking (ever)											
Total	59.9	60.8	59.0	50.0	63.1	.667	59.0	61.7	53.3	64.7	.687
Boys	61.9	60.7	58.9	60.0	72.2	.572	55.7	64.9	70.0	82.1	.065
Girls	58.9	60.8	59.1	42.9	58.2	.640	60.7	60.3	45.0	52.5	.451
Drunkenness (30 days)											
Total	32.8	24.3	23.2	25.7	24.4	.976	33.0	35.8	27.3	28.6	.581
Boys	34.5	30.4	32.2	35.7	47.9	.191	35.2	32.7	41.7	31.4	.914
Girls	31.8	28.3	34.3	28.6	33.3	.581	31.8	37.4	21.9	26.5	.306
Drunkenness (lifetime)											
Total	57.0	61.9	51.0	67.6	58.1	.036	56.7	53.6	59.0	63.6	.547
Boys	64.8	66.3	61.0	61.5	71.7	.615	64.4	56.5	66.7	78.1	.280
Girls	52.8	59.6	45.6	71.4	50.6	.016	52.6	52.1	55.6	53.3	.995
Drug use (lifetime)											
Total	23.9	24.3	23.2	25.7	24.4	.976	21.0	31.4	20.5	29.8	.025
Boys	33.1	37.0	30.6	28.6	33.3	.778	28.4	38.5	50.0	42.9	.136
Girls	19.2	17.9	19.6	23.8	19.5	.912	17.2	28.0	9.4	20.4	.039
Pay for sex (lifetime)											
Boys	66.4	50.5	75.4	64.3	75.0	.001	64.4	70.0	66.7	71.4	.797
Not using condoms every single time (last year)											
Total	77.5	68.5	84.2	74.3	78.5	<.001	76.8	82.4	70.5	76.2	.302
Boys	82.5	71.7	89.3	92.9	83.3	.006	81.2	84.6	91.7	82.9	.788
Girls	74.9	66.8	81.6	61.9	75.9	.003	74.5	81.3	62.5	71.4	.149

Note. p values are based on chi-square tests. Boldface values indicate significant associations at least at the $p < .05$ level.

Table 4. Univariate Associations of Bullying and Cyberbullying With Multiple Health Risk Behaviors

	Male			Female		
	OR	95% CI	<i>p</i> value	OR	95% CI	<i>p</i> value
Smoking (never vs. ever)						
Victim	0.93	0.48–1.80	.828	0.93	0.58–4.20	.762
Bully	0.97	0.248–3.81	.969	0.48	0.16–1.48	.203
Bully–victim	1.67	0.69–4.12	.251	0.90	0.49–1.65	.897
Cybervictim	1.47	0.68–3.15	.326	0.98	0.58–1.66	.947
Cyberbully	1.85	0.46–7.51	.388	0.53	0.21–1.33	.176
Cyberbully–victim	3.65	1.30–10.24	.014	0.72	0.37–1.41	.331
Drug use (lifetime) (0 vs. 1+)						
Victim	0.75	0.42–1.33	.329	1.12	0.68–1.82	.664
Bully	0.68	0.20–2.35	.544	1.43	0.49–4.18	.513
Bully–victim	0.85	0.41–1.78	.671	1.11	0.58–2.13	.750
Cybervictim	1.58	0.82–3.01	.169	1.88	1.13–3.11	.015
Cyberbully	2.52	0.78–8.19	.124	0.50	0.18–1.69	.263
Cyberbully–victim	1.89	0.90–3.98	.094	1.24	0.58–2.61	.580
Being drunk (30 days) (0 vs. 1+)						
Victim	1.09	0.61–1.95	.780	1.32	0.87–2.01	.185
Bully	1.27	0.39–4.13	.692	1.02	0.37–2.76	.976
Bully–victim	2.10	1.02–4.32	.043	1.27	0.73–2.20	.395
Cybervictim	0.89	0.46–1.72	.736	1.28	0.82–2.01	.284
Cyberbully	1.31	0.40–4.31	.653	0.60	0.25–1.43	.249
Cyberbully–victim	0.84	0.39–1.83	.666	0.77	0.40–1.59	.456
Being drunk (lifetime) (0 vs. 1+)						
Victim	0.79	0.44–1.44	.448	0.57	0.37–0.86	.008
Bully	0.81	0.24–2.71	.738	1.69	0.63–4.54	.301
Bully–victim	1.29	0.59–2.82	.522	0.69	0.41–1.18	.173
Cybervictim	0.72	0.37–1.40	.333	0.98	0.62–1.56	.930
Cyberbully	1.11	0.32–3.84	.873	1.12	0.51–2.48	.772
Cyberbully–victim	1.98	0.81–4.85	.137	1.03	0.55–1.93	.932
Not using condom (last year) (Always, every single time vs. Never/sometimes)						
Victim	3.27	1.57–6.81	.002	2.20	1.41–3.44	.001
Bully	5.12	0.64–4.16	.124	0.81	0.317–2.05	.650
Bully–victim	1.97	0.81–4.77	.133	1.56	0.87–2.78	.133
Cybervictim	1.27	0.55–2.95	.579	1.49	0.87–2.56	.150
Cyberbully	2.54	0.32–2.36	.380	0.57	0.29–1.21	.145
Cyberbully–victim	1.16	0.43–2.91	.823	0.86	0.44–1.66	.646
Pay for sex (lifetime) (0 vs. 1+)						
Victim	3.00	1.67–5.40	<.001	—	—	—
Bully	1.76	0.548–5.66	.342	—	—	—
Bully–victim	2.94	1.36–6.35	.006	—	—	—
Cybervictim	1.29	0.65–2.55	.461	—	—	—
Cyberbully	1.11	0.32–3.86	.872	—	—	—
Cyberbully–victim	1.38	0.62–3.07	.424	—	—	—

Note. Reference group is “Not being involved” in all categories. Boldface values indicate significant associations at the $p < .05$ level. CI = confidence interval; OR = odds ratio.

traditionally bullied female students were more likely to report drunkenness for the last month (OR = 1.736, 95% CI 1.083–2.782; **Table 5**).

Discussion

This study explored the sex-stratified associations of multiple health risk behaviors with different bullying

and cyberbullying involvement groups in a sample of young adults. Greater odds of engaging in health risk behaviors were noted for those in the victim and the bully–victim groups, mainly in bullying and less in cyberbullying categories, albeit with gender differences. The latter suggests that interventions should be multifaceted and tailored according to bullying status and gender.

Table 5. Multivariate Associations of Bullying and Cyberbullying With Health Risk Behaviors

	Male			Female		
	OR	95% CI	<i>p</i> value	OR	95% CI	<i>p</i> value
Being drunk (last 30 days) (0 vs. 1+)						
Victim	1.18	0.60–2.33	.632	1.74	1.08–2.78	.022
Bully	0.68	0.13–3.61	.651	1.16	0.38–3.51	.799
Bully–victim	2.69	1.14–6.32	.024	1.67	0.88–3.17	.119
Being drunk (lifetime) (0 vs. 1+)						
Victim	0.91	0.46–1.81	.794	0.54	0.33–0.87	.011
Bully	1.05	0.22–5.04	.956	1.80	0.61–5.38	.285
Bully–victim	1.34	0.54–3.29	.530	0.70	0.34–1.32	.262
Pay for intercourse (lifetime) (0 vs. 1+)						
Victim	2.47	1.24–4.91	.010			
Bully	1.90	0.40–8.98	.420			
Bully–victim	3.05	1.20–7.75	.019			
Not using condom (last year) (Always, every single time vs. Never/sometimes)						
Victim	3.66	1.50–8.93	.004	2.12	1.29–3.51	.003
Bully	2.84	0.32–25.46	.351	0.88	0.30–2.57	.820
Bully–victim	2.46	0.80–7.53	.115	1.98	0.97–4.05	.062
Smoking (ever) (never vs at least once)						
Cyber victim	1.35	0.53–3.43	.524	0.95	0.50–1.80	.863
Cyberbully	1.85	0.26–13.15	.537	0.52	0.19–1.48	.221
Cyberbully–victim	4.14	1.13–15.12	.032	0.63	0.29–1.36	.240
Drug use (lifetime) (0 vs. 1+)						
Victim	0.54	0.28–1.04	0.063	0.89	0.50–1.56	.674
Bully	0.58	0.13–2.57	0.472	1.05	0.28–4.01	.939
Bully–victim	0.40	0.16–1.09	0.067	0.89	0.41–1.96	.776
Cybervictim	1.88	0.89–3.98	0.099	1.58	0.85–2.94	.151
Cyberbully	1.49	0.32–6.86	0.608	0.59	0.17–2.06	.403
Cyberbully–victim	1.06	0.41–2.70	0.910	1.12	0.48–2.63	.796

Note. Reference group is “Not being involved” in all categories. Multiple logistic regression models were adjusted for maternal and paternal education level, current residence, age, and country of origin. Only health risk behaviors that had a statistically significant association with bullying or cyberbullying in the univariate models are included in this table. Boldface values indicate significant associations at the $p < .05$ level.

Regarding sexual risk taking, victimization during secondary education is associated with a higher probability of failure to use condoms during the college years, for both male and female young adults. Condom use requires direct confrontation with another person, and victims of bullying may not want to engage in such a conflict by demanding healthy practices. Although there is a lack of studies during emerging adulthood, findings in adolescents support this outcome (Callaghan, Colette, & Molcho, 2015; Hertz et al., 2015), which is likely to stem from the low self-esteem (Patchin & Hinduja, 2010; O’Moore & Kirkham, 2001) and the inability of victims to take control of decisions that involve them and other individuals. Victimized and bully–victim males were at increased odds for paying for sex. Bullying victims have less likelihood of being in dating relationships (Arnocky & Vaillancourt, 2012) and not having sex or being a virgin in college is not consistent with current societal ideals. Thus, paying for sex may reflect a coping mechanism for boys to prove their masculinity and identify with peer groups.

Concerning alcohol abuse, inconsistent gender-specific associations were found in this study that may be mediated by different drinking motives, as proposed by Archimi and Kuntsche (2014). Bully–victim male students, but not traditional bullies, had increased odds for drunkenness, although in other reports all bullying categories, and especially bullies, get intoxicated at higher levels (Archimi & Kuntsche, 2014; Chan & La Greca, 2016; Vieno et al., 2011). However, in a prospective study in males in Finland, bullying involvement at the age of 8 years was not associated with drunkenness at the age of 18 years (Niemelä et al., 2011). Moreover, in this study, there is a controversial pattern for females who suffered victimization through school years. On one hand, victimized females were highly likely to report drunkenness during the past month, but less likely during their lifetime. Other researchers (Hertz et al., 2015) have also verified higher short-term drunkenness by victimized females, contrary to the argument that victims are more likely to avoid risk-taking behaviors

(Archimi & Kuntsche, 2014; Holt, Matjasko, Espelage, Reid, & Koeing, 2013). This controversy could suggest that victimized females were more socially isolated and as a result avoided alcohol-related risky behaviors while they were in high school, where the actual victimization occurred; as university students, they turned to alcohol consumption in an effort to fit in and gain admission to peer groups or as a maladaptive behavior to relieve stress and depressive symptoms. Escalation to heavy drinking is consistent with emotional distress alcohol consumption trajectories proposed by Colder, Campbell, Ruel, Richardson, and Flay (2002) in adolescents.

However, in this study, there were no relationships between any form of cyberbullying that would cause emotional distress and trigger heavy drinking as a means to manage the distress. Thus, the need of belonging to a team and other reasons such as coping with depressive symptoms, and the exploration of boundaries and of a personal identity may be more plausible explanations for victimized female students' drunkenness during the university years.

Cyberbully-victims were at greater odds of ever smoking, a finding confirmed for traditional bully-victims (Weiss et al., 2011). Not surprisingly, those who undertake the dual role of bullying as provocative victims (Vessey et al., 2013) are known to report lower levels of self-esteem than victims or bullies alone (O'Moore & Kirkham, 2001), greater distress, and increased anxiety (Sourander et al., 2007).

Through different mediating pathways, higher illegal substance use for different bullying and cyberbullying involvement groups has been reported, with the exception or with weaker associations in victims (Niemelä et al., 2011; Valdebenito et al., 2015; Vessey et al., 2013). Contrary to these conclusions, no associations were noted for any bullying and cyberbullying cluster and drug use in adjusted regression models in this study, although there was a tendency for higher drug use among some bullying and cyberbullying involvement groups.

If we examine comprehensively all the associations between bullying and cyberbullying during adolescence and young adulthood and substance use, there are some discrepancies between the present findings when contrasted with the literature. It may be the case that, as shown for alcohol (Colder et al., 2002), substance use does not follow a linear consumption pattern for all individuals, but rather corresponds to different and more complicated usage trajectories with periods of increased abuse in terms of frequency and quantity. To confirm this, Azagba (2016) reported significantly different smoking susceptibility related to bullying by grade level in adolescents. In this case, the possible associations of bullying and cyberbullying with substance use may not

be stable during all developmental periods. The transition from high school to university corresponds to one of the greatest transitions during the lifespan (Kritsotakis et al., 2016). Substance use is usually increasing during college years, probably masking some of the associations that were existent during high school, but also providing the opportunities for new associations and possible mediating pathways to emerge. Moreover, gender differences may come as no surprise because different trauma perception among males and females leads to different coping responses (Bouffard & Koeppel, 2017), which may in turn lead to gender-related associations between bullying and health risk behaviors.

Limitations

Notwithstanding the novel additions about the gender-specific associations of bullying and cyberbullying with multiple health risk behaviors, this study has certain limitations. The population was not culturally diverse and representative of the undergraduate student population in Greece. Hence, any generalizability beyond this sample should be made with caution. However, it should be noted that a high participation level was achieved and the students came from different regions all over Greece and abroad, with various socioeconomic backgrounds. The retrospective examination of bullying during the school years and the self-reported health risk behaviors may result in recall and social desirability bias. However, the largest body of bullying research is based on retrospective recall, and most importantly, people tend to recall with stability and accuracy bullying incidents from their childhood (Rivers, 2001), especially when it has caused emotional distress (Brewin, Andrews, & Gotlib, 1993). Additionally, all the questionnaires are well validated and extensively used around the globe, allowing for cross-country comparisons. In this study we did not evaluate probable confounding variables, such as gender identity, depression, or history of abuse that are related to substance use, and thus, omitted variable bias cannot be excluded. However, our choice of confounders is comparable to those reported in similar research (e.g., Hertz et al., 2015; Vieno et al., 2011; Weiss et al., 2011). Furthermore, for most variables, such as adolescent depression, a socio-economic gradient has been documented, with lower socio-economic status being correlated to a greater prevalence of depression (Magklara et al., 2015). The regression models were adjusted for maternal and paternal education and country of origin in this study, thus partially accounting for the possible effect of omitted variables. The cross-sectional analysis cannot offer insights in causation, and there

is always the possibility that individuals who engage more in health risk behaviors have a higher possibility of being involved in bullying and cyberbullying incidents. However, although the reciprocal relationship of bullying with health risk behaviors is very plausible (Maniglio, 2015), longitudinal research suggests that after adjustment for possible confounding variables, bullying is independently associated with health risk behaviors (Crookston et al., 2014).

Conclusions

In conclusion, both male and female young adults who were victims of bullying during middle and high school were less likely to use condoms when compared to uninvolved peers. Among males, being a bully-victim at school doubled the odds of past month drunkenness and tripled the odds of paying for sex. Greater probabilities to pay for sex were also evident in victims of bullying. Cyberbully-victim male students were more likely to report smoking. In female bullying victims, alcohol abuse associations were somewhat conflicting, with decreased lifetime but increased past month likelihood for drunkenness. It seems that traditional victimization, the dual role of bullying and victimization, and in a lesser extend cyberbullying and cybervictimization yield the bigger, albeit different, associations with multiple health risk behaviors in undergraduate students, possibly indicating distinct gender-sensitive influences. Future research should employ a longitudinal approach focusing not only on the relationships but also on the underlying motives and the specific context in which each risk behavior initiates and occurs. In this way, we will be able to provide effective prevention and health promotion interventions during adolescence and in universities at the early stages of emerging adulthood.

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Clinical Resources

- Bullying: <https://www.stopbullying.gov/>
- Cyberbullying: www.stopcyberbullying.org/

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CLINICAL SCHOLARSHIP

Perceptions of Smartphone User-Centered Mobile Health Tracking Apps Across Various Chronic Illness Populations: An Integrative Review

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Key words

mHealth, motivation, smartphone mobile health apps, usability

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Abstract

Purpose: This integrative review presents a synthesis of the current qualitative research addressing the motivating factors, usability, and experiences of mobile health tracking applications (apps) across various chronic disease populations.

Design: Integrative review of the literature.

Methods: Databases used to conduct this integrative review included: PubMed Plus, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Google Scholar, Science Direct, and EBSCO megafile. The following search terms were used in all five databases: smartphone apps, apps, mHealth, eHealth, mobile health apps, health tracking apps, user-centered apps, wireless technology, engagement, qualitative, and usability.

Findings: The initial literature review yielded 689 results. Once inclusion and exclusion criteria were employed, 11 studies met the criteria set forth for this review. The reviewed studies provided insight into users' perceptions, experiences, and motivations to incorporate smartphone mobile health apps into their daily lives when living with chronic illnesses.

Conclusions: This review indicates the growing interest in user-centered mobile health tracking apps, but with little understanding of motivating factors that foster sustained app use. Mobile health tracking apps targeted to users with chronic conditions need to have a high level of usability in order to motivate users to sustain engagement with their mobile health tracking app.

Clinical Relevance: User-centered mobile health tracking app technology is being used with increasing frequency to potentially provide individualized support to chronic illness populations.

Due to the ubiquity of smartphone ownership and the changing paradigm toward patient-centered health care, mobile health innovations have engendered the development of mobile health tracking applications (apps). These apps are typically commercially available through app distribution platforms, such as Google Play and Apple App Store, and are commonly downloaded onto smartphones or tablet devices to provide a myriad of functions based on individual health care needs and patient conditions (Fiordelli, Diviani, & Schulz, 2013; Varshney, 2014). Currently, over 165,000 mobile health apps are available, with the most common type of health tracking

apps targeting dieting and fitness (Quintiles IMS, 2016). Yet, more health tracking apps are being created to target chronic health conditions such as diabetes, multiple sclerosis, and cardiovascular health (Quintiles IMS, 2016).

User-centered mobile health tracking apps have gained widespread popularity by facilitating the maintenance of health and management of chronic conditions (Sarkar et al., 2016) and by empowering individuals to contribute to their own well-being and health (Birkhoff & Moriarty, 2016). They provide an assortment of information, encouragement, alerts, and interactive tools (Dennison, Morrison, Conway, & Yardley, 2013). A user-centered

design involves consideration of the user at every stage of the design process (McCurdie et al., 2012); health tracking functions allow users to self-record information in a smart device about their diet, health, or activities by enabling users to input and store information in one convenient, readily available place (Patel, 2014).

The field of mobile health technology is anticipated to become a major force in U.S. health care (Terry, 2015) through digital innovation as patients increasingly embrace mobile health apps (Silva, Rodrigues, de la Torre Diez, Lopez-Coronado, & Saleem, 2015). According to a Gallup poll in 2014, 34% of all U.S. adults downloaded at least one app to support wellness, and 19% of U.S. adults downloaded and regularly used a mobile health app (Witters & Agrawal, 2014). A catalyst in the growth of mobile health apps is the availability of mobile technology, the increased affordability and access, and the inherent convenience offered by these devices (Varshney, 2014). As a result, the global mobile health market is expected to exceed \$49 billion by the year 2020, and monitoring services delivered through mobile phones are expected to grow 49.7% from 2014 to 2020 (Grand View Research, 2015). Because of the omnipresence of smartphone ownership, mobile health tracking apps downloaded onto a smart device may support the management of health anytime and anywhere (Silva et al., 2015).

Though interest in user-centered mobile health tracking apps is growing, there is minimal understanding of the cognitive and motivational factors that influence use and adoption of such apps (Cho, Park, & Lee, 2014). Further, little is known about the usability and user burden for individuals engaging with a user-centered mobile health tracking app. The cognitive factors that drive use of user-centered mobile health tracking apps may be conceptualized into four categories: health consciousness, health information orientation, eHealth literacy, and health app use efficacy (Cho et al., 2014). Health consciousness refers to the extent to which individuals take care of themselves on a daily basis (Jayanti & Burns, 1998). The more people are interested and involved in taking care of themselves or being health conscious, the more likely they are to use mobile health tracking apps (Cho et al., 2014). Health information orientation characterizes health information-seeking behaviors through an app on one's smartphone (Cho et al., 2014). For example, in 2012, 52% of smartphone owners used their smartphones to search for health information (Fox & Duggan, 2012). eHealth literacy refers to accurate interpretation of health information obtained from an app (Cho et al., 2014). Understanding online health information may further encourage use of mobile health tracking apps (Cho et al., 2014). Health app use efficacy, the final category of cognitive factors, refers to the cognitive ability of

individuals to selectively use certain health tracking apps to meet their needs (Cho et al., 2014). To increase health app use efficacy, user-centered mobile health tracking apps need to be easy to use (Cho et al., 2014).

Health app use efficacy directly relates to the balance between ease of use and user burden. Usability is the level of ease or difficulty users experience when operating an app (Price et al., 2014). User burden related to use of apps has not been defined in the literature; however, it closely relates to cognitive load, which is defined as the mental resources required to execute a particular task (Cognitive Load, 2007, p. 189). User-centered mobile health tracking apps that require a repetitive and complex process to provide accurate information require a large amount of time and mental energy from their users (Cho et al., 2014). This requirement may negatively affect users' health tracking app use efficacy by creating a significant user burden, leading to unwillingness to use the app (Cho et al., 2014). Therefore, to promote effective use of user-centered mobile health tracking apps, designers need to increase the app's usability and lower its user burden.

Although interest in mobile health tracking apps is increasing, there is a dearth of foundational research on factors that influence motivation to use apps (Dennison et al., 2013). Sparse research has addressed users' experience with these apps (Dennison et al., 2013), including users with chronic diseases. Therefore, the purpose of this integrative review is to address the gap in the literature by reviewing the available published qualitative literature on users' views and experiences with mobile health apps across various chronic disease populations, to identify current knowledge on motivating factors to use apps, and to suggest directions for future research.

Methods

Databases used to conduct this integrative review included PubMed Plus, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Google Scholar, Science Direct, and EBSCO megafire. In an effort to identify other relevant studies, reference lists of similar studies were manually reviewed for additional articles. The following search terms were used in various combinations in all five databases: smartphone apps, apps, mHealth, eHealth, mobile health apps, health tracking apps, user-centered apps, wireless technology, engagement, qualitative, and usability. Further limits placed on searches included English language publications and publication years from 2007 to 2015. Since mobile health technology, specifically mobile health tracking apps, is still in its infancy, limiting the search dates to recent years excluded non-smartphone app technology.

The inclusion criteria for this analysis were peer-reviewed, qualitative studies that evaluated patient experiences with user-centered mobile health tracking apps across chronic disease populations. These broad parameters were selected because of the current paucity of user-centered mobile health tracking app literature. The exclusion criteria were text messaging/short messaging system (SMS), exercise/dietary apps for healthy populations, abstract only, non-English language, editorials, and quantitative studies.

Results

The initial literature search, with the aforementioned combined search terms, yielded 689 results. Once inclusion and exclusion criteria were employed, 22 full-text articles were identified, retrieved, and assessed. The list was further reduced if the study's target population was not individuals with chronic illnesses. As a result, a total of 11 studies met all inclusion criteria located in **Table S1**.

All but one of the studies included in the review employed qualitative descriptive design. All 11 studies explored some aspect of users' experiences and their perceptions of user-centered mobile health tracking apps that targeted various health issues in different populations with chronic diseases. Five studies did not test a health tracking app; instead, the researchers gathered data about user preferences and recommendations for the development of a proposed app (Anderson, Burford, & Emmerton, 2016; Goodwin, Cummins, Behan & O'Brien, 2016; Hilliard, Hahn, Ridge, Eakin, & Riekert, 2014; Juarascio, Goldstein, Manasse, Forman, & Butryn, 2015). Three of the studies were qualitative follow-up studies after larger quantitative studies (Giroux, Bacon, King, Dulin, & Gonzalez, 2014; Ly et al., 2014; Pludwinski, Ahmad, Wayne, & Ritvo, 2016). The reviewed studies used predetermined or semistructured questions in individual interviews or focus groups to collect data. Content or thematic analysis was applied to the data. Purposive and criterion sampling strategies were used in these studies to recruit participants with specific chronic illnesses.

Usability and Engagement

Usability of and engagement with health tracking apps were a recurring theme noted throughout many reviewed studies. A high level of usability of health tracking apps is an essential component to ensure successful engagement with these types of apps (Birkhoff & Moriarty, 2016). Anderson and colleagues (2016) explored consumers' experiences with their own personal mobile health tracking apps to manage various chronic health conditions. Participants reported that the features

and functionality of their own personal mobile health tracking apps were of paramount importance to maintain their engagement with a health tracking app. This study noted the importance of the constant stimulation needed for users to continuously engage with a health tracking app designed for self-management of chronic conditions because of changing user health and wellness needs.

Giroux et al. (2014) explored the experiences of participants who had trialed a Location-Based Monitoring and Intervention for Alcohol Use Disorders (LBMI-A) app for 6 weeks. The emerging themes addressed the perceived helpfulness, and usability of the app reinforced clinically relevant means to support individuals with alcoholism through mobile health tracking technology.

Juarascio et al. (2015) assessed the feasibility of a conceptualized binge eating app prototype; participants did not use an app. This study highlighted the importance of developing a nimble product to increase usability and decrease user burden, as well as creating features that continuously engage users with a user-centered health tracking app.

Personalization of Features

The desire of participants to personalize and tailor health tracking apps to their particular needs was noted in many findings. Goodwin and colleagues (2016) explored the viewpoints of mental health service users to inform future development of a user-centered mobile health tracking app. Thematic analysis of participants' interview responses revealed that tracking of mental health behaviors and personalizing the app to meet specific needs of users were of principal interest. The researchers concluded that involving end users in the design of a mental health directed app is critical and emphasized the importance of a partnership with them when creating a useful app.

Hilliard et al. (2014) identified user preferences and design recommendations for a self-management cystic fibrosis (CF) health tracking app; however, in this study, participants did not use and evaluate an app. All the themes resulting from analysis of participants' responses related to the desired design features of a future health tracking app that would provide support for their chronic disease state. A critical point identified by Hilliard et al. was the importance of having individuals with CF collaborate with designers in all stages of app development in order to construct a product that suits their needs.

Scheibe, Reichelt, Bellmann, and Kirch (2015) explored factors associated with acceptance of two briefly tested diabetes health tracking apps for 32 people aged 50 and older with type 1 or 2 diabetes. Perceived benefit and perceived ease of use emerged as primary factors in

use of a diabetes health tracking app. The findings suggested that health tracking apps developed for this age group need to be adaptable and tailored to individual skill level to ensure successful usability and engagement.

Accessibility of Health Tracking Apps

Having health tracking apps present and accessible at all times through smart devices emerged as an important theme throughout various studies. Ly et al. (2014) explored the experiences of participants who had trialed a health tracking app developed for people with depression. Thematic analysis of participants' responses identified commitment, treatment, and lack of goals as major themes with several secondary themes. A unique finding of this study was that the participants described the depression app as always present and accessible to them in their everyday life, leading to a sense of security.

Whitehead, Ale, Vickers-Douglas, Tiede, and Dammann (2014) studied the experiences of two pediatric patients who used a user-centered health tracking app, Anxiety Coach, to enhance treatment of obsessive-compulsive disorder. The researchers concluded that participants had positive experiences using the app and found the app helpful in managing their symptoms between therapy sessions. The results underscored the important role the app may have in extending therapy into patients' daily lives where symptoms naturally occur.

Support Provided by Health Tracking Apps

Having health and wellness supported by a health tracking app in one's own environment emerged as an important theme in numerous studies. Pludwinski et al. (2016) explored experiences of individuals who participated in a Healthy Coach type 2 diabetes randomized control trial with smartphone app support. The themes that emerged from the analysis of the data related to the experience of the trial and the difficulty in managing a chronic condition on one's own. This study highlighted the importance of support needed to manage chronic illnesses.

Wang and colleagues (2016) evaluated a newly designed mobile health tracking app directed at supporting caregivers of children treated for acute lymphoblastic leukemia. The researchers reported that the mobile health tracking app was well liked by caregivers and provided support to them during the chemotherapy treatment regimen.

Williams, Price, Hardinge, Tarassenko, and Farmer (2014) explored patients' expectations and experiences using a user-centered mobile health tracking app and

their perceptions of the impact of its use on their well-being and ability to manage their chronic obstructive pulmonary disease. The user-centered mobile health tracking app was well received by the participants, provided a sense of continuity of care, and increased their awareness of symptom variability. The researchers concluded that mobile health apps have the potential to support rather than replace clinical care and that patients need encouragement in order to obtain intended benefits of apps.

Discussion

The reviewed studies provided insight into users' perceptions, experiences, and motivations to incorporate smartphone mobile health apps into their daily lives when living with chronic illnesses. A critical interconnected theme in the reviewed articles was the ease of use of apps as a key factor motivating users to maintain engagement. Mobile health apps that were designed to be simple, self-explanatory, and visually appealing had favorable usability feedback (Goodwin et al., 2016; Wang et al., 2016) regardless of users' age or previous experience with apps (Williams et al., 2014). Thus, health tracking apps need to be intuitive with understandable menu guidance and easy navigation (Scheibe et al., 2015) to increase cognitive and motivational factors to sustain engagement with health tracking apps. Establishing clear benefits that only a mobile health app can deliver compared to standard therapy may further motivate individuals to use an app (Hilliard et al., 2014; Scheibe et al., 2015). Moreover, visualization of behavioral progress through graphs and achieved goals as part of the app could enhance motivation to use a health tracking app (Giroux et al., 2014; Hilliard et al., 2014; Juarascio et al., 2015; Scheibe et al., 2015) by promoting health consciousness. Yet, with the potential wealth of data being collected by a health tracking app, the most effective user-friendly way to provide feedback to both the user and clinician remains unclear (Hilliard et al., 2014).

Using mobile health tracking apps may provide a sense of empowerment and control of chronic health conditions. Whiteside et al. (2014) found that their Anxiety Coach app provided a source of coping mechanisms for pediatric patients to use; participants reported feeling empowered to independently manage symptoms in their daily lives. Williams and colleagues (2014) concluded that increased awareness of changing baseline health status through tracking of symptoms enables participants to make informed decisions about when to call their health provider. Furthermore, Ly et al. (2014) found that users reported the near constant proximity of their

smartphone to track health issues provided a sense of security. Accordingly, user-centered mobile health tracking apps may be useful adjunct tools to face-to-face therapy (Whiteside et al., 2014). Still, users may be unlikely to remain motivated to use a health tracking app without the support from a clinician (Juarascio et al., 2015). Similarly, Ly et al. (2014) found that their health tracking app was not motivating or effective without the help of a clinician, most likely because the reminders and feedback from a clinician reinforced the psychological tracking features of the app. Williams et al. (2014) emphasized that mobile health tracking apps have a supporting role in self-management rather than replacing current care. Therefore, user-centered mobile health tracking apps may be effective not as stand-alone therapies, but rather as adjunct treatments.

The ability to track progress is an important feature of many health tracking apps (Ly et al., 2014) and may be beneficial for many health behaviors (Hilliard et al., 2014). The ability to track one's behaviors may lead to a higher level of awareness of and increased accountability for those behaviors (Giroux et al., 2014). For example, Giroux et al. (2014) found that tracking daily alcohol intake through a self-monitoring app provided personalized feedback of users' drinking patterns, raised their awareness of drinking triggers, and aided in the recognition of and motivation to curb their alcohol intake. Similarly, Juarascio et al. (2015) found that self-monitoring of behaviors with a health tracking app may have facilitated a reduction in binge eating, leading to a better quality of life. Thus, tracking behaviors of interest may provide a visual picture of trends and patterns of activities to promote healthy behavior changes.

Mobile health tracking apps may be initially appealing and frequently used; however, interest and use may wane over time, defeating the goal of improved health outcomes (Hilliard et al., 2014; Juarascio et al., 2015; Scheibe et al., 2015). Anderson and colleagues (2016) found that self-monitoring of a chronic condition through a mobile health tracking app requires constant stimulation to accommodate changing needs in the health and well-being of its users. A reinforcement strategy could be in a form of a game built into the app; however, participants in Juarascio et al.'s (2015) study voiced doubt that game playing would be a strong reinforcement approach. Participants tended to use their health tracking app less when they reached their goals or when no new self-management techniques were offered (Anderson et al., 2016).

Having a customizable app to increase the level of ability and decrease user burden is recommended to foster a relationship between the user and the app. Allowing users to select and track their activities to suit their needs

appears to be essential to sustain health tracking app use and decrease user burden (Giroux et al., 2014; Goodwin et al., 2016; Juarascio et al., 2015; Scheibe et al., 2015). Customization may include personalized reminders and alerts tailored to a user's specific needs and medical conditions (Hilliard et al., 2014). Furthermore, the potential for customization of a health tracking app may support a clinician's efforts to tailor the treatment to the needs of the patient (Ly et al., 2014). Having the ability to specify the type and quantity of information to be entered or omitted, as well as the frequency of reminders sent to app users, may promote continued use of the health tracking app (Juarascio et al., 2015). A low level of user burden may lead to increased engagement by the user with targeted apps (Dennison et al., 2013). For example, Whiteside et al. (2014) stated that their app, Anxiety Coach, decreased user burden because its use actually contributed positively to participants' treatment experience. Similarly, Hilliard et al. (2014) found that health tracking apps that eased the burden of daily disease management may facilitate healthy behavior patterns. If health tracking apps fail to meet the expectations of users, they will likely be discarded (Dennison et al., 2013).

The reviewed studies identified many factors needed to encourage use of user-centered mobile health tracking apps. However, these studies had several limitations. The most common weakness of the reviewed studies was the lack of applicability of the experiences, views, and motivations among different chronic condition groups incorporating mobile health tracking apps into their daily lives. Because user-centered health tracking apps are tailored to the needs of people living with certain chronic illnesses, results of the studies may not apply to populations with different diseases or to other health tracking apps (Anderson et al., 2016; Giroux et al., 2014; Hilliard et al., 2014; Juarascio et al., 2015; Ly et al., 2014; Scheibe et al., 2015; Whiteside et al., 2014). Many of the researchers recognized that their samples were small and self-selected, further limiting the generalizability of their findings (Giroux et al., 2014; Goodwin et al., 2016; Hilliard et al., 2014; Juarascio et al., 2015; Ly et al., 2014; Scheibe et al., 2015; Whiteside et al., 2014) and possibly introducing bias into their findings. Ly et al. (2014) hand-selected 12 of the 81 participants from their quantitative study due to time limitations, perhaps introducing bias. Furthermore, because the sample sizes were small and the entire chronic disease population is large and heterogeneous, it would be impossible to address all the needs of diverse populations adequately with one app (Scheibe et al., 2015). The heterogeneity of chronic illness mobile health tracking app users suggests that these health tracking apps need to be customizable to users' needs and

preferences (Scheibe et al., 2015). On the other hand, Hilliard et al. (2014) speculated that even though the key themes identified in their study focused on individuals with CF, those themes may be relevant to other people with chronic medical conditions and burdensome treatment regimens. Further research is needed to determine if specific therapeutic features of user-centered mobile health tracking apps are applicable across various chronic illness populations.

Another important limitation was the lack of actual app testing in five of the reviewed studies (Anderson et al., 2016; Goodwin et al., 2016; Hilliard et al., 2014; Juarascio et al., 2015), as well as very limited testing in Scheibe et al.'s (2015) study. For example, Juarascio et al. (2015) provided mock screen shots of a prototype of a proposed binge-eating app to gather perspectives of potential users and clinicians who treat binge-eating behaviors. Hilliard et al. (2014) focused their study on design recommendations of a proposed CF app. Scheibe et al. (2015) presented two diabetes apps at the end of an interview session for the participants' brief use, but the study was designed to glean their perspectives of and attitudes about app use in general and not a specific diabetes app. Although, it is important to involve potential users in the development of an app, the limited exposure to the app limits the usefulness of those users' insights. Furthermore, the fact that the participants in Scheibe et al.'s study did not use or test the health tracking app limits the validity of participants' perspectives about the feasibility and utility of the proposed app to support the management of their chronic disease. Therefore, further qualitative studies are needed early in the development of user-centered mobile health tracking apps to obtain better insight into the usefulness of these apps by different populations.

The type and timing of the interviews conducted in these qualitative studies are potential limitations. Giroux et al. (2014) asked very specific, pre-determined questions, which may have prevented a broader view of the participants' perspectives while trialing the LBMI-A app to curb their alcohol intake. Additionally, Ly et al. (2014) and Hilliard et al. (2014) conducted phone interviews in their study to gather participants' viewpoints, limiting available data because body language and demeanor could not be observed. Lastly, Ly et al. (2014) conducted their phone interviews 6 months after participants trialed the depression app. Participants' recall of the utility of their health tracking app after this length of time may have affected the participants' memory of use of the app.

Even with the aforementioned limitations, the studies represent a first step in learning about factors that influence and motivate users to engage with mobile health

tracking apps (Ly et al., 2014). Juarascio et al. (2015) were the first to examine a future prototype app that may provide real-time interventions for a sample of people identified as binge eaters, and Giroux et al. (2014) were the first to investigate the perspectives of participants who trialed the alcohol intake-curling prototype app. Ultimately, all the reviewed studies added to the body of knowledge related to user-centered mobile health tracking apps and provide a foundation for future research efforts. Because of the early state of the science on user-centered mobile health tracking apps and the nature of pilot studies, limitations of the studies indicate the need for further investigation as this technology grows and becomes part of the fabric of our everyday lives.

Future Research

The research on use of user-centered mobile health tracking apps and their effect on health is clearly still in an early stage, resulting in a dearth of literature on participants' experiences with such apps (Ly et al., 2014). In an effort to learn about motivations of individuals with chronic health issues to use health tracking apps and to promote sustained engagement, future research could explore the growing range of functions of and time spent using user-centered mobile health tracking apps (Cho et al., 2014) and users' ability to integrate such apps seamlessly into their daily lives (Giroux et al., 2014).

Because of the novelty of user-centered mobile health tracking apps, limited data exist on the economic impact of these types of apps. A systematic review of economic evaluations of mobile health interventions conducted by Iribarren, Cato, Falzon, and Stone (2017) found there is a growing body of evidence supporting cost effectiveness of mobile health interventions; however, most of the interventions evaluated were non-health tracking app interventions. Therefore, more research is needed to evaluate economic cost and benefits of utilizing user-centered mobile health tracking apps in various patient populations in an effort to learn the true value of these types of apps.

To enhance users' motivation to continue use of a health tracking app, periodic surveys asking about the usefulness of app features may be beneficial (Juarascio et al., 2015). Testing the use of graphs, providing visual feedback, and incorporating games into the app's functions may also promote continued motivation of individuals with chronic illnesses to use a health tracking app (Giroux et al., 2014; Juarascio et al., 2015). However, it will be important to avoid burdening the users with too much feedback, which could dampen their enthusiasm for health tracking apps.

Because a large amount of data can be collected through the use of health tracking apps and little is

known about how the data will be used by app users and their clinicians (Hilliard et al., 2014), it is imperative that these two separate issues be addressed early in the development, testing, and dissemination of user-centered mobile health tracking apps. App users, healthcare providers, and other stakeholders must be involved in the design of apps to determine the most effective and ethical uses of health tracking apps for chronic disease management (Hilliard et al., 2014).

Qualitative studies can provide rich data and feedback needed to design and refine new or existing user-centered mobile health tracking apps. After completion of qualitative studies and the health tracking apps are operational, randomized controlled trials (RCTs) are an essential next step to examine the effect these apps have on management of chronic conditions with sustained engagement (Anderson et al., 2016; Wang et al., 2016). At this point it is unknown if user-centered mobile health tracking apps affect health behaviors and clinical outcomes over a period of time. RCTs are needed to evaluate specific targeted outcomes among various chronic illness populations.

Limited information is available depicting who are and who are not mobile health tracking app users. Specific app download statistics available from various app stores do not provide detailed information such as demographics, reasons for download, and consistency of use (Krebs & Duncan, 2015). Previous studies have found health app users tended to be younger, and have higher education and income levels (Fox & Duggan, 2012; Krebs & Duncan, 2015). However, little else is known about non-health app users. Therefore, future studies could examine the differences between health tracking app users and non-users, and what factors influence users' adoption and use of these types of apps.

In summary, the results of this review of qualitative studies underscore the importance of carefully evaluating user-centered mobile health tracking apps to influence health behaviors to achieve desired outcomes. The studies' findings suggest that health tracking apps provide a promising opportunity to transform health care; however, research is needed to examine their potential and their limitations in supporting chronic medical conditions.

Conclusions

User-centered mobile health tracking apps have demonstrated small-scale feasibility among users with chronic medical conditions. Yet, data on the views, perceptions, and experiences with apps of populations with chronic conditions are limited, leaving a significant gap in

the literature. New mobile health tracking apps are continually being constructed; however, qualitative studies on motivation to use health tracking apps and the ease of their use are few in number. As a result, the current state of the science is weak because of the novelty of the user-centered mobile health tracking apps. Nevertheless, with increased smartphone use integrated into people's daily lives, this technological innovation is likely to spur future research studies to address the gap in knowledge (Birkhoff & Moriarty, 2016).

Clinical Resources

Due to the novelty of user-centered mobile health tracking apps, there is a dearth of clinically focused mobile health websites. To find national and global statistics related to mobile health apps, <http://www.pewinternet.org> might be used. To find the latest information technology news, which includes mobile health app news, <http://www.healthcareitnews.com> may be used. Until user-centered mobile health tracking apps become more commonplace in health care, there will be limited clinical websites.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

Table S1.



CLINICAL SCHOLARSHIP

Aromatherapy Massage for Neuropathic Pain and Quality of Life in Diabetic Patients

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Key words

Aromatherapy, massage, neuropathic pain, painful diabetic neuropathy, quality of life, randomized trial

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Abstract

Purpose: This study aimed to examine the effects of aromatherapy massage on neuropathic pain severity and quality of life (QoL) in patients suffering from painful diabetic neuropathy.

Design and Methods: This open-label randomized controlled clinical study was conducted in a university hospital endocrine outpatient clinic in Turkey. The study sample consisted of 46 patients, randomly allocated to an intervention group ($n = 21$) and a control group ($n = 25$). The intervention group received aromatherapy massage three times per week for a period of 4 weeks. The control group received only routine care. Data were collected from patients using the Douleur Neuropathique questionnaire, the visual analog scale, and the Neuropathic Pain Impact on Quality of Life questionnaire.

Findings: Neuropathic pain scores significantly decreased in the intervention group compared with the control group in the fourth week of the study. Similarly, QoL scores significantly improved in the intervention group in the fourth week of the study.

Conclusions: Aromatherapy massage is a simple and effective nonpharmacological nursing intervention that can be used to manage neuropathic pain and improve QoL in patients with painful neuropathy.

Clinical Relevance: Aromatherapy massage is a well-tolerated, feasible, and safe nonpharmacological method that can be readily integrated into clinical settings by nursing staff. The essential oils rosemary, geranium, lavender, eucalyptus, and chamomile can be safely used by nurses in the clinical setting, if applicable. However, training and experience of nurses in aromatherapy massage is critical to achieving positive results.

Peripheral neuropathy is one of the most prevalent microvascular complications and can develop in up to 50% of diabetic patients (Sahay & Srinagesh, 2011). Diabetic peripheral neuropathy manifests in different clinical symptoms, including paresthesia, dysesthesia, alterations in sense of vibration and proprioception, hypoactive deep tendon reflexes, motor weakness, and neuropathic pain (Donnan & Ledger, 2006; Gedik & Demir, 2008).

Neuropathic pain is probably one of the most common and distressing symptoms in patients with diabetic peripheral neuropathy. Studies revealed that 16% to 26%

of patients with diabetic peripheral neuropathy suffered from pain (Abbott, Malik, van Ross, Kulkarni, & Boulton, 2011; Davies, Brophy, Williams, & Taylor, 2006). Relevant studies have shown that neuropathic pain can adversely affect quality of life (QoL), limiting the activities of daily living, self-care skills, employment, sleep quality, and interpersonal relationships (Galer, Gianas, & Jensen, 2000; Motilal & Maharaj, 2013; Satoh et al. 2011).

Despite the use of conventional treatment modalities such as anticonvulsants, antidepressants, and opioids, neuropathic pain remains an unresolved problem in

patients with diabetes (Bril et al., 2011; Donnan & Ledger, 2006; Wong, Chung, & Wong, 2007). These conventional treatments can lead to many adverse effects, such as constipation, mood disturbance, and sedation and provide only partial relief in the severity of neuropathic pain (Tesfaye & Kempler, 2005). Therefore, additional methods that complement current treatment modalities need to be developed. Evidence-based complementary therapies considered as safe are increasingly being used in the treatment of diabetes and its complications (Agrawal et al., 2007; Akyuz & Kenis, 2014; Borman, 2009; Bril et al., 2011; Ceylan et al., 2009; Kumar, Bajaj, & Mehrotra, 2006; Motilal & Maharaj, 2013; Zhang, Ma, & Yan, 2010).

Aromatherapy, one of the complementary therapies currently available, is widely used in the clinical setting. This therapy is defined as the use of essential oils, extracted from plants, to increase QoL and well-being (Buckle, 2014). Chemical components of essential oils pass through the nasal passages to the olfactory system and the limbic system of the brain. The amygdala and hippocampus are particularly important sites in the limbic system for the processing of essential oils. The amygdala is responsible for the emotional reaction to individual aromas, while the hippocampus governs olfactory memory, which is involved in the formation and retrieval of explicit memories (Buckle, 2014; Lindquist, Snyder, & Tracy, 2013; Takeda, Tsujita, Kaya, Takemura, & Oku, 2008). When essential oil molecules are inhaled or absorbed through the skin, these stimulate the amygdala and the hippocampus and initiate an impact on physical, emotional, and mental health (da Silveira e Sá, 2015).

Literature exists on the therapeutic properties of essential oils (Ali et al., 2015; Buckle 2014; Motilal & Maharaj, 2013). The analgesic effects of aromatherapy are thought to be related to the following factors: (a) the complex mixture of volatile chemicals reaching the pleasure memory sites within the brain; (b) certain analgesic components within essential oils that can affect the neurotransmitters dopamine and serotonin, and noradrenaline receptor sites in the brain; (c) the interaction of touch with sensory fibers in the skin; and (d) the rate of absorption of essential oils into the bloodstream that is increased by massage (Buckle, 2014). However, clinical studies examining the analgesic effects of essential oils used in the treatment of neuropathic pain are very limited (Motilal & Maharaj, 2013). Rosemary (*Rosmarinus officinalis*), geranium (*Pelargonium graveolens*), and chamomile (*Chamaemelum recutita*) have analgesic, antinociceptive, anti-inflammatory, antineuralgic, and muscle-relaxing effects; lavender (*Lavandula angustifolia*) and eucalyptus (*Eucalyptus citriodora*) have similar

properties, including analgesic, neuroprotective, anti-inflammatory, and muscle-relaxing effects (Abad, Nouri, Gharjanie, & Tavakoli, 2011; Ali et al., 2015; Begum, Sandhya, Vinod, Reddy, & Banji, 2013; Ghasemzadeh, Amin, Mehri, Mirnajafi-Zadeh, & Hosseinzadeh, 2016; Koulivand, Khaleghi Ghadiri, & Gorji, 2013; Lucarini et al., 2013, Motilal & Maharaj, 2013). Several systematic reviews, preclinical trials, and case reports suggest that rosemary, geranium, lavender, eucalyptus, and chamomile show promising effects on alleviating the severity of neuropathic pain (Abad et al., 2011; Ali et al., 2015; Begum et al., 2013; Ghasemzadeh et al., 2016; Koulivand et al., 2013; Li, 2010; Lucarini et al., 2013; Motilal & Maharaj, 2013; Nouri & Abad, 2012).

Considering the negative impact of neuropathic pain on QoL and the limited effectiveness of conventional medications, it is essential to investigate the effects of the various complementary therapies available, including aromatherapy massage. Therefore, the present study aimed to examine the effects of aromatherapy massage on the severity of neuropathic pain and QoL. The hypothesis of the study was that aromatherapy massage would decrease the severity of neuropathic pain and improve QoL in patients with diabetes.

Methods

Design

This study was an open-label randomized controlled trial investigating the effects of aromatherapy massage on the severity of neuropathic pain and QoL in patients with diabetes.

Setting

The study was conducted in the endocrine outpatient clinic of a university hospital located in Ankara, Turkey, between July 2015 and May 2016.

Sample

The study population consisted of patients with painful diabetic neuropathy. Eligible patients with diabetes included those that were 21 to 85 years of age, had a Douleur Neuropathique questionnaire (DN4) score of ≥ 4 points, and had no history of other causes of neuropathic pain. The following patients were excluded from the study: those who had hand or foot wounds or previous related surgery, irritation, ulceration, soft tissue infection, essential oil allergies, or blood coagulation disorders, or were pregnant.

The power of the study, with alpha of .05 and the mean difference in visual analog scale (VAS) scores of 3.3 (intervention 2.1; control 5.4), revealed 0.99 power using SamplePower* software (IBM Corp., Armonk, NY, USA).

A stratified sampling method was used to provide homogeneity between the study groups with respect to the duration of diabetes (<10 and \geq 10 years), HbA1c level (<7 and \geq 7%), and use of medication for neuropathy (yes and no). Ninety-four patients were assessed for eligibility, of whom 48 were excluded due to ineligibility (not meeting inclusion criteria or declining to participate). Therefore, 46 patients were randomly allocated to the study groups (21 and 25 in the intervention and control groups, respectively; **Figure 1**). To achieve randomization, the first patient was assigned to the intervention group and the next to the control group by the principal investigator (PI), and so on. All 46 patients completed the study.

Regarding the stratification criteria, the groups were found to be similar in terms of duration of diabetes ($\chi^2 = .025$; $p = 0.635$), HbA1c level ($\chi^2 = .422$; $p = 0.673$), and treatment for neuropathy ($\chi^2 = .022$; $p = 0.883$).

Instruments

The data were collected by face-to-face interviews with the patients in the endocrine outpatient clinic. During these interviews, patient questionnaires, DN4, VAS, and Neuropathic Pain Impact on Quality of Life questionnaire (NePIQoL) were used. The details of these investigations are now described.

Patient questionnaire. The patient questionnaire, developed based on the relevant literature, contained questions on sociodemographic traits (age, gender, educational level, marital status), disease- and treatment-related characteristics (disease duration, HbA1c level, treatment protocol, comorbid diseases), and neuropathic pain parameters (location of symptoms, use of medication for neuropathy, factors related to pain severity, daytime period when the highest score of neuropathic pain was experienced, use of complementary therapies for neuropathic pain; Ceylan et al., 2009; Motilal & Maharaj, 2013; Zhang et al., 2010).

DN4. The DN4 is a clinician-administered questionnaire that includes signs and symptoms associated with neuropathic pain. Pain assessment includes four questions; while the first two are based on interviews with patients, the others are based on physical examination. The first question defines the characteristics of pain (e.g., burning, painful, cold, tingling). The second question

relates to paresthesia and dysesthesia (tingling, pins and needles, numbness, and itching) in the painful area. The third question examines sensory deficits in the area where the pain is localized (hypoesthesia to touch and pricking), and the fourth question queries whether friction causes an increase in the severity of pain or the presence of pain. Each question is scored “yes” or “no,” each “yes” response being scored 1 and each “no” response being scored 0, with a total possible score of 10. At the end of the examination, 4 points are determined as the cutoff value, with \geq 4 points denoting neuropathic pain. The DN4 was developed and validated by a French neuropathic pain group (Bouhassira et al., 2005; Van Acker et al., 2009). In a Turkish validity and reliability study, the Cronbach’s alpha coefficient was 0.97 and the sensitivity and specificity used in the diagnosis of neuropathic pain were 95% and 96.6%, respectively (Unal-Cevik, Sarioglu-Ay, & Evcik, 2010).

VAS. The VAS is commonly used to measure the severity of pain based on patient self-reporting. This scale is a tool ranging from 0 (*no pain*) to 10 (*worst possible pain*; Price, McGrath Rafii, & Buckingham, 1983). Patients were asked to place a mark on the line at a point that corresponded to the level of severity of pain they were currently feeling.

NePIQoL. The NePIQoL is a self-reported scale used to assess neuropathic pain and its impact on QoL. The questionnaire contains 42 items in six domains: psychological, physical, symptoms, personal care, relationships, and social/work activity. The minimum score that can be obtained from the questionnaire is 42, and the maximum score is 210. A high score on the scale indicates an increased level of QoL (Poole, Murphy, & Nurmikko, 2009). In a Turkish study, the Cronbach’s alpha coefficient was 0.95 and test-retest reliability was 0.99 (Acar, Turkel, Kocak, & Erdemoglu, 2015).

Data collection. The baseline data were collected using the patient questionnaire, DN4, VAS, and NePIQoL during the first interview with patients in the endocrine outpatient clinic. The DN4 was used only to detect neuropathic pain at the baseline assessment by the PI. The VAS and NePIQoL were assessed through patient self-reporting. No placebo was utilized since the blend of essential oils administered in this study has a characteristically strong odor. Therefore, blinding of researchers and patients to study groups could not be used. All study patients were instructed on how to rate their own VAS scores. Within the 4-week study protocol, the severity of pain in all patients was assessed in the second and fourth weeks. Assessment of QoL was repeated

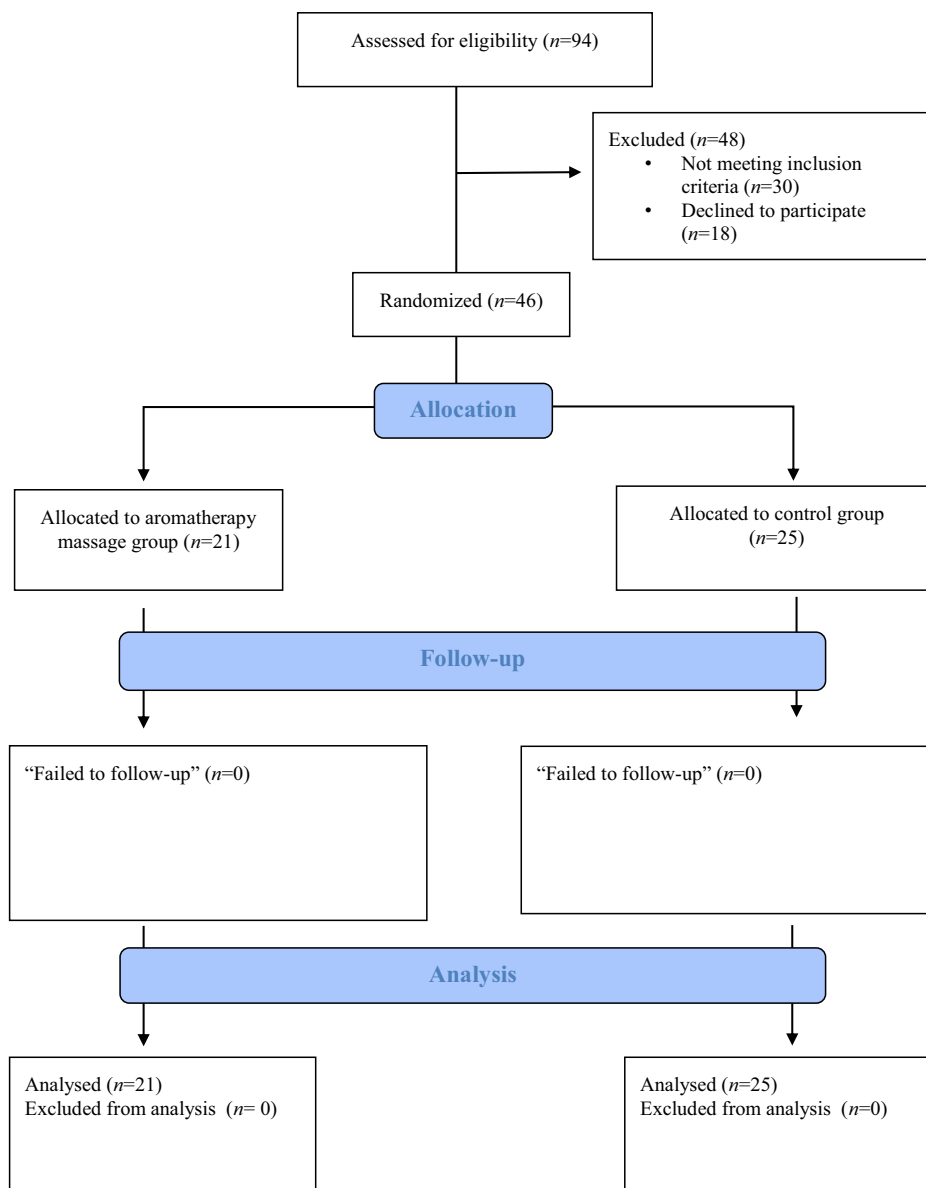


Figure 1. Flow diagram of subject progress through the phases of randomized trial.

in the fourth week for both groups. Severity of pain and QoL were measured within 15 min following aromatherapy massage sessions in the intervention group. For the control group, the data collection was completed during patients' visits to the endocrine outpatient clinic in the second and fourth weeks.

Procurement and Preparation of Aromatherapy Massage Oil Blend

The essential oils reported to have potential effects on neuropathic pain were chosen based on the literature (Abad et al., 2011; Ali et al., 2015; Begum et al., 2013;

Buckle, 2014; Ghasemzadeh et al., 2016; Koulivand et al., 2013; Li, 2010; Lucarini et al., 2013; Motilal & Maharaj, 2013; Nouri & Abad, 2012; Saeki, 2000) and on an expert opinion from a certified aromatherapist working in the Drug Development and Pharmacokinetic Research Application Center at Ege University in Turkey.

Coconut (*Cocos nucifera*) oil was used as the carrier oil. We blended five essential oils in an attempt to achieve synergistic effects: rosemary, geranium, lavender, eucalyptus, and chamomile. The oils were mixed with the coconut carrier oil in a 5% solution, at a ratio of 1:1:1:1:1. All the oils, obtained from a supplier in Antalya, Turkey,

were of good quality and carried gas chromatography analysis certification. The essential oil blend was stored in 100-mL glass bottles, which were lightproof and air-tight. A fresh mixture was prepared every 72 hr during the intervention period.

Implementation of the Research Procedure

The intervention patients were invited to the endocrine outpatient clinic three times per week during the 4-week study period, so each patient received 12 aromatherapy massage sessions in total (Motilal & Maharaj, 2013). The duration of each massage was 30 min, with 20 min for the feet and 10 min for the hands. The intervention started with the right foot, moving on to the left foot, right hand, and left hand. Six milliliters essential oil blend was utilized—2 mL for each foot and 1 mL for each hand.

Aromatherapy massage was performed in a quiet room in the endocrine outpatient clinic. Before commencing the foot massage, patients were asked to assume a supine position on the examination couch while the researcher sat on a chair facing the patients' feet, which were at the researcher's chest level. Classical massage techniques were utilized during the intervention. The essential oil blend was first applied topically to the feet, and effleurage and friction were performed from the toes to the ankle. Plantar effleurage, friction, and petrissage techniques were then administered (Tuna, 2011). After the completion of foot massage, aromatherapy massage was initiated for the hands. During hand massage, the researcher and patient sat face to face and the patient put his or her hands on a towel that was placed on the researcher's knee. The intervention started on the dorsum of the hand, where effleurage was administered, moving on to all the fingers. Massage was then administered from palm to wrist using the effleurage technique. Finally, superficial friction for all fingers and palms, and petrissage for the thenar and hypothenar muscle groups, were performed (Tuna, 2011). The control group received only routine care.

Ethical Considerations

This study was approved by the ethic committee of a university located in Ankara (decision no. 99950669/07). Before commencing the study, its aim and methods were explained and written informed consent was obtained from each patient. Data were collected and recorded in a manner that protected the anonymity of the participants. The patients could withdraw from the study at any time without stating a reason, and they were not expected to pay for anything associated with the study.

Data Analysis

All data were analyzed using SPSS version 23.0 (IBM Corp., Chicago, IL, USA). Percentages, frequencies, means, standard deviations, and medians were used to define sample characteristics. The Mann-Whitney U test was used to define differences between the intervention and control groups. The statistical significance levels for the two-tailed test and analyses were considered as $p < .05$ and $.001$, respectively.

Results

Sample Demographic and Disease Characteristics

The mean ages of the patients in the intervention and control groups were 54.3 ± 8.8 and 57.2 ± 9.7 years, respectively. The majority of the patients were female in both the intervention (61.9%) and control (88.0%) groups, and the majority of patients were married (81.0% and 84.0%, respectively). The proportion of patients who had received primary education was 52.4% and 60%, respectively (Table 1).

The length of time since diagnosis of diabetes was less than 10 years in both the intervention group (64.0%) and control group (57.1%). HbA1c values were equal to or greater than 7% in the majority of patients in both groups (90.5% and 84.0%, respectively). Regarding current medication, more than half of the patients (57.1%) in the intervention group were using oral antidiabetic drugs (OADs) and insulin, while just under half of those (44.0%) in the control group were using OADs only. Most of the patients in both groups had symptoms of neuropathy in their feet and hands (95.2% and 88.0% in the intervention and control groups, respectively). Moreover, the majority of patients in both groups were not receiving any treatment for neuropathic pain (61.0% and 64.0%, respectively; see Table 1).

Intervention Effects on Severity of Neuropathic Pain and QoL

The median VAS pain scores of the patients in the control group were 6.0 at baseline, 5.0 in the second week, and 5.5 in the fourth week of the study. The corresponding scores for the intervention group were 6.5, 4.0, and 2.0 (Figure 2). Regarding comparison of VAS scores between the intervention and control groups, while statistical testing showed no significant difference for the second week of the study, there was a significant reduction in the fourth week in favor of the intervention group (Table 2).

Regarding QoL, the NePIQoL median scores for the control group were 122.0 points at baseline and 120.0

Table 1. Sociodemographic and Disease Characteristics of the Sample (N = 46)

	Group				
	Age (mean ± SD)	Control		Intervention	
		<i>n</i>	%	<i>n</i>	%
Sociodemographic characteristics		57.2 ± 9.7		54.3 ± 8.8	
Gender	Male	3	12.0	8	38.1
	Female	22	88.0	13	61.9
Education status	Primary school	15	60.0	11	52.4
	High school	6	24.0	4	19.0
	University	4	16.0	6	28.6
Marital status	Married	21	84.0	17	81.0
	Single	4	16.0	4	19.0
Medical characteristics					
Type of diabetes	Type 1	1	4.0	1	4.8
	Type 2	24	96.0	20	95.2
Disease duration	<10 years	16	64.0	12	57.1
	≥10 years	9	36.0	9	42.9
HbA1c level	<7%	4	16.0	2	9.5
	≥7%	21	84.0	19	90.5
Treatment protocol	Only OADs	11	44.0	8	38.1
	Only insulin	3	12.0	1	4.8
	OADs and insulin	9	36.0	12	57.1
	Dual OADs	2	8.0	0	0.0
Localization of neuropathy symptoms	Feet	3	12.0	1	4.8
	Hands and feet	22	88.0	20	95.2
Medication for neuropathic pain	Not present	16	64.0	13	61.9
	Present	9	36.0	8	38.1

Note. OAD = oral antidiabetic drug.

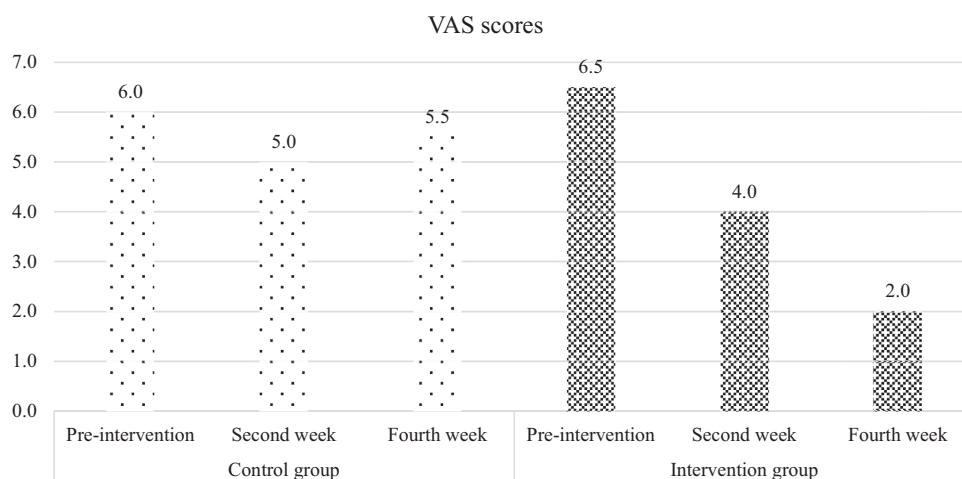


Figure 2. Changes in visual analog scale (VAS) scores during the study.

points in the fourth week of the study; corresponding scores for the intervention group were 116.0 and 141.0 points (**Figure 3**). At the end of the monitoring period, the intervention group yielded significantly higher QoL scores compared with the control group in the fourth week of the study (**Table 3**).

Discussion

This randomized controlled study investigated the effects of aromatherapy massage on the severity of neuropathic pain and QoL in patients with diabetes. In this study, neuropathic pain scores significantly decreased

Table 2. Pain Score Differences Between Groups

VAS	Control		Intervention		Mann-Whitney U	p
	Median	Min–Max	Median	Min–Max		
Baseline	6.0	1.5–10.0	6.5	2.0–9.5	233.000	.513
Second week	5.0	1.5–10.0	4.0	0.0–7.0	184.000	.081
Fourth week	5.5	0.5–9.5	2.0	0.0–4.5	72.500	.000

Note. Bold indicates significant at the .01 level (two tailed). Min–Max = minimum–maximum; VAS = visual analog scale.

and QoL scores improved in the intervention group. The median pain score was reduced by 4.5 VAS units in the intervention group. To date, no study has specifically examined the effect of aromatherapy massage on the severity of neuropathic pain, although many have investigated its effect on the severity of pain in different patient populations. Among these studies, reduction in VAS pain scores varied between 3.8 and 4.5 (Bakhtshirin, Abedi, Yusefzoi, & Razmjooee, 2015; Gok Metin & Ozdemir, 2016). Considering these results, the reduction in pain scores in the present study is comparable to those of previous reports.

Aromatherapy combined with massage therapy has recently gained popularity, especially in regard to pain management. Essential oils commonly reported in the literature for neuropathic pain management include lavender, eucalyptus, rosemary, chamomile, and geranium (Li, 2010). One report emphasized that essential oils, when mixed in the recommended ratios, could help in reducing certain side effects experienced by diabetic patients, such as loss of skin integrity, increased blood glucose, stress, and anxiety (Pandey, Tripathi, Pandey, Srivatava, & Goswami, 2011). One randomized controlled study examined the impact of topical aromatherapy

on patients with diabetes, reporting a decrease in neuropathic pain scores after 4 weeks of treatment (Motilal & Maharaj, 2013). The present study differs from that report as the former used aromatherapy with massage. The significant decrease in pain scores in our study can be attributed to the combined use of aromatherapy and massage and the synergistic effects of an essential oil blend, which included analgesic, neuroprotective, sedative, and circulation-boosting features.

According to our results, a significant reduction in median pain score in the intervention group was observed in the fourth week. Contrary to this finding, one study on aromatherapy revealed that intervention effects generally started after the second week of intervention (Gok Metin & Ozdemir, 2016). A potential reason for variation found in the timing of the onset of aromatherapy effects may relate to both the neuropathic pain characteristics and the cumulative effects of the essential oil blend. However, further clinical trials are warranted to validate this inference.

Neuropathic pain can impair QoL by limiting physical functions, and emotional and social well-being. Some reports have suggested that massage and aromatherapy massage improved QoL in different patient

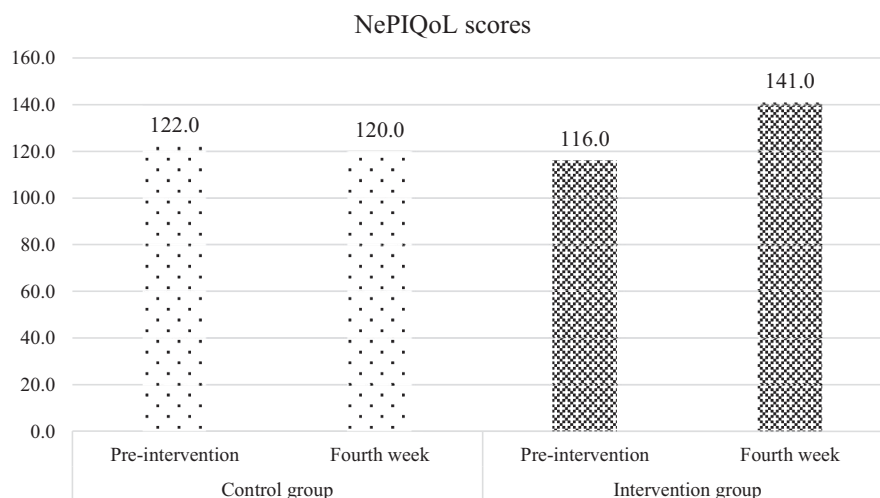
**Figure 3.** Changes in Neuropathic Pain Impact on Quality of Life (NePIQoL) questionnaire scores during the study.

Table 3. Quality of Life Score Differences Between Groups

NePIQoL	Control		Intervention		Mann-Whitney U	<i>p</i>
	Median	Min–Max	Median	Min–Max		
Baseline	122.0	88.0–186.0	116.0	83.0–173.0	239.500	.612
Fourth week	120.0	76.0–179.0	141.0	92.0–182.0	173.500	.049

Note. Bold indicates significant at the .05 level (two tailed). Min–Max = minimum–maximum; NePIQoL = Neuropathic Pain Impact on Quality of Life questionnaire.

populations (Ovayolu, Sevig, Ovayolu, & Sevinç, 2014; Wändell, Carlsson, Gåfväls, Andersson, & Törnkvist, 2011). One study that examined the effects of massage and relaxation therapy on patients with type 2 diabetes showed that the former increased QoL (Wändell et al., 2011). Another study investigating the effects of massage or aromatherapy massage on breast cancer patients indicated that the latter method improved QoL scores (Ovayolu et al., 2014). Consistent with these reports, QoL scores significantly improved following aromatherapy massage in this study. During the intervention period, it was observed that reduction in pain scores contributed to an increased QoL.

This study confirmed that in the fourth week of aromatherapy massage, a significant decrease in the severity of neuropathic pain and improvement in QoL was found in patients with diabetes. However, further well-designed randomized controlled clinical trials with a longer treatment period are warranted to validate the findings of the study.

Implications for Clinical Practice

No aromatherapy-related side effects were observed during the study period. Patient compliance with intervention was high and there were no dropouts. Therefore, aromatherapy massage was found to be a well-tolerated, feasible, and safe nonpharmacological method of treatment.

In addition to the low risk of aromatherapy massage with high compliance, beneficial effects on the severity of pain and QoL were obtained with intervention. Based on these results, aromatherapy massage may be helpful for patients with diabetic peripheral neuropathy. Nurses can apply aromatherapy massage as a care component of neuropathic pain management. Rosemary, geranium, lavender, eucalyptus, and chamomile essential oils can be safely used by nurses in the clinical setting if applicable. To achieve positive results, nursing training and experience with aromatherapy massage are critical. Nurses and other healthcare professionals can learn massage techniques and aromatherapy administration methods by attending certification programs; they can update their

knowledge on aromatherapy by means of these training activities. In this way, they can integrate the latest information into the clinical settings and extend the use of aromatherapy to achieve evidence-based outcomes.

Limitations

The study had some limitations. The first of these was application of the study protocol over 4 weeks with no postintervention follow-up; thus, the long-term effects of aromatherapy massage were not examined. Other limitations included the small sample size and the use of only one clinical center; therefore, the findings of the present study are not generalizable for all patients with painful diabetic neuropathy. One further limitation was the absence of a control group receiving massage with unscented oil.

Conclusions

In summary, our data suggest that aromatherapy massage reduced neuropathic pain scores and improved QoL after 4 weeks of intervention. Further, randomized controlled trials testing the individual ingredients of the essential oil blend used in this trial (e.g., lavender, eucalyptus, chamomile) and comparing the effects of classical massage and aromatherapy massage would help to clarify their usefulness in the management of neuropathic pain.

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Clinical Resources

- R. J. Buckle Associates, LLC, Complementary Health Therapies Consultancy and Education.

Clinical aromatherapy for health professionals: <http://www.rjbuckle.com/ccapcourse.html>

- National Association for Holistic Aromatherapy. Exploring aromatherapy: <https://naha.org/explore-aromatherapy/resources/>
- Royal Cornwall Hospitals. Aromatherapy—Clinical guideline for midwives: <http://www.rcht.nhs.uk/DocumentsLibrary/RoyalCornwallHospitalsTrust/Clinical/MidwiferyAndObstetrics/AromatherapyClinicalGuidelineForMidwives.pdf>
- U.S. Food and Drug Administration. Aromatherapy: <http://www.fda.gov/Cosmetics/ProductsIngredients/Products/ucm127054.htm#essentialoil>

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Depression as a Risk Factor of Organic Diseases: An International Integrative Review

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Abstract

Purpose and Design: This integrative review offers a systematic synthesis of the international literature regarding the role of depression as a risk factor in physical illnesses and the mechanisms of this connection. Special attention is paid to those modifiable factors.

Findings: Published studies of depression and physical illness and disease ($N = 24$) from five countries that were indexed in PubMed, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), APA PsycNET, Scopus, Dialnet, and CUIDEN were examined. Results suggest that depression is a significant risk factor for the development of physical illnesses and diseases. More commonly studied were the connections between depression and cardiovascular disease, metabolic syndrome, biochemical alterations, diabetes, dementia, cognitive impairment, Alzheimer's disease, somatization and chronic pain, asthma, arthritis, and hyperlipidemia. Less frequently studied conditions connected to depression were cancer, infections, allergies, autoimmune disease, gastric ulcer, rhinitis, thyroiditis, bronchitis, migraines, fractures, and osteoporosis.

Conclusions: Mechanisms connecting depression to physical illness appear to involve alterations in the hypothalamic-pituitary axis, unhealthy lifestyle, chronic or acute stressors including posttraumatic stress, an increase in C-reactive protein (CRP) in men, taking antidepressant medication, and social and emotional loneliness.

Clinical Relevance: A good patient-provider relationship can help to promote decreased acute or chronic stressors, increased family and social support, decreased loneliness, modification of unhealthy lifestyles such as smoking, obesity, physical inactivity, alcohol, control of CRP, and antidepressant medication. Nurses are well placed to help prevent physical diseases through detection and referral of patients who are depressed or undiagnosed and not receiving adequate mental health treatment.

Depressive disorders constitute a group of disorders with great clinical heterogeneity that are characterized by a set of symptoms that include sadness, hopelessness, inhibition, and hypo-activity. Often pharmacological and psychological interventions are necessary.

The relationship between depression and physical illness and disease is complex (Chinchilla-Moreno, 2008).

Depression often predisposes individuals to physical illness and disease, and likewise, the presence of physical

Table 1. Search Terms Used in Specific Databases

Database	Descriptors	Found	Total	Relevant
Dialnet	depresión AND (causa AND (enfermedad orgánica))	5	9	1
	depresión AND (relación AND (enfermedad física))	4		
CUIDEN	Depresión AND (relación AND (enfermedad orgánica))	10	17	1
	Depresión AND (causa AND (enfermedad física))	7		
Scopus	depression AND ((relationship) AND (organic disease))	12	73	4
	depression AND (cause AND (physical illness))	61		
CINAHL	depression AND (cause AND (organic disease))	58	145	6
	depression AND (relationship AND (physical illness))	87		
PubMed	depression AND (cause AND (organic disease))	99	201	10
	depression AND (relationship AND (physical illness))	103		
APA PsycNET	depression AND (cause AND (organic disease))	17	97	2
	depression AND (relationship AND (physical illness))	80		

illness and disease often increases the probability of depression (World Health Organization, 2012). This is because activation of the endocrine and immune systems by the central nervous system is coordinated by a bidirectional network of signals. Hence, depression and inflammation are capable of affecting and being affected by the balance of cytokine messengers produced by the immune system (Montesó & Martínez, 2009). The main modulator of these signals is the hypothalamic-pituitary-adrenal (HPA) axis, which regulates the activity of neurotransmitters and their receptors in the maintenance of homeostasis. Depression is considered a pathological response of our organism to stress, and patients often identify stressful situations with depression and the subsequent onset of illness (Piqueras-Rodríguez, Ramos-Linares, Martínez-González, & Oblitas, 2009).

Recently, research has been expanding to include the role of depression in predicting the onset of physical illness among previously healthy individuals and has focused on a number of potential explanatory mechanisms. For example, depressed individuals consume more alcohol, smoke more tobacco, engage in less physical activity, eat less healthily, and show lower levels of health care (Holahan, Pahl, & Cronkite, 2010). Each of these health behaviors offers a potential explanation for the association of depression with physical illness and disease. The main aim of the present review is to summarize the recent literature on depression as a predictor of physical illness and disease. There are two goals. First, it is important to summarize the literature that shows that depression can act as a risk factor for physical illness and disease. Second, equally important is to show potential mechanisms of this association, paying attention to those modifiable factors in which nursing could assist in prevention or treatment.

Methods

Eligibility Criteria

Selected publications come from six developed countries (Australia, Canada, Mexico, Norway, Spain, and the United States), covering the period 2004 to 2015. We have selected scientific articles found in scientific health databases (**Table 1**). In the bibliographic search, 24 articles were selected for the review of the total of 375 potentially eligible studies after eliminating duplicates and screening titles, abstracts, and key words. We excluded commentaries, editorials, or those without abstracts.

Data Sources

The electronic databases consulted for the bibliographic search were PubMed, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), APA PsycNET, Scopus, Dialnet, and CUIDEN. Search terms used in each database are provided in **Table 1**.

Results

Following is a detailed review of the most critical evidence of depressive disorders and their association with physical illness and disease. Results of this review are structured according to the illness and disease categories that were found to be common in the review (**Table 2**).

Cardiovascular Disease

Cardiovascular disease (CVD) is commonly associated with depression. For example, Borreu-Foguet et al. (2013) determined that the most common cardiovascular risk factors (CVRFs) in patients with depression were as follows: 38% hypertension, 41% smoking, and 56%

Table 2. Results of the Most Relevant Studies Included in the Review

Study authors, country (year)	Aim of study	Methodology	Physical illness categories	Mechanisms for physical illness
1. Borreau-Foguet et al., Spain (2013)	To determine if depressive patients present cardiovascular risk factors and the effect of these factors on quality of life.	Transversal study. Data were collected from 137 patients with depression; 65% were women.	1. CVD (hypertension, dyslipidemia)	2. Unhealthy lifestyles (low educational level, lack of economic resources, being single, smoker, and physical inactivity)
2. Smith-Patrick & Blumethal, United States (2011)	To analyze the relationship between mood, personality, and development and progression of CVD.	Clinical research study. Analysis of the pathophysiological mechanisms involved in depression.	1. CVD (cardiovascular death and cardiac events)	1. Alteration in the hypothalamic-renal axis (HPA) (platelet activation and inflammation) 3. Chronic or acute stressors in the form of posttraumatic stress (negative emotions) 6. Emotional and social loneliness
3. Meyer et al., United States (2004)	To evaluate the role of depression as a specific risk factor for hypertension.	Longitudinal population study. Analysis (CVD) of prospective data of 901 people with depression without hypertension.	1. CVD (hypertension) 3. Biochemical alterations (elevated catecholamine's levels in the blood)	1. Alteration in the hypothalamic-renal axis (HPA)
4. Clancy et al., Australia (2013)	To explore the relationship between smoking and mental health and the intention of depressed patients to stop smoking.	Qualitative study. Phenomenological type interview in 208 patients with depression, in exploring the prospects of smoking cessation in the following 12 months.	1. CVD 7. Back pain 8. Arthritis, asthma 9. Bronchitis, migraines	2. Unhealthy lifestyles (smoking)
5. Patten-Scott et al., Canada (2008)	To determine the incidence of several important chronic diseases in people with depression.	Cross-sectional study. NPHS data survey of Canada (1994–2002) in 15,254 people	1. CVD (HTA) 8. Arthritis, asthma 9. Other (bronchitis, migraines, inflammation) 7. Somatization and chronic pain 2. MS	3. Chronic or acute stressors in the form of PTSD (infant depression)
6. Weiss et al., United States (2011)	To investigate the relationship between PTSDs, depressive states, and MS.	Cross-sectional descriptive study. Sample 245 persons. We evaluated PTSD, MS, and MDD experiences.		

Continued

Table 2. *Continued*

Study authors, country (year)	Aim of study	Methodology	Physical illness categories	Mechanisms for physical illness
7. De las Cuevas et al., Spain (2011)	To explore whether physical comorbidities have a higher incidence in patients with depressive disorders.	Cross-sectional study. To compare the physical and demographic data of patients with PP with those of the general population.	1. CVD (HTA, dyslipidemia) 8. Hyperlipidemia 4. Diabetes	2. Unhealthy lifestyles (obesity)
8. Holahan et al., United States (2010)	To examine the relationship between depression and the incidence of physical illness in general.	Cases and controls. The study followed 388 patients with depression who were receiving treatment for depressive disorders.		2. Unhealthy lifestyles (smoking, alcohol, sedentary lifestyle)
9. Chokka et al., United States (2006)	To analyze the relationship of antidepressants with metabolic alterations in patients with primary depression.	Clinical research. Analysis of clinical data of patients being treated for depression.	1. CVD (cardiovascular death and cardiac events) 2. MS 3. Biochemical alterations	5. Taking of antidepressant medication
10. Johnson & Grippio, United States (2006)	To study the comorbidity of heart failure and depression in a mild stress condition.	Experimental clinical research. Animal experiments to identify behavioral, physiological, and biochemical changes.	1. CVD (heart failure) 3. Biochemical alterations (cytokines and renin-angiotensin-aldosterone system are elevated)	1. Alteration in the hypothalamic-renal axis (HPA) 4. Increase in CRP in men
11. Ford & Erlinger, United States (2004)	To determine the association between MDDs and elevated levels of CRP in a national representative cohort.	Transversal study. Data from 6,914 people from a national NHANES survey.	1. CVD 3. Biochemical alterations	4. Increase in CRP in men
12. Romero et al., Mexico (2004)	Men with recent depression have found high CRP levels. Inflammation may be a possible mechanism of depression as a factor causing CVD. Major depression in men is strongly associated with increased CRP and may explain the risk for CVD in depressed men.	Bibliographic review. Analysis of clinical and scientific research studies.	1. CVD (HTA) 3. Biochemical alterations 4. Other (cancer, infections, allergies, autoimmune disease) 5. Dementia	1. Alteration in the hypothalamic-renal axis (HPA) (unbalance of cytokines, hormones, and neurotransmitters) 3. Chronic or acute stressors

Continued

Table 2. *Continued*

Study authors, country (year)	Aim of study	Methodology	Physical illness categories	Mechanisms for physical illness
13. Farmer et al., United Kingdom (2008)	To determine physical illnesses incident to people with primary depression.	Case-control studies. Structured interview (SCAN) to 1,546 cases with depression without PI and 884 healthy controls.	1. CVD (HTA) 3. Biochemical alterations 8. Asthma and arthritis, gastric ulcer, rhinitis, thyroidism	1. Alteration in the hypothalamic-renal axis (HPA)
14. Wolkowitz et al., United States (2011)	To review psychological and biochemical factors that occur in MDD and that can affect physical comorbidity.	Translational study. Review the psychological styles of adaptation and neuroendocrinological mechanisms in people with MDD.	2. MS (glucose intolerance and insulin resistance, increased intracellular calcium, a pro-inflammatory environment) 3. Biochemical alterations 4. Diabetes	1. Alteration in the hypothalamic-renal axis (HPA) due to accelerated aging
15. Mezuk et al., United States (2008)	To examine the possible bidirectional relationship between depression and type 2 diabetes.	Bibliographic review. Advanced Medline search of prospective comparative studies between 1990 and 2009 for depression and diabetes.	4. Diabetes 9. Others: low HDL cholesterol	
16. Engum, Norway (2007)	To investigate if the symptoms of depression precede the onset of diabetes; to examine whether mediating factors can explain such associations.	Prospective 10-year study. Data collected from 8,311 people with symptoms of baseline depression; health self-assessment survey.	4. Diabetes 9. Others: low HDL cholesterol	2. Unhealthy lifestyles (smoking, education, singleness)
17. Spira et al., United States (2012)	To determine if elevated levels of depressive symptoms are predictors of incidences of cognitive impairment or dementia in the elderly.	Prospective 5-year study. 398 people. Geriatric Depression Scale.	5. Cognitive impairment and dementia	
18. Drageset et al., United States (2012)	To analyze the relationships between depressive symptoms and emotional and social loneliness among elderly people without cognitive impairment.	Correlational descriptive correlational. Interview with 227 elderly residents with the geriatric scale of depression and social integration.	5. Cognitive impairment and dementia	3. Chronic or acute stressors (lack of social support)
19. Aguilar-Navarro & Avila-Funes, Mexico (2007)	To review the clinical characteristics of depression and its consequences in the elderly, free of PI.	Bibliographic review. Examine epidemiological studies using scientific health databases.	1. CVD (ischemic heart disease) 7. Somatization and chronic pain 9. Other (weight loss, osteoporosis)	3. Chronic or acute stressors (duels, changes of address, loss of physical and mental abilities)

Continued

Table 2. *Continued*

Study authors, country (year)	Aim of study	Methodology	Physical illness categories	Mechanisms for physical illness
20. Vilalta-Franch et al., Spain (2013)	To study several subtypes of depressive disorders as risk factors for dementia and Alzheimer's disease.	A cohort study with 451 elderly people without dementia. Calculation of proportional risk in 5 years.	5. Cognitive impairment and dementia (dementia and Alzheimer's disease)	
21. Aragonès et al., Spain (2009)	To determine the incidence of other common mental disorders in patients with major depression and to analyze such comorbidities.	Cross-sectional study. Screening and psychiatric interview in 210 patients. The frequency of somatizations and anxiety concomitant with MDD is determined.	6. Mental disorders (psychiatric comorbidity, anxiety)	
22. Drayer et al., United States (2005)	To determine if somatic symptoms are associated more with chronic diseases than with depression.	Observational study in PC. Regression model and logistic correlation. Interviews in 248 elderly patients.	7. Somatization	
23. Ohayon & Skhatzberg, United States (2010)	To assess the incidence of chronic pain and MDD in the general population.	Design: Quantitative. Method: Sample of 3,243 people with depression. Telephone interview with health status survey.	7. Somatization and pain	3. Chronic or acute stressors in the form of posttraumatic stress (stress, lack of sleep, tiredness)
24. Aloumanis & Mavroudis, Greece (2013)	To summarize current evidence to elucidate pathophysiological aspects of the association between depression and osteoporosis.	Design: Meta-analysis. Method: The possible impact of mood and effect of depression on bone health is described.	9. Other (fractures and osteoporosis)	1. Alteration in the hypothalamic-renal axis (HPA) (neuroendocrine alterations)

Note: CRP = C-reactive protein; CVD = cardiovascular disease; HDL = high-density lipoprotein; HPA = hypothalamic-pituitary-adrenal; HTA = hypertension; MDD = major depressive disorder; MS = metabolic syndrome; NHANES = National Health and Nutrition Examination Survey; NPHS = National Population Health Survey; PC = primary care; PI = Physical Illness; PP = psychiatric patients; PTSD = posttraumatic stress disorder; SCAN = Schedules for the Clinical Assessment of Neuropsychiatry.

dyslipidemia. Smith-Patrick and Blumenthal (2011) observed that the onset and progression of CVRFs may be a consequence of negative emotions, mood states (depression, stress, anxiety) and low perceived social support. Meyer, Armenian, Eaton, and Ford (2004) showed that individuals with depressive episodes have an increased risk for incident hypertension. The risk associated with major depressive disorder (MDD) was elevated for several long-term diseases, including (odds ratios [ORs] in parentheses): cardiovascular disease (1.7), arthritis (1.9), asthma (2.1), back pain (1.4), bronchitis (2.2), hypertension (1.7), and migraines (1.9). Furthermore, Clancy, Zwar, and Richmond (2013) found that pain and inflammation have a greater incidence in depressives. Patten-Scott et al. (2008) investigated cases of patients with MDD where the risk factors (ORs) associated with this mental disorder were elevated for several diseases in the long term (Clancy et al., 2013).

Metabolic Syndrome

De las Cuevas, Ramallo, and Sanz (2011) in their analysis noted that hyperlipidemia, hypertension, obesity, and diabetes were found to be significantly associated with depression. Weiss et al. (2011) observed that high rates of metabolic syndrome were a consequence of post-traumatic stress. The incidence of metabolic syndrome was 47% in individuals with chronic stress and 32% in individuals with depression. Adequate treatment of depression has been considered to reduce the complications of metabolic syndrome (Weiss et al., 2011). According to Holahan et al. (2010), depression is associated with aspects of unhealthy behavior (tobacco use, alcohol use, sedentary lifestyle), and depressed patients showed a two-thirds greater likelihood of suffering physical illnesses compared to healthy controls. In addition, depression makes adherence to treatment and follow-up of rehabilitation programs difficult and limits patient reincorporation into activities of daily life. An important aspect observed in the study by Chokka, Tancer, and Yeragani (2006) showed the incidence of metabolic syndrome was elevated in patients with depression due to the side effects of antidepressant medication. These investigators demonstrated that the side effects of tricyclic antidepressants cause metabolic alterations in patients with depression such as weight gain, insulin resistance, cardiac arrhythmias, and pharmacological interactions (Chokka et al., 2006).

Biochemical Alterations

Johnson and Grippo (2006) described neurohormonal factors (i.e., pro-inflammatory cytokines, renin-

angiotensin-aldosterone system, and tumor necrosis index) as a common cause in the onset of depression and ischemic heart disease. Ford and Erlinger (2004) observed that men who had episodes of more recent or recurrent depression also had higher levels of C-reactive protein (CRP). Inflammation may be a possible mechanism of depression as a causative factor in the onset of CVD. The data have also suggested that the inflammatory state can return to normal when the depression is resolved. Major depression in men was strongly associated with increased CRP levels and may explain the increased risk for CVD in depressed men (Ford & Erlinger, 2004). The present review also suggests that chronic physical pathologies commonly occurring in late life have a high incidence in the elderly with depression. For example, Wolkowitz, Reus, and Mellon (2011) postulated that these bidirectional alterations between depressive disorders and physical illnesses may be the result of aging of cells. In sum, depression is often characterized by an excess of potentially destructive hormonal mediators, and these alterations (e.g., pro-inflammatory cytokines) increase the possibility of physical illness.

Diabetes

Mezuk, Eaton, and Albrecht (2008) found that patients suffering from depression were 60% more likely to suffer from diabetes, compared to nondepressed patients. On the other hand, type 2 diabetes conferred only modest risk for depression. Conversely, depression has been shown to be a predictor of diabetes (Engum, 2007). In this study, symptoms of depression were also associated with low education, singleness, smoking, physical inactivity, high triglycerides, and low high-density lipoprotein cholesterol. Symptoms of depression and anxiety emerged as significant risk factors for the onset of type 2 diabetes (Engum, 2007). Depression and anxiety may be an important risk factor for diabetes.

Cognitive Impairment, Dementia, and Alzheimer's Disease

Several population studies show that elderly people with no previous physical comorbidities had a significantly higher risk for developing functional disability in daily life activities following the onset of depressive symptoms (Cahoon, 2012; Drageset, Espehaug, & Kirkevold, 2012; Spira, Rebock, Stone, Kramer, & Yaffe, 2012). Years of follow-up of the elderly with baseline depression has shown that about 70% developed cognitive impairment and 65% developed dementia (Spira et al., 2012). High levels of depressive symptoms in octogenarians were an important risk factor for cognitive impairment,

worsening functional capacity and quality of life, and increased mortality and health expenses. Vilalta-Franch et al. (2013) studied the relationship between depression and dementia, determining that late-onset depressive episodes are risk factors for dementia and Alzheimer's development regardless of the severity of depression. Depression could be a prodrome in dementia and also a common complication of different types of dementia.

Mental Disorders

Aragonés, Luis-Piñol, and Labad (2009) showed that in 46% of people with depression, concomitant mental disorders are a common phenomenon; for example, anxiety disorders occur in 55% of patients with depression and organic diseases. When depression exists, the odds of suffering from another mental disorder are much higher.

Somatization and Pain

A strong association has been shown between severe depression and somatization, and the somatic effects of depression were unrelated to organic disease (Aguilar-Navarro & Avila-Funes, 2007; Drayer et al. 2005). Depression and pain are independent processes that share a common mechanism that can lead to the onset of each other. Patients with depression described their pain as severe, as compared to those who did not have depression (Ohayon & Skhartzberg, 2010; Patten-Scott et al., 2008). As for causes of pain, subjects with MDD were more likely to have no identifiable cause for pain. In 50% of those with depression, pain intensity was increased by lack of sleep, stress, and tiredness in these patients. Mood disorders seemed to modify both the individual's perception of pain and the ability to tolerate it (Ohayon & Skhartzberg, 2010).

Asthma, Arthritis, and Hyperlipidemia

Patten-Scott et al. (2008) and Farmer et al (2008) showed that arthritis and asthma were elevated in patients with MDDs. Hyperlipidemia has been shown to be associated with depression (Borreu-Foguet et al., 2013; De las Cuevas et al., 2011).

Others

Romero, Hernández, Salinas, and Sandoval (2004) found an increased likelihood of cancer, infections, allergic reactions, and autoimmune disease in patients with depression. Farmer et al. (2008) showed that people with depression had high incidences of gastric ulcer, rhinitis, and thyroiditis. Associations of depression with

bronchitis and migraines have appeared in additional studies (Clancy et al., 2013; Patten-Scott et al., 2008). Aloumanis and Mavroudis (2013) showed that depression was associated with a decrease in bone density, increasing the risk for fractures. Low bone density was common in postmenopausal women and depression was a risk factor for steatosis.

Mechanisms

Alteration of the Hypothalamic-Pituitary-Adrenal Axis

In periods of depression there is hyperstimulation of the HPA axis, which increases adrenal hormones and serum cortisol of the endocrine system in response to stimuli (Aloumanis & Mavroudis, 2013; Farmer et al., 2008; Johnson & Grippo, 2006; Meyer et al., 2004; Romero et al., 2004; Smith-Patrick & Blumenthal, 2011; Wolkowitz et al., 2011). Also, the cytokines of the immune system stimulate the release of neurotransmitters and hormones, altering the function of the cardiovascular system. HPA axis dysfunction during depression is considered a predictor of the onset of diabetes (e.g., insulin resistance, aging of cells, elevated cortisol). It has been found that people with depression have a higher level of inflammation and higher levels of leukocytes and CRP. Endocrine dysfunction (e.g., cortisol and cytokines) in depression affect bone health, and increase the risk of fractures and osteoporosis. Depression and pain are processes that share a common mechanism—the HPA axis. Depression, and its associated disruption to the HPA axis, may represent a modifiable risk factor in the development of many physical illnesses and diseases and chronic pain.

Unhealthy Lifestyles

Sedentary lifestyle, unhealthy diet, inconsistent hygiene, and low treatment adherence increase the risk of cardiovascular and metabolic disease (Borreu-Foguet et al., 2013). It has been shown that low mood negatively affects the ability to quit smoking. Depressive symptoms were significantly associated with low educational level, lack of economic resources, being single, smoking, and physical inactivity (Borreu-Foguet et al., 2013). Symptoms of depression combined with poor lifestyles were significant risk factors in the development of ischemic heart disease and diabetes (De las Cuevas et al., 2011). Indiscriminate use of antidepressants was associated with weight gain, insulin resistance, and cardiac arrhythmias (Chokka et al., 2006). Being a smoker has also been detected as a mechanism by Clancy et al. (2013), Holahan et al. (2010), and Engum (2007). Depression

may interfere with healthy lifestyles and health behavior choices that promote health.

Chronic or Acute Stressors in the Form of Posttraumatic Stress

Stressful factors in adult life and adverse events may act as precipitants of depression and have important implications in the development of organic diseases. For instance, high rates of metabolic syndrome are a consequence of posttraumatic stress in childhood. Stress, depression, and inflammation are able to affect the balance of cytokines produced by the immune system (Smith-Patrick & Blumenthal, 2011).

Other Mechanisms

There are several mechanisms that are less commonly discussed in the literature. CRP in men was detected as a potential mechanism of depression and physical illness and disease connection by Johnson and Grippo (2006) in a nationally representative cohort. Depression often results in the use of antidepressive medications, which have unhealthy physical side effects (Chokka et al., 2006). Finally, the onset of CVRFs may be a consequence of negative emotions, low moods (depression, stress, and anxiety) and lack of social support (Drageset et al., 2012; Smith-Patrick & Blumenthal, 2011).

Discussion and Conclusions

In summary, 23 studies examined depression and physical illness or disease, including CVD ($n = 10$), metabolic syndrome ($n = 6$), biochemical alterations ($n = 4$), diabetes ($n = 2$), dementias, cognitive impairment, and Alzheimer's disease ($n = 9$), mental disorders ($n = 1$), and somatization and chronic pain ($n = 3$). Two studies examined depression and asthma ($n = 1$) and arthritis ($n = 1$). Depression and several other conditions were examined in one other study, and these conditions included bronchitis, rhinitis, allergies, thyroidism, autoimmune diseases, low back pain, migraine, dyslipidemia, gastric ulcer, arthritis, fractures and osteoporosis, and cancer (see **Table 1**).

Among the 23 studies, five concluded that depression and physical illness or disease were related because of alterations in the hypothalamic-pituitary axis, resulting in excesses of potentially destructive mediators such as cortisol and cytokines. Seven studies identified unhealthy lifestyles, including smoking, obesity, and physical inactivity as potential mechanisms. Chronic, acute, or post-traumatic stress was suggested as a mechanism in three studies. In one study, increases in CRP in men, taking

antidepressants, and social and emotional loneliness were proposed as mechanisms.

This review offers evidence that depression can be a risk factor for physical illness and disease. The mechanisms involved are complex and interconnected, and involve many neuro-endocrine, pathophysiological, and behavioral processes to explain the relationship. Nurses are uniquely positioned in health care to understand the impact of depression on physical illness and disease and the biological, psychosocial, and lifestyle factors involved.

Nursing Implications

Recognition of the mechanisms linking depression with physical illness and disease may serve to provide early detection and intervention strategies to prevent or minimize the effects of depression. Nurses should be especially aware of the potential physical illness and disease consequences of depression. A good nurse–patient relationship might help to suppress the means by which depression's effects are conferred to physical illness and disease by offering strategies for coping with acute or chronic stressors, increasing family and social support, decreasing loneliness, modifying unhealthy lifestyles such as smoking, obesity, physical inactivity, and alcohol use, and helping to control CRP and use of antidepressants. Knowing the mechanisms of the relationship between depression and physical illness and disease will help nurses manage and intervene in prevention and therapeutic actions. To do so, the nursing profession must continue to engage in specific and continuous training in mental health.

Clinical Resources

- Anxiety and Depression Association of America: <https://www.adaa.org/>
- Families for Depression Awareness: <http://www.familyaware.org/>
- National Institute of Mental Health: <https://www.nimh.nih.gov/health/topics/depression/index.shtml>
- World Health Organization: http://www.who.int/mental_health/evidence/en/prevention_of_mental_disorders_sr.pdf

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CLINICAL SCHOLARSHIP

Correlates of Nocturia and Relationships of Nocturia With Sleep Quality and Glycemic Control in Women With Type 2 Diabetes

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Key words

Adiposity, diabetes, nocturia, sleep quality

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Abstract

Purposes: To explore correlates of nocturia, compare sleep quality and glycemic control for women with and without nocturia, and examine relationships of nocturia with sleep quality and glycemic control in women with diabetes.

Design: This study was a cross-sectional, correlational study with data collected from 275 women with type 2 diabetes.

Methods: Data were collected using a structured questionnaire. Multivariate logistic regression analyses were used to identify correlates. Chi-squared tests were used to identify candidate variables for the first logistic regression model. A one-way analysis of variance was used to compare sleep quality and glycemic control for women with and those without nocturia. Pearson correlations were used to examine the relationships of nocturia with sleep quality and glycemic control.

Findings: Of the 275 participants, 124 (45.1%) had experienced nocturia (at least two voids per night). Waist circumference, parity, time since diagnosis of diabetes, sleep quality, and increased daytime urinary frequency were correlated with nocturia after adjusting for age. Compared to women without nocturia, women who had nocturia reported poorer sleep quality. A significant correlation was found between the number of nocturnal episodes and sleep quality.

Conclusions: Nocturia and poor sleep are common among women with diabetes. The multifactorial nature of nocturia supports the delivered management and treatments being targeted to underlying etiologies in order to optimize women's symptom management. Interventions aimed at modifiable correlates may include maintaining a normal body weight and regular physical exercise for maintaining a normal waist circumference, and decreasing caffeine consumption, implementing feasible modifications in sleeping environments and maintaining sleep hygiene to improve sleep quality.

Clinical Relevance: Healthcare professionals should screen for nocturia and poor sleep and offer appropriate nonpharmacological lifestyle management, behavioral interventions, or pharmacotherapy for women with diabetes.

Taiwan's National Health Insurance claims database showed that the prevalence of diabetes increased 56% in women from 2000 to 2009, and the total population with diabetes increased more than 70% (Jiang, Chang, Tai, Chen, & Chuang, 2012). A nationwide survey in Taiwan showed that only 32.4% of individuals with diabetes had it under good control (Yu et al., 2009). Poor diabetes control may lead to many chronic complications (e.g., cardiovascular disease, peripheral vascular diseases, nephropathies, and neuropathies) including lower urinary tract symptoms (LUTS; Chiu, Huang, Wang, & Kuo, 2012).

Among various LUTS, nocturia has a negative effect on sleep (Ancoli-Israel, Bliwise, & Nørgaard, 2011; Bliwise, Rosen, & Baum, 2014). Poor or inadequate sleep may lead to poor glycemic control for individuals with diabetes (Tsai et al., 2012). Among Asian general populations, the prevalence of nocturia (at least two voids per night) for women ≥ 18 years of age was 26% (Wang et al., 2015), and for women ≥ 40 years of age was 32% (Wen et al., 2015). A limited number of studies showed that nocturia can be a concern for women with diabetes. Lee et al. (2004) reported that 40% of women with type 2 diabetes experienced nocturia. Another study ($n = 1,301$) revealed that the prevalence of nocturia among women with diabetes was significantly higher than that among men with diabetes (64% vs. 56%; Chung et al., 2014).

Among general populations, correlates of nocturia for women include an advanced age, obesity (adiposity), poor sleep or insomnia, LUTS other than nocturia, medical or gynecological conditions (e.g., hypertension, and parity), and personal habits (e.g., caffeine consumption; Bliwise et al., 2014; Yoshimura, 2012; Yu et al., 2006). Information on correlates of nocturia among women with diabetes is limited. Chung et al. (2014) conducted a study among women and men with type 2 diabetes and reported that age, an overactive bladder (OAB), and diabetes duration might be associated with nocturia (at least two voids per night) and severe nocturia (at least three voids per night). After adjusting for age, OAB, and diabetes duration, correlates of nocturia and severe nocturia were having had a stroke, use of calcium channel blockers, hypertension, waist circumference, creatinine, and high-sensitivity C-reactive protein (Chung et al., 2014).

Study results showed significant associations of nocturia and poor sleep or insomnia with anxiety and depression (Rosekind & Gregory, 2010). Other negative effects of nocturia and poor sleep or insomnia include poor general health, a poor health-related quality of life (HRQL) (Bliwise et al., 2014; Weiss et al., 2011, 2013), decreased daytime function or safety (Rosekind & Gregory, 2010; Weiss et al., 2011), and increased odds of mortality (Kupelian et al., 2011). For individuals with diabetes,

those who experienced nocturia have a higher mortality rate than those without nocturia (Chung et al., 2014), and poor or inadequate sleep may lead to poor glycemic control (Tsai et al., 2012).

Studies of nocturia among women with diabetes are scant, particularly regarding its correlates and relationships with sleep and glycemic control. The study purposes were to (a) explore correlates of nocturia, (b) compare sleep quality and glycemic control for women with and those without nocturia, and (c) examine relationships of nocturia with sleep quality and glycemic control in a sample of women with type 2 diabetes. While the beneficial effects of nonpharmacological lifestyle management, behavioral interventions, and pharmacotherapy on nocturia have been reported (Nimeh, Alvarez, Mufarreh, & Lerner, 2015; Weiss et al., 2011, 2013), our study results should be helpful in developing adequate interventions for this population.

Methods

Study Design and Ethical Considerations

This was a cross-sectional, correlational study. Ethical approval was obtained from two hospitals before the study commenced.

Setting and Study Participants

Our study was conducted at two hospital metabolism and endocrinology outpatient departments in Taipei, Taiwan. Inclusion criteria were women with a confirmed diagnosis of type 2 diabetes of ≥ 3 months, aged 20 to 70 years, with intact cognition, and with the ability to communicate verbally. Women who had surgical menopause, a bilateral oophorectomy, or menopause due to chemotherapy or radiation were excluded. Other exclusion criteria included being physically impaired, pregnant, breastfeeding, currently taking oral contraceptives, and having a history of spinal surgery or cardiovascular-renal-nervous system diseases (e.g., coronary heart disease, chronic renal diseases, or stroke). Two sampling lists of potential participants at the two outpatient departments were generated. A systematic sampling method was used to enroll every second potential participant who was listed. No other woman was recruited as a substitute when a selected woman declined to participate. Three hundred women were approached and 14 declined to participate; therefore, 286 women were recruited. Questionnaires completed by women who had experienced a urinary tract infection (UTI) in the past month or who were currently experiencing burning during urination ($n = 11$) were excluded from the analyses. Data

analyses were based on the information collected from 275 participants.

G-Power 3.1.7 was used to estimate the power of this study by selecting a logistic regression as the statistical analytical method. Waist circumference, a correlate of nocturia in individuals with diabetes (Chung et al., 2014), was used to conduct the power estimation. Based on information obtained from the current study, the probabilities of nocturia for someone with a waist circumference of ≥ 80 cm and someone with a waist circumference of < 80 cm were used to estimate the effect size. A medium convention value (0.30) was selected to estimate the expected squared multiple correlation coefficient (R^2) between waist circumference and all other covariates. A power of 0.86 was obtained under the following assumptions: a two-tailed α of 0.05, a sample size of 275, an R^2 of .09, and a proportion of 0.804 for our participants who had a waist circumference of ≥ 80 cm.

Instrument

The questionnaire included four sections: (a) individual characteristics, (b) personal habits, (c) LUTS, and (d) sleep quality. The first three sections (32 items) were derived from the Taiwan Teacher Bladder Survey (TTBS; Liao, Dougherty, Boyington, Lynn, & Palmer, 2006). We invited six experts to review the content validity of the first three sections of the questionnaire. The criteria for ensuring content validity were based on the standards proposed by Lynn (1986). After the content validity of the first three sections of the questionnaire was confirmed by the six experts, a pilot study ($n = 10$) was conducted before the main study. The 10 participants in the pilot study reported no specific problems with the questionnaire.

Participants' blood pressure, body height and weight, waist circumference, age, parity, reproductive age status, use of hormone replacement therapy, and disease-related information (e.g., hypertension, the time since diagnosis of type 2 diabetes, treatments received, fasting plasma glucose, and A1C) were collected. Women with a body mass index (BMI) of ≥ 24.0 kg/m² were defined as overweight or obese. Central adiposity was defined as a waist circumference of ≥ 80 cm (Health Promotion Administration, 2015; Ma et al., 2013). Women were classified into three groups based on their menstrual cycle-based reproductive age status: reproductive, perimenopausal, and postmenopausal (Harlow et al., 2012). In this study, A1C was used to represent the glycemic control status.

Information collected about personal habits included smoking habits, bladder habits, and habits of fluid, alcohol, and caffeine consumption. Women's bladder habits and fluid consumption habits were categorized into two

groups (good or poor) based on their responses to the items related to delaying urination, restricting hydration, and the likelihood of adequate hydration. Based on women's experiences during the past month, they were asked to estimate the type and amount of fluid consumption in milliliters or cups during a 24-h period. Total daily caffeine consumption was calculated by summing the amount of caffeine intake for all beverage categories based on women's 24-h estimations (Arya, Myers, & Jackson, 2000).

The presence of LUTS was defined as the self-reported occurrence during the past month of increased daytime urinary frequency, nocturia, urgency, urinary incontinence, a slow stream, an intermittent stream, hesitancy, and a feeling of incomplete emptying. The internal consistency of construct LUTS in the TTBS (Kuder-Richardson 21 = 0.71), and the content validity (content validity index = 1.00) or test-retest reliability (phi correlations = 0.74–1.00) of the items related to LUTS were deemed adequate (Liao et al., 2006). Most of the definitions for LUTS were based on a standardization report proposed by the International Continence Society (Abrams et al., 2002). In this study, the presence of LUTS was defined as LUTS occurring at least one or several times a month and lasting more than 1 month. Nocturia was defined as at least two voids per night because (a) this definition is commonly used (Chung et al., 2014; Kupelian et al., 2011), and (b) previous studies found that nocturia with at least two voids per night had a significant negative effect on the HRQL (Tikkinen et al., 2010; Weiss et al., 2011, 2013).

The 9-item Chinese version of the Pittsburgh Sleep Quality Index (CPSQI) was used to measure sleep quality (Tsai et al., 2005). The CPSQI is a self-rated questionnaire that assesses multiple dimensions of sleep quality during the past month. The CPSQI has an overall reliability coefficient of 0.82 to 0.83 and an acceptable test-retest reliability (0.77–0.85). There are seven components (subjective overall sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction) in the CPSQI. Seven component scores (range = 0–3) yield a CPSQI global score (range = 0–21); a higher CPSQI global score represents poorer sleep quality. A cutoff value of 6 was used to discriminate poor sleepers (CPSQI global score > 6) from good sleepers (Tsai et al., 2005).

Data Collection

Data were collected over a 15-month period in 2013 and 2014. Women were interviewed (20–25 min) in a private area at the outpatient departments. A research

nurse trained by the principal investigator measured women's blood pressure, body height and weight, and waist circumference, interviewed and recorded women's responses to the questionnaire, and abstracted disease-related information from the women's medical records. The research nurse used sphygmomanometers and height and weight scales regularly maintained by the two selected hospitals to measure the participant's blood pressure and body height and weight. To measure the participant's waist circumference, the research nurse located the inferior margin of the ribs and the superior border of the iliac crest, and placed a measuring tape in a horizontal plane at a point midway between the lowest ribs and the iliac crest (Ma et al., 2013). Information related to women's fasting plasma glucose and A1C was based on their blood testing results conducted 7 to 10 days earlier, before their outpatient appointments.

Data Analysis

SPSS 18.0 software (SPSS Inc., Chicago, IL, USA) for Windows was used to analyze the data. Statistical significance was established at $p < .05$. Descriptive statistics were calculated to demonstrate women's individual characteristics, personal habits, LUTS, and sleep quality. A multivariate logistic regression adjusted for age was used to identify correlates of nocturia. The variable selection procedure was based on the process proposed by Hosmer, Lemeshow, and Sturdivant (2013). To identify candidate variables for the first multivariate logistic regression model, chi-squared tests were used to compare occurrence rates of nocturia for women with different characteristics. Variables with p values of $< .20$ for the univariate chi-squared tests were selected for the first model. When all significant correlates of nocturia ($p < .05$) were identified, estimated odds ratios (ORs) and associated 95% confidence intervals (CIs) for each significant correlate were obtained. A one-way analysis of variance (ANOVA) was conducted to compare the mean CPSQI global and component scores and mean A1C values for women with and those without nocturia. Analyses using Pearson correlations were conducted to examine the relationships of numbers of nocturnal episodes with (a) CPSQI global and component scores and (b) A1C values.

Results

All participants in this study were native Taiwanese. Mean systolic and diastolic blood pressures for the 275 women with diabetes were 132.09 (range: 95.0–191.0, $SD = 16.13$) and 74.66 (range: 41.0–109.0, $SD = 10.76$)

mmHg, respectively. Distributions of women's individual characteristics and personal habits are presented in **Tables 1** and **2**. Of the 275 women with diabetes, 124 (45.1%) had experienced nocturia (at least two voids per night). Only three other LUTS had a prevalence of higher than 20%: urinary incontinence ($n = 96$, 34.9%), increased daytime urinary frequency ($n = 73$, 26.5%), and incomplete emptying ($n = 62$, 22.5%). Of the 124 women with nocturia, 84 (67.7%) of them experienced nocturia almost every night and had experienced it for more than 5 years. More than half ($n = 42$, 53.8%) of the 78 women who experienced two voids per night reported mild to severe symptom-related bother. For women who experienced at least three voids per night ($n = 46$), 37 (80.4%) of them reported mild to severe symptom-related bother. Only 15 (12.1%) women with nocturia had mentioned their symptoms to a healthcare professional. The mean CPSQI score for the 275 women was 8.22 ($SD = 3.80$; range: 1–19), with more than half of the women ($n = 174$, 63.3%) being poor sleepers (CPSQI score > 6). More than half of the women rated their overall sleep quality as "poor" or "very poor" ($n = 152$, 55.3%).

Correlates of Nocturia

Chi-squared tests revealed that women who (a) had a waist circumference of ≥ 80 cm (49.8% vs. 25.9%, $p = .002$), (b) were in a postmenopausal status (48.5% vs. 28.3%, $p = .012$), (c) had given birth at least three times (58.3% vs. 33.8%, $p < .001$), (d) had a hypertension diagnosis (53.9% vs. 38.8%, $p = .013$), (e) had been diagnosed with diabetes for more than 10 years (58.4% vs. 39.9%, $p = .006$), and (f) were poor sleepers (55.2% vs. 27.7%, $p < .001$) were more likely to have experienced nocturia than those who were in the other groups. Personal habits for women with nocturia and those without did not significantly differ. Women who had experienced increased daytime urinary frequency (63.0% vs. 38.6%, $p < .001$), urinary incontinence (54.2% vs. 40.2%, $p = .027$), or incomplete emptying (58.1% vs. 41.3%, $p = .020$) were more likely to have experienced nocturia than those who had not experienced these symptoms.

Five significant correlates of nocturia ($p < 0.05$) were identified after adjusting for age. Women who (a) had a waist circumference of ≥ 80 cm (OR = 2.62, 95% CI = 1.29, 5.36), (b) had given birth at least three times (OR = 1.87, 95% CI = 1.09, 3.22), (c) had been diagnosed with diabetes for more than 10 years (OR = 1.90, 95% CI = 1.03, 3.49), (d) were poor sleepers (OR = 2.98, 95% CI = 1.68, 5.30), and (e) had experienced increased daytime urinary frequency (more than eight episodes during the day; OR = 2.62, 95% CI = 1.43, 4.80) had

Table 1. Individual Characteristics of Study Participants ($N = 275$)

Variable	<i>n</i>	%
Age (range: 20–70; mean = 57.91; <i>SD</i> = 8.05 years)		
≤55 years	89	32.3
>55 years	186	67.7
Body mass index (range: 18–44; mean = 26.23; <i>SD</i> = 4.67 kg/m ²)		
<24.00 kg/m ² (underweight or normal)	90	32.7
24.00–26.99 kg/m ² (overweight)	76	27.6
≥27.00–29.99 kg/m ² (slightly obese)	56	20.5
≥30.00–44.00 kg/m ² (moderately or severely obese)	53	19.2
Waist circumference (range: 64–131; mean = 88.63; <i>SD</i> = 10.87 cm)		
<80 cm	54	19.6
≥80 cm	221	80.4
Reproductive age status		
Reproductive (regular menstrual cycles)	17	6.2
Perimenopausal (variability in menstrual cycle lengths, or a final menstrual period less than 1 year previously)	29	10.5
Postmenopausal (a final menstrual period more than 1 year previously)	229	83.3
Without hormone replacement therapy	221	
With hormone replacement therapy	8	
Parity		
0	28	10.2
1	30	10.8
2	90	32.7
3	83	30.3
≥4	44	16.0
Hypertension		
No	115	41.8
Yes	160	58.2
Time since diagnosis of diabetes (range: 0.25–37.00; mean = 8.85/median = 7.0; <i>SD</i> = 7.21 years)		
3 months to 1 year	27	9.8
>1–5 years	77	28.0
>5–10 years	94	34.2
>10–20 years	54	19.6
>20–37 years	23	8.4
Treatment(s) received		
Oral hypoglycemic agents	215	78.2
Oral hypoglycemic agents and insulin	38	13.8
Diet control and exercise	13	4.3
Insulin	7	2.5
No regular treatment	2	0.7
Fasting plasma glucose (range: 59–297; mean = 148.32; <i>SD</i> = 44.93 mg/dL)		
<100 mg/dL	25	9.1
100–140 mg/dL	112	40.7
>140–180 mg/dL	77	28.0
>180–297 mg/dL	61	22.2
A1C (range: 5.5%–13.7%; mean = 7.88%; <i>SD</i> = 1.52%)		
<7%	79	28.7
7.0%–8.0%	99	36.0
8.1%–9.0%	42	15.3
>9.0%–13.7%	55	20.0

Note. Variables (possible correlates of nocturia) used in later chi-squared tests included body mass index (<27 kg/m² vs. ≥27 kg/m²), waist circumference (<80 cm vs. ≥80 cm), reproductive age status (reproductive and perimenopausal vs. postmenopausal), parity (<3 vs. ≥3 times), hypertension (no vs. yes), time since diagnosis of diabetes (≤10 vs. >10 years), and A1C (<7% vs. ≥7%).

Table 2. Personal Habits of Study Participants (*N* = 275)

Variable	<i>n</i>	%
Smoking habit		
No	258	93.8
Yes	17	6.2
Bladder habits		
Good	248	90.2
Poor	27	9.8
Delay urinating for more than 20 minutes		
Never	180	65.5
Sometimes (1 day a week or less)	54	19.6
Usually (2–3 days a week)	28	10.2
Always (every day or nearly every day)	13	4.7
Reduce fluid consumption to prolong urination interval or to avoid urination		
Never	234	85.1
Sometimes (1 day a week or less)	24	8.7
Usually (2–3 days a week)	9	3.3
Always (every day or nearly every day)	8	2.9
Fluid consumption habits		
Good	237	86.2
Poor	38	13.8
Do not drink fluid until thirsty		
Never	209	76.0
Sometimes (1 day a week or less)	27	9.8
Usually (2–3 days a week)	11	4.0
Always (every day or nearly every day)	28	10.2
Too busy to drink fluid due to work or housework		
Never	223	81.1
Sometimes (1 day a week or less)	27	9.8
Usually (2–3 days a week)	10	3.6
Always (every day or nearly every day)	15	5.5
Fluid intake (mL/day)		
>3000 mL/day	16	5.8
>1,500–3,000 mL/day	145	52.7
1,000–1,500 mL/day	78	28.4
<1,000 mL/day	36	13.1
Alcohol consumption		
No	263	95.6
Yes	12	4.4
Caffeine consumption (mg/day)		
0 mg/day	94	34.2
1–100 mg/day	29	10.5
>100–400 mg/day	135	49.1
>400 mg/day	17	6.2

Note. Variables (possible correlates of nocturia) used in later chi-squared tests included smoking habit (no vs. yes), bladder habits (good vs. poor), fluid consumption habits (good vs. poor), fluid intake ($\leq 1,500$ mL vs. $> 1,500$ mL), alcohol consumption (no vs. yes), and caffeine consumption (≤ 100 mg/day vs. > 100 mg/day).

higher odds of experiencing nocturia than those who did not have these characteristics (**Table 3**). No interaction effects were found.

Nocturia With Sleep Quality and Glycemic Control

Significant differences in mean CPSQI global scores and six CPSQI component scores were found by a one-way

ANOVA for women with different numbers of nocturnal episodes. Women with a higher number of nocturnal episodes had a higher mean AIC value. Comparison of mean AIC values for women with different numbers of nocturnal episodes did not significantly differ (**Table 4**). Analyses using Pearson correlations showed significant correlations of the number of nocturnal episodes with (a) the CPSQI global score ($r = 0.28, p < .001$) and (b) six CPSQI component scores: subjective overall sleep

quality ($r = .32, p < .001$), sleep latency ($r = .23, p < .001$), habitual sleep efficiency ($r = .24, p < .001$), sleep disturbances ($r = .21, p < .001$), use of sleeping medication ($r = .17, p < .01$), and daytime dysfunction ($r = .17, p < .01$). Pearson's correlation between the number of nocturnal episodes and A1C value was not significant.

Discussion

The occurrence rate of nocturia in our participants (45%) was similar to the rate (40%) reported by Lee et al. (2004) and was lower than the rate (64%) reported by Chung et al. (2014). Women who have cardiovascular or neurological diseases are more likely to experience nocturia (Wen et al., 2015; Yoshimura, 2012). The difference between the rate of nocturia in this study and Chung et al.'s study (2014) may be explained by differences in participant characteristics: (a) women who had cardiovascular or neurological diseases (e.g., coronary heart disease and stroke) were excluded from this study, and (b) the mean age was lower and the duration of diabetes was shorter for our participants than those for the participants in Chung et al.'s study (2014).

Correlates of Nocturia

Our study finding that waist circumference was a correlate of nocturia is consistent with findings reported in previous studies (Chung et al., 2014; Liu et al., 2011; Townsend, Curhan, Resnick, & Grodstein, 2008). Waist circumference is a measure of central adiposity, whereas the BMI indicates overall adiposity (Townsend et al., 2008). The association between intra-abdominal pressure or bladder pressure and central adiposity is stronger than that between intra-abdominal pressure or bladder pressure and the BMI (Lambert, Marceau, & Forse, 2005). Increased intra-abdominal pressure may lead to weakening of the pelvic floor innervation and musculature, and an increase in vesical pressure and urethral mobility. The relationship between central adiposity and nocturia may be explained by the mechanical effects of central adiposity on intra-abdominal pressure, bladder pressure, and urethral mobility (Ramalingam & Monga, 2015). However, an influence of pelvic organ prolapse on nocturia needs to be considered because adiposity may also be associated with this condition (Jelovsek, Maher, & Barber, 2007).

Our study supports the finding regarding the correlation of parity and nocturia (Wang et al., 2015; Yoshimura, 2012). In this study, 116 (91.3%) of the 127 women who had given birth at least three times had used the vaginal delivery method. Vaginal delivery has been demon-

strated to induce injuries to the pelvic floor muscles, nerves, and connective tissue. A woman's pelvic floor structure, strength of the soft tissue, size of the baby, and mechanism of delivery can also affect the nature and severity of injuries resulting from childbirth. During a woman's lifespan, the performance of her pelvic floor function is a combined outcome of biologic, reproductive, and lifestyle conditions (Delancey, KaneLow, Miller, Patel, & Tumbarello, 2008). Moreover, vaginal delivery is an established risk factor for prolapse, whereas LUTS are typical symptoms in women with pelvic organ prolapse (Jelovsek et al., 2007). Collecting more detailed information about a woman's delivery process, pelvic organ prolapse condition, and pelvic floor function in further research could provide an insight into the possible effects of these conditions on lower urinary tract functions.

For individuals with diabetes, possible influences of the diabetes duration on urinary incontinence (Bani-issa, Halabi, Abdullah, Hasan, & Raigangar, 2014), an OAB (Liu et al., 2011), and nocturia (Chung et al., 2014) were reported. The influence of diabetes on lower urinary tract function is multifactorial and may include an osmolality diuresis effect, neuropathy-neuronal impairment, alterations in detrusor physiology, and urothelial dysfunction (Weiss et al., 2011). Partanen et al. (1995) found a significantly higher frequency of polyneuropathies in individuals with diabetes than in controls after a 5- to 10-year follow-up. Women with type 2 diabetes voided smaller volumes than did women in the control group (Lee et al., 2004). Changxiao et al. (2014) conducted a study among 1,640 women with a mean diabetes duration of 8 years and reported that 56% ($n = 918$) of them had experienced involuntary detrusor contractions. An animal study revealed that diabetes may affect urothelial homeostasis and further contribute to the underlying mechanisms of diabetic bladder dysfunction (Hanna-Mitchell et al., 2013). The prevalence of diabetes-related chronic complications (e.g., neuropathies) increases with disease duration (Liu, Fu, Wang, & Xu, 2010). Healthcare professionals should target women with a long history of diabetes, provide appropriate management, prevent or postpone the occurrence of diabetes-related chronic complications (American Diabetes Association, 2015), and diminish possible influences of these complications on lower urinary tract functions.

The complexity of the relationship between nocturia and sleep may increase because sleep deprivation can change hemodynamics and thereby increase nighttime urine production (Van Kerrebroeck et al., 2002). Awakening from sleep may be associated with a variety of reasons besides nocturia (Bliwise et al., 2014). For example, an individual's sleep may be disturbed by their

Table 3. Multivariate Logistic Regression Analyses of Correlates for Nocturia ($N = 275$)

Variable	Category	p value	Odds ratio	95% CI
Waist circumference	<80 cm	.008	Reference group	1.29–5.36
	≥ 80 cm		2.62	
Parity	<3	.024	Reference group	1.09–3.22
	≥ 3		1.87	
Time since diagnosis of diabetes	≤ 10 years	.040	Reference group	1.03–3.49
	>10 years		1.90	
Sleep quality (CPSQI global score)	Good sleeper (≤ 6)	<.001	Reference group	1.68–5.30
	Poor sleeper (> 6)		2.98	
Increased daytime urinary frequency	No	.002	Reference group	1.43–4.80
	Yes		2.62	

Note. CI = confidence interval; CPSQI = Chinese version of the Pittsburgh Sleep Quality Index.

Table 4. Relationships of Nocturia With Sleep Quality and Glycemic Control ($N = 275$)

	Without nocturia		Nocturia		p value Scheffe post hoc	
	≤ 1 void/night ($n = 151$) Mean (SD)		2 voids/night ($n = 78$) Mean (SD)	≥ 3 voids/night ($n = 46$) Mean (SD)		
Sleep quality/A1C						
CPSQI global score (range: 1–19)	7.28 (3.76) ①		8.85 (3.38) ②	10.24 (3.65) ③	13.30	<.001*** ③>①; ②>①
Subjective overall sleep quality (range: 0–3)	1.43 (0.73) ①		1.78 (0.71) ②	2.17 (0.68) ③	20.52	<.001*** ③>①; ②>①
Sleep latency (range: 0–3)	1.42 (1.10) ①		1.78 (1.04) ②	2.07 (1.16) ③	7.22	.001** ③>①
Sleep duration (range: 0–3)	1.74 (0.84)		1.90 (0.78)	1.72 (0.78)	1.11	.332
Habitual sleep efficiency (range: 0–3)	0.97 (1.03) ①		1.23 (0.95) ②	1.61 (1.06) ③	7.21	.001** ③>①
Sleep disturbances (range: 0–3)	0.95 (0.31) ①		1.06 (0.25) ②	1.09 (0.35) ③	5.32	.005** ③>①; ②>①
Use of sleeping medication (range: 0–3)	0.39 (0.86) ①		0.64 (1.09) ②	0.89 (1.25) ③	4.08	.020* ③>①
Daytime dysfunction (range: 0–3)	0.37 (0.55) ①		0.45 (0.53) ②	0.70 (0.73) ③	5.60	.004** ③>①
A1C (%)	7.76 (1.40)		7.97 (1.56)	8.39 (1.93)	1.95	.122

Note. CPSQI, Chinese version of the Pittsburgh Sleep Quality Index.

* $p < .05$; ** $p < .01$; *** $p < .001$.

mental or emotional conditions, pain experience, or obstructive sleep apnea (Bliwise et al., 2014; Weiss et al., 2011, 2013). Corticotropin-releasing factor is expressed in areas of the central nervous system that control voiding and response to stress. This corticotropin-releasing factor also increases during anxiety, depression, and pain (Klausner & Steers, 2004). Possible associations of nocturia, sleep, and these conditions could not be excluded because pain and depression are common among individuals with diabetes (Sudore et al., 2012). Collecting information on this specific population's mental or emotional conditions and pain, and obstructive sleep apnea experiences is suggested to further examine the underlying factors of nocturia and relationships of nocturia and sleep with these conditions. For individuals with nocturia, beneficial effects of behavioral therapy combined with exercise on nocturia and sleep quality were reported (Johnson et al., 2016). Providing behavioral interventions in women with diabetes who were disturbed by nocturia is recommended because they may have

positive effects on improving both nocturia and sleep quality.

Chung et al. (2014) reported an association between OAB and nocturia among individuals with diabetes. Associations of urinary incontinence, urgency, and OAB with nocturia were reported in general populations (Wen et al., 2015; Yoshimura, 2012). Individuals with poor diabetes control may experience osmotic diuresis, which further results in polyuria, increased urinary frequency, and nocturia. Diabetes also predisposes individuals to urinary retention due to impaired bladder contractility or a contractile neuropathic bladder (Ouslander, 2002). These factors need to be investigated in future studies to clarify the relationships of nocturia with other LUTS.

In this study, nocturia was associated with two modifiable correlates (waist circumference and poor sleep). Related interventions aimed at modifiable correlates are recommended and may include maintaining a normal body weight and regular physical exercise for maintaining a normal waist circumference, and decreasing daily

caffeine consumption, arranging adequate medication timing, implementing feasible modifications in sleeping environments, and maintaining sleep hygiene to improve sleep quality. Researchers can obtain information from a voiding diary, urodynamic assessments, or a sleep laboratory in further studies to investigate the underlying etiologies of nocturia in women with diabetes, and provide individualized, appropriate management or treatments. Other related lifestyle management and behavioral interventions may include minimizing alcohol intake, restricting nighttime fluid intake, timing medications, training the bladder, training the pelvic floor muscles, practicing urge-suppression techniques, managing peripheral edema, and losing excess body weight (Burgio, 2013; Nimeh et al., 2015; Weiss et al., 2011, 2013).

Nocturia With Sleep Quality and Glycemic Control

Findings of this study are consistent with other studies that were conducted among general populations with an increasing number of nocturnal episodes being negatively associated with sleep quality (Ancoli-Israel et al., 2011). Discussion of the relationship between nocturia and poor sleep was presented in previous sections. The following discussion focuses on the relationship between the number of nocturnal episodes and glycemic control. However, further discussion on this relationship is limited because an association between nocturia and glycemic control has seldom been reported. In this study, the insignificant correlation of the number of nocturnal episodes with A1C might be explained by the small sample size and uneven distributions of variables. For example, only 13 women (4.7%) had experienced nocturia of at least four voids per night. Previous study results showed that poor or inadequate sleep may lead to poor glycemic control in individuals with diabetes (Tsai et al., 2012), and there is a close relationship between nocturia and poor sleep or insomnia (Bliwise et al., 2014). Conducting studies of large numbers of women with diabetes is recommended to further examine the relationships among nocturia, sleep quality, and glycemic control.

There are several limitations to this study. First, a cross-sectional design can only suggest an association. Second, the convenience sample and sample exclusion (e.g., cognitive impairment) may have reduced the generalizability of the study results. Third, most measures were collected through self-reporting. A recall bias cannot be excluded. Future studies could consider using objective examinations (e.g., actigraphy) to validate self-reported measures. Fourth, a lack of information on women's C-reactive protein, medication usage with a hypertension diagnosis, and other comorbid conditions and symptoms (e.g., pain,

distress, etc.) with possible influences on nocturia and sleep limited the examination of relationships of nocturia with those conditions.

Conclusions and Implications

This preliminary study showed that nocturia and poor sleep are common in women with type 2 diabetes. Among our participants with nocturia, 54% to 80% of them reported mild to severe symptom-related bother, and only a small portion of them had sought professional help. Waist circumference, parity, time since diagnosis of diabetes, sleep quality, and increased daytime urinary frequency may be linked to nocturia. A significant relationship between nocturia and poor sleep was identified. As the beneficial effects of nonpharmacological lifestyle management, behavioral interventions, and pharmacotherapy on nocturia were reported (Nimeh et al., 2015; Weiss et al., 2011, 2013), the high occurrence rate of nocturia warrants that healthcare professionals should screen for nocturia and poor sleep, and offer appropriate management. The multifactorial nature of nocturia supports delivered management targeting the underlying etiologies in order to optimize individuals' symptom management. Further research conducted in women with diabetes could examine the underlying etiologies of nocturia using objective examinations (e.g., a voiding diary and actigraphy).

Clinical Resource

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CLINICAL SCHOLARSHIP

The Effect of Binaural Beat Technology on the Cardiovascular Stress Response in Military Service Members With Postdeployment Stress

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Key words

Binaural beat technology, military, postdeployment stress, heart rate variability

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Abstract

Purpose: To assess the efficacy of embedded theta brainwave frequency in music using binaural beat technology (BBT) compared to music alone on the cardiovascular stress response in military service members with postdeployment stress.

Design: A double-blinded, randomized, pre- and postintervention trial.

Methods: Seventy-four military services members with complaint of postdeployment stress were randomized to either music with BBT or music alone. Each group listened to their respective intervention for a minimum of 30 min at bedtime for three consecutive nights a week for a total of 4 weeks. A 20-min pre- and postintervention heart rate variability (HRV) stress test and daily perceived stress via diaries assessed intervention efficacy.

Findings: There was a statistical difference ($p = .01$) in low-frequency HRV between the music with BBT group compared to the music only group. The average low-frequency HRV decreased in the music with BBT group $2.5 \text{ ms}^2/\text{Hz}$, while in the music only group it increased $7.99 \text{ ms}^2/\text{Hz}$. There was also a significant difference ($p = .01$) in the high-frequency HRV measures, with the music with BBT group showing an increase in HRV by $2.5 \text{ ms}^2/\text{Hz}$ compared to the music only group, which decreased by $7.64 \text{ ms}^2/\text{Hz}$. There were significant ($p = .01$) differences found in total power measures, with the music only group decreasing by $1,113.64 \text{ ms}^2/\text{Hz}$ compared to $26.68 \text{ ms}^2/\text{Hz}$ for the music with BBT group. Finally, daily diaries consistently showed that participants who used BBT reported less stress over the course of the 4 weeks.

Conclusions: When placed under an acute stressor, participants who used music with embedded BBT showed a decrease in sympathetic responses and an increase in parasympathetic responses, while participants who used music alone had the opposite effect.

Clinical Relevance: The use of BBT in the theta brainwave frequency embedded into music decreases physical and psychological indications of stress. BBT embedded with beta and delta frequencies may improve cognitive functioning and sleep quality, respectively.

Cardiovascular disease (CVD) is the leading cause of death in the United States (U.S. Department of Health and Human Services, Center for Disease Control, and Prevention, National Center for Health Statistics, 2015). Although young and held to a higher fitness standard than the general public, military personnel are at higher risk for CVD than the general population (Armed Forces Health Surveillance Center, 2011). Numerous studies have shown a link between combat exposure and increased risk for CVD in Vietnam veterans (Eisen et al., 2005; Gray, Reed, Kaiser, Smith, & Gastanaga, 2002; McCauley, Lasarev, Sticker, Rischitelli, & Spencer, 2002). Soldiers deployed in combat regions are 1.28 times more likely to develop hypertension than those who did not have combat exposure (Granado et al., 2009). Approximately 8% to 11% of veterans returning from deployment rate their health as “fair to poor,” with an increase to 10% to 13% 6 months later (Armed Forces Health Surveillance Center, 2011). Returning veterans are at high risk for health concerns such as stress, anxiety disorders, poor sleep quality, and substance abuse, all of which have a negative effect on the cardiovascular (CV) system (Armed Forces Health Surveillance Center, 2011; Thomas et al., 2010).

The CV system is negatively impacted by anxiety and stress via neurological and endocrine pathways (Olafranye, Jean-Louis, Zizi, Nunes, & Vincent, 2011). Overactivation of the stress response, or allostatic load, increases the risk for CVD (McEwen, 1998). Chronic stress produces an autonomic imbalance with a predominance of sympathetic activity that results in dysregulation of daily blood pressure patterns and heart rate variability (HRV). Typically, blood pressure decreases at night, surges upon awakening, and remains elevated throughout the day (Giles & Izzo, 2008; Kario et al., 2003). A dysregulated system secondary to chronic stress exposure will have a greater surge magnitude in the morning and a blood pressure (BP) that does not drop by at least 10% during sleep (Giles & Izzo, 2008; Grassi, 2009; Kario et al., 2003; Kikuya et al., 2000; Stolarz, Staessen, & O'Brien, 2002). As for HRV, a high HRV is associated with greater parasympathetic drive, which is cardioprotective, while low HRV associated with greater sympathetic drive increases CVD risk (Taylor, 2010).

Heart rate variability is mediated by the autonomic nervous system (ANS). The ANS comprises the parasympathetic nervous system (PSN) and the sympathetic nervous system (SNS; Larkin, 2005). The SNS, often known as the stress response, is characterized by pupil dilation, decreased saliva, increased heart rate, bronchial dilation, decreased gastrointestinal motility, glycogen glucose conversion, secretion of adrenaline and noradrenalin, and the inhibition of bladder contraction

(Larkin, 2005). As for the PSN, the relaxation state, the opposite occurs. The pupils constrict, saliva increases, heart rate decreases, to name a few (Larkin, 2005). To measure HRV electrodes are often attached to display two commonly used measures, low frequency (LF) and high frequency (HF; Medicare, 1996; Task Force of the European Society of Cardiology the North American Society of Pacing Electrophysiology, 1996). LF bands (.04–.15 Hz) measure both the PSN and SNS activity, while HF bands (.15–4 Hz) measure PSN activity (Medicare, 1996). For example, during a stressor, LF increases while HF decreases, and when relaxed HF should increase while LF decreases.

With the number of veterans returning with CV dysregulation indicated by increased anxiety, stress disorders, or elevated risk for CVD, there is a need for a low-cost, acceptable intervention designed to counteract this CV dysregulation. Since CV function can be conceptualized as primarily rhythmic processes, like many biological processes, interventions targeting physiological rhythms are appropriate (Glass, 2001). For instance, entrainment is a common phenomenon used by music therapists to influence behavioral, motor, or physiological responses of patients (Stegemoller, 2014). Entrainment principles have been useful in assisting stroke and Parkinson's disease patients improve gait, improve cardiac function, and decrease stress (Thaut, McIntosh, & Hoemberg, 2015).

Binaural beat technology (BBT) is a specific form of entrainment that was first discovered by a German researcher named Heinrich Wilhelm Dove in 1839 (Oster, 1973). This phenomenon occurs when one listens to two “mistuned” tones that in turn create a third tone known as the binaural beat. This third tone is not heard but is processed in the area of the brain where the contralateral integration of the auditory input (known as the superior olivary nucleus) resides (Moore, 2004; Swann, Bosanko, Cohen, Midgley & Seed, 1982). This in turn affects the reticular activating system, which alters the electrical potentials of the thalamus and cerebral cortex, changing the brainwave frequency. This concept is known as the frequency following response, in which the intervals of neural activity synchronize with the cycle of the stimulus (Smith, Marsh, Greenberg, & Brown, 1978). As a result, the entrainment or synchronization affects the listener's mental, physical, or emotional state (Monroe Products, 2016). If changing brainwaves can mediate psychological stress, this mediation may affect the CV stress response.

In a study published in 2014, 21 participants were randomized into two groups to assess the effect of BBT on HRV following 20 min of CV exercise at a 70% maximum oxygen uptake (VO_2 max; McConnell, Froeliger, Garland, Ives, & Sforzo, 2014). Using a double-blinded repeated measure approach, HRV was measured at three

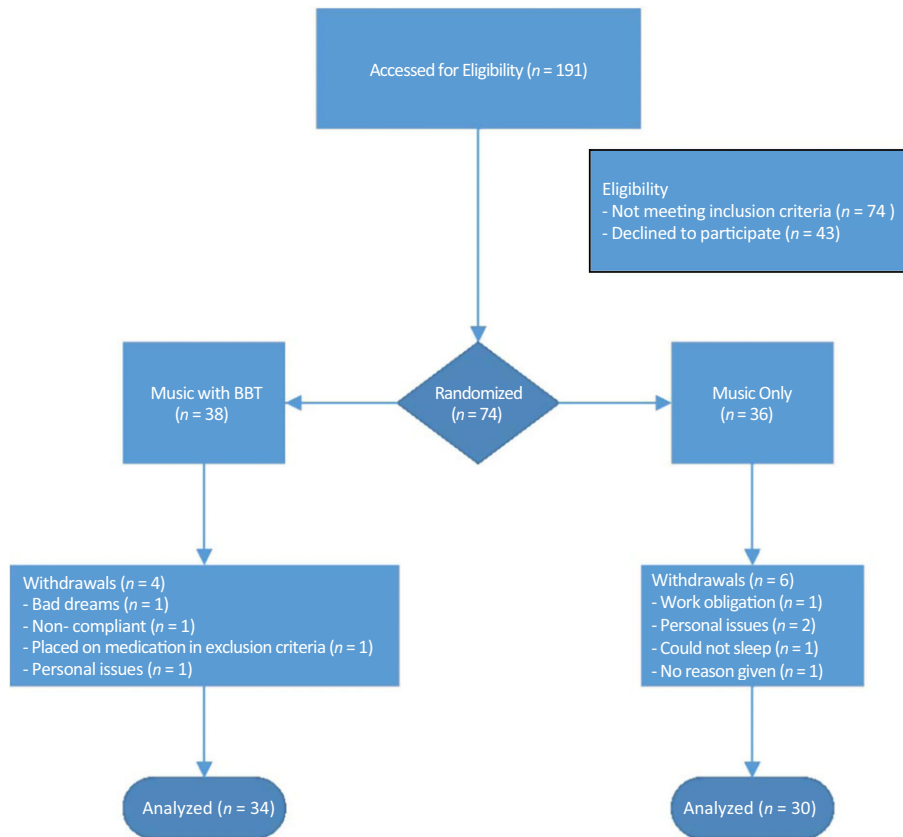


Figure 1. Participant flow diagram. BBT = binaural beat technology.

time points after the stressor. During the first 10 min of relaxation, there was a significant difference ($p = .003$) in LF, with the placebo group indicating a constantly higher LF compared to the BBT group (McConnell et al., 2014). Additionally, the BBT group had a consistently higher HF compared to the control group during the first 10 min, and this difference was statistically significant ($p = .03$; McConnell et al., 2014). Perceived stress measures were also taken. Participants in the BBT group reported more relaxation in comparison to the placebo group ($p = .04$; McConnell et al., 2014). While McConnell et al.'s study assessed the effect of BBT on HRV (while in use) and perceived relaxation after a "physical" stressor, the current study assessed the effect of BBT on HRV (after using it for 4 weeks) and perceived stress after a "psychological" stressor. This study is the first documented study using entrainment in a military population.

Purpose

The aim of this study was to assess the efficacy of music embedded with BBT in the theta brainwave frequency (4–7 Hz) on the CV stress response in a group of military

service members with a complaint of chronic stress following deployment compared to music alone.

Methods

Design

The research team used a prospective, double-blinded, randomized, pre- and postintervention design to conduct this study.

Participants

Since this study involved the comparison of two groups at a minimum of two intervals, a power analysis was conducted for the 2×2 mixed analysis of variance (ANOVA; between and within design). For a medium effect (.025) and a power of 0.95, a target sample of 54 was needed. To address the possibility of attrition over the 3 years of the study, the sample size was increased by 35%, which equaled an additional 19 participants for a sample size of 73. To make the groups equal, the total sample size was increased by one for a total 74 participants (Figure 1).

The participants consisted of military service members with a complaint of continued stress following a deployment. Participants were recruited from two military healthcare treatment facilities located in the eastern United States. To be included in the study, participants had to be 18 years of age or older, have a history of deployment within the last 10 years, be eligible to receive health care at the two military healthcare treatment facilities, and be able to commit to the 4-week study. Participants were excluded if they were taking any medication in the antihypertensive, antianxiety, or antiseizure categories, had been diagnosed with moderate to severe traumatic brain injury (TBI), or had a history of epilepsy, documented hearing deficit, utilization of a hearing aide, or ear trauma.

Measures

Heart rate variability. The Biocom Technologies® HRV Live 1.0 Heart Rate Variability Monitor and Software (Poulsbo, WA, USA) was used to capture HRV measures at baseline and again after using the intervention for 4 weeks. Using a dual chest electrode, continuous HR signals were captured, digitized, and analyzed on a computer via Bluetooth technology. Continuous HR measures were collected during five 5-min intervals: (a) baseline, (b) while being trained for the hand-eye coordination challenge, (c) during the challenge, (d) after the challenge, and (e) when verbally coached to relax.

Daily logs. Daily logs were completed upon awakening to document if they followed the protocol as instructed and to answer the questions “Were you tense (stressed) at work yesterday?”, if applicable, and “Were you tense (stressed) at home yesterday?”

Intervention

The Monroe Institute’s Hemi-Sync “Dreamland” audio files (embedded with BBT in the theta brainwave frequency, approximately 4–7 Hz) via a mini mp3 player and specialized headphones was used as the intervention. “Hemi-Sync is an audio-guidance process system that works through the generation of complex, multilayered audio signals, which act together to create a resonance that is reflected in unique brain wave forms characteristic of specific states of consciousness” (Monroe Products, 2016). The audio file contained a variety of separate tracks, each ranging from 5 to 10 min in length with an assortment of different music styles. All mp3 players started with the same track and after reaching the last track looped back to the beginning for continuous play throughout the night. Those in the music only group

had the same identical tracks but without the technology. Each week the participants chose a minimum of at least three consecutive nights in which they were to use their respective intervention for a minimum of 30 min at bedtime. This process was repeated each week for the duration of the 4 weeks.

Procedure

The study was approved by the Walter Reed Army Medical Center’s Institutional Review Board, and the data were collected between June 2012 and July 2015. As participants enrolled, they were assigned a unique study identification number and were asked to blindly pick from a box of preloaded mp3 players (half containing music with BBT and half containing music alone). To ensure that the investigator remained blinded throughout the duration of study, the mp3 players were shipped from the distributor already coded with unique identifiers, randomized, and packaged in groups of 10 to ensure that at any given time during the 3 years there would be equal distribution between both groups. The distributor maintained the key code until all participants completed the intervention.

Pre-intervention phase. After they consented, participants completed a participant information sheet that included age, race, ethnicity, gender, marital status, military branch of service, military status, rank, date returned from last deployment, location of deployment, and number of times deployed. Participants were instructed to abstain from caffeine products at least 6 hr before participating in the hand-eye coordination challenge to collect baseline HRV measures.

Hand-eye coordination challenge. To put the participants into a stressed state, participants were asked to play the Mattel game “Operation” for 5 min while connected to the HRV monitor. In this game, forceps are used to extract small pieces from an animated figure. If the forceps touch the sides of the figure, a loud sound occurs. To make the challenge more stressful, participants had to play the game via a mirror with only 10 s per piece. If the piece was not extracted within 10 s, a second buzzer was activated signaling the participant to move to the next piece.

At the conclusion of the HRV test, participants were given:

1. MP3 player preloaded with Hemi Sync’s audio files (depending on group assignment).
2. SleepPhone stereo headphones to work in conjunction with the mp3 player.

3. A set of daily diaries.
4. Participant instruction sheet.

Intervention phase (4 weeks). Participants were instructed to listen to their respective mp3 player for a minimum of 30 min at bedtime on three consecutive nights per week for 4 weeks. Upon awakening, participants were instructed to complete a short daily log. Each week the research coordinator contacted the participants for quality checks to ensure compliance.

Postintervention phases. After using the intervention for 4 weeks, each participant returned (within 1 week of last use of the technology) for one post-intervention HRV test, conducted in the same manner as the pre-intervention HRV test conducted 4 weeks earlier, in order to compare pre- and postmeasures.

Data Analysis

SPSS v. 22 statistical software (SPSS, Inc., Chicago, IL, USA) was used to assist in analyzing the data. Descriptive statistics were used to compile the demographic data. A mixed ANOVA was conducted to determine to what extent the two groups differed on LF, HF, and total power HRV measures across the two waves of data collection based on the following 2×2 (Group \times Time) comparisons. For the daily diary questions that contained dichotomous answers, output for the means (which is the proportion that endorsed the “yes” option), a Microsoft Excel line chart was used. All assumptions were examined (e.g., homogeneity of variance-covariance matrices, sphericity if $t > 2$, etc.) as well as any data anomalies (e.g., outliers). The level of significance was set at α of .05 for all analyses.

Results

Participant demographics are presented in **Table 1**. The average length of deployment for the entire sample was 9.76 (SD = 4.5) months, the average number of deployments was 2.59 (SD = 2.8), and 54.1% were deployed in Afghanistan.

There was a statistically significant ($p < .01$) difference in the LF HRV measures in which the BBT group showed a decrease ($-2.5 \text{ ms}^2/\text{Hz}$), while the control group showed an increase ($+7.99 \text{ ms}^2/\text{Hz}$; **Figure 2**). A statistically significant ($p < .01$) difference was also found in the HF HRV measures, with the BBT group showing an increase ($+2.5 \text{ ms}^2/\text{Hz}$), while the control group showed a decrease ($-7.64 \text{ ms}^2/\text{Hz}$) in HRV (**Figure 3**). Finally, the control group showed a statistically significant ($p < .05$) decrease in total power HRV ($-1,113.64 \text{ ms}^2/\text{Hz}$)

Table 1. Demographics

Demographics		Music with BBT $n = 37$ (51%) ^a	Music only $n = 36$ (49%)	p value
Years of age, mean (SD)		38.3 (± 8.29)	37.9 (± 10.16)	.873
Race	American	1 (3%)	0 (0)	.423
	Indian or Alaskan Native			
	Asian	3 (8%)	4 (11%)	
	African	11 (30%)	5 (14%)	
	American Caucasian	21 (57%)	24 (69%)	
	Other	1 (3%)	2 (6%)	
Ethnicity	Non- Hispanic	11 (65%)	12 (8%)	.52
	Hispanic	6 (35%)	4 (25%)	
Gender	Female	7 (18%)	14 (39%)	.051
	Male	31 (82%)	22 (61%)	
Marital status	Single	8 (22%)	9 (25%)	.727
	Separated	2 (5%)	4 (11%)	
	Divorced	5 (14%)	3 (8%)	
	Married	22 (60%)	20 (56%)	
Branch	Army	26 (70%)	25 (69%)	.811
	Navy	6 (16%)	8 (22%)	
	Air Force	4 (11%)	2 (6%)	
	Marines	1 (3%)	1 (3%)	
		1 (3%)	1 (3%)	
Military status	Active Duty	32 (84%)	32 (89%)	.893
	Reserve	2 (5%)	2 (5%)	
	National Guard	2 (5%)	1 (3%)	
	Retired	2 (5%)	1 (3%)	
Months deployed, mean (SD)	9.84 (5.29)	9.67 (3.68)	.87	
Times deployed, mean (SD)	2.32 (1.42)	2.89 (3.79)	.387	

Note. BBT = binaural beat technology.

^aSample sizes may differ given missing data.

compared to the decrease in total power HRV for the BBT group ($-26.68 \text{ ms}^2/\text{Hz}$; **Figure 4**). When participants were asked if they were stressed at work or at home, the BBT group consistently scored lower across all time points (Figures 5 and 6).

Discussion

Although there are only a handful of studies using HRV as a measure to assess the technology's efficacy, findings were consistent (McConnell et al., 2014; Roy et al., 2012). This study's results suggest that music embedded with BBT in the theta brainwave frequency had a positive

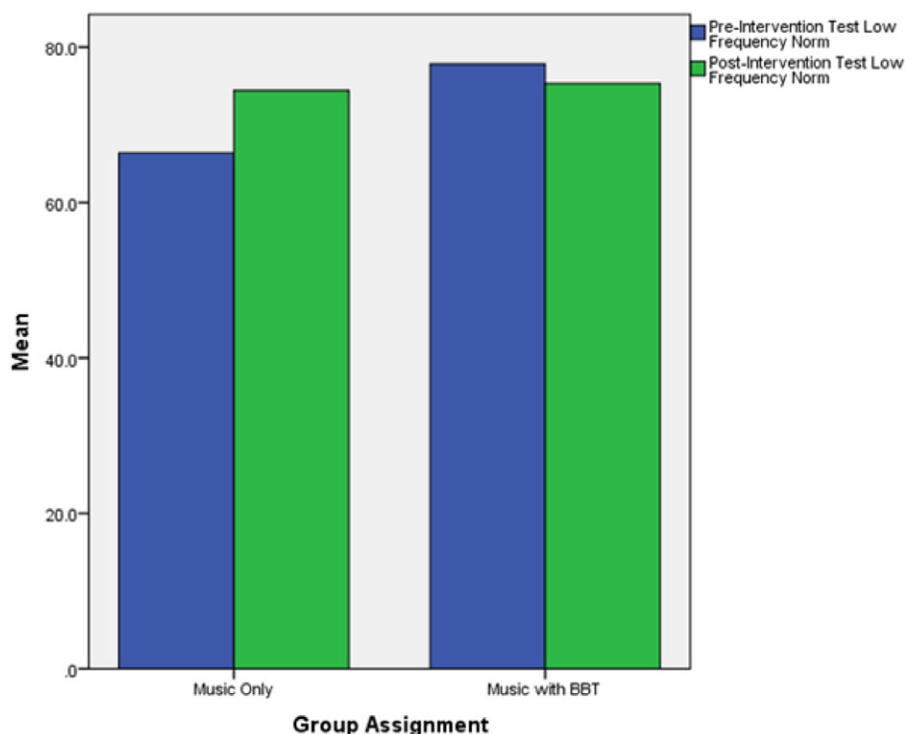


Figure 2. Low frequency heart rate variable while under an acute stressor. BBT = binaural beat technology.

effect on the CV stress response in military service members. Just as in the McConnell et al. (2014) study, which used BBT in the same brainwave frequency (theta) but on a physical stressor, there was a higher incidence of self-reported relaxation with increased parasympathetic activation and decrease sympathetic response after using the technology. This important finding suggests that military service members may be able to more effectively manage stress using music embedded with BBT. Music tends to be a great method for reducing stress in many people; however, the use of the embedded BBT music has the potential to make even greater positive impact on stress. It has become common knowledge that the accumulation of stress over time can lead to multiple behavioral health problems such as posttraumatic stress disorder, anxiety, insomnia, substance abuse, eating disorders, etc. If stress can be managed early and in a noninvasive way, these subsequent issues may diminish.

Interestingly, this study's control group not only had a significant difference when compared to the BBT group, but had the total opposite effect (e.g., decreased parasympathetic activation and increased sympathetic activation). This opposite effect is troubling, because this effect indicates that stress without an intervention poses a significant threat to the health of today's military service members. With the criteria being complaints of continued

stress within 10 years of deployment, this may be a cumulative effect of stress that is being demonstrated.

To support the evidence that the control group fared worse, HRV total power was also assessed. Total power reflects overall autonomic activity where sympathetic activity is a primary contributor (Medicore, 1996). In healthy adults, total power should be at least 1,000 ms^2/Hz (Medicore, 1996). In the case of chronic stress, total power decreases due to the weakened regulating function (Medicore, 1996). In this study, the total power in the BBT group remained consistently around 1,200 ms^2/Hz , whereas the control group significantly dropped 1,113.64 ms^2/Hz to a measure of 985.26 ms^2/Hz . This suggests that the control group exhibited more signs of chronic stress, although they were placed under a situation created by an acute stressor in this study.

Several questions still remain. First, does BBT have a dose effect? In other words, would someone who used the technology for 1 week have the same effect as someone who used it for 2 weeks. Since this study was neither stratified nor set up to measure postintervention HRV measures at different intervals, this was difficult to assess. Second, is there a latency period after using the technology? In other words, how long will the participant feel the effect of BBT after it is turned off or does it only work when it is in use? The McConnell et al. (2014) study

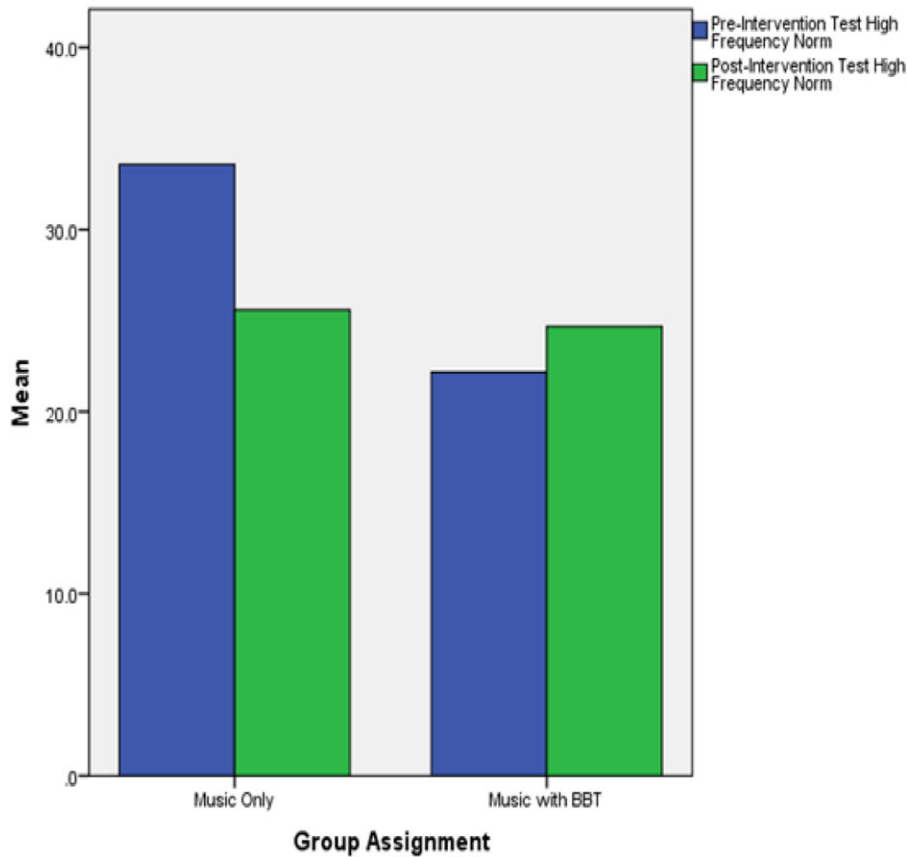


Figure 3. High-frequency heart rate variability while under an acute stressor. BBT = binaural beat technology.

showed that when using BBT for 20 min, there was a significant difference between the BBT and control group in the first 10 min. However, at the 20-min mark both groups had a similar effect. Using a randomized stratified group exposed to the technology for varying times and stopping at different time points could answer these questions.

Limitations

This study had several limitations. First, the two groups were not divided equally (e.g., 37 vs. 37). When the distributor was asked to make the groups equally distributed, they inadvertently sent two equal groups instead (36 vs. 38). Since the study was double blinded, the investigator was not aware of this until the end. Although not divided equally, this did not make a significant impact on the results. Second, although randomized, more females were in the control group than the intervention group (39% vs. 18%). Lastly, other than verbal confirmation from the participants and notes in the daily diary, there was no way to objectively capture the total number of minutes that the intervention was used.

Implications for Nursing Practice and Future Research

BBT does not require a physician's order nor does it need to be administered by an advanced practice provider. It can be an independent nurse-initiated action in an outpatient setting, inpatient setting, or even on military deployments. The vast majority of the participants felt that the SleepPhones and mp3 players were easy to extremely easy to use, had very good quality sound, and were really comfortable to wear. Buy-in from patients is imperative when implementing new innovative treatment modalities. It has been shown that patients who are engaged in their care are more likely to adhere to treatments recommended. For military populations, the capability of an effective intervention that can be used in an austere environment is paramount to keeping service members healthy. Given the stigma often associated with postdeployment stress and the seeking of treatment, the use of BBT is unassuming as it appears as though the service member is simply listening to music.

This technology also has the capacity to be altered to help other common deployment health concerns such as

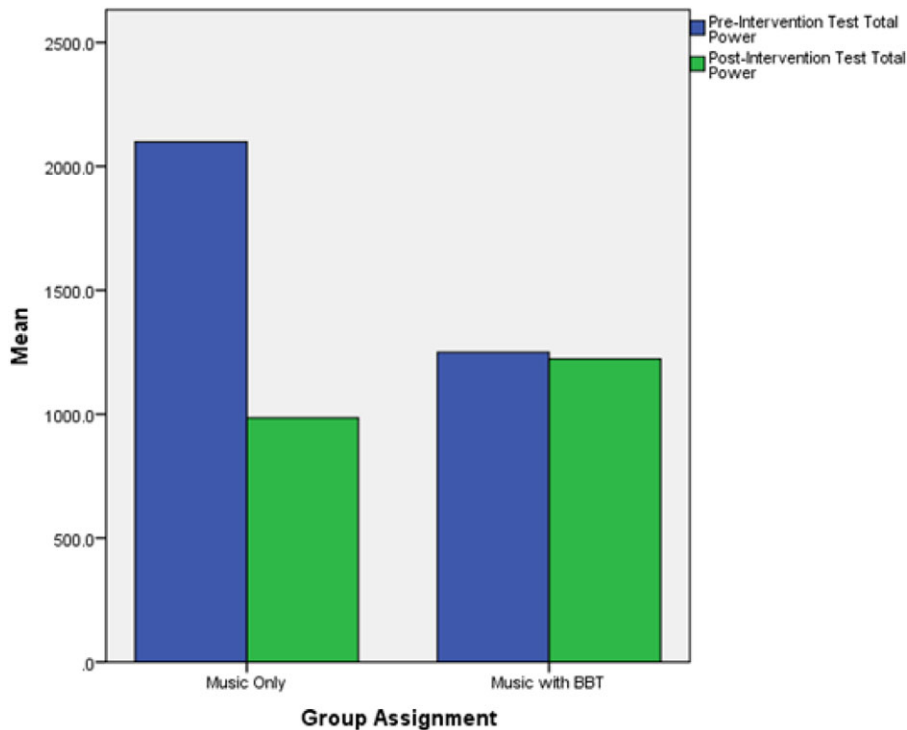


Figure 4. Total power heart rate variability while under an acute stressor. BBT = binaural beat technology.

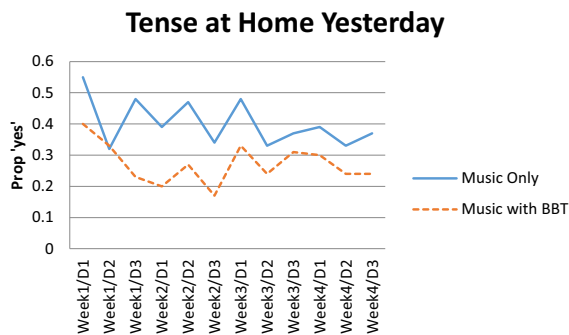


Figure 5. Sleep diary entries: “Were you tensed (stressed) at home yesterday?” BBT = binaural beat technology.

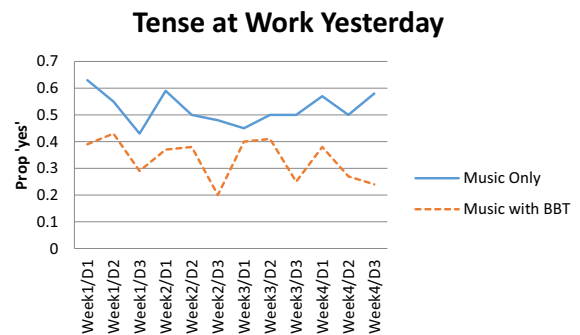


Figure 6. Sleep diary entries: “Were you tensed (stressed) at work yesterday?” BBT = binaural beat technology.

the beta frequency range to improve focus when tired and the delta frequency range to improve sleep quality when hours are limited. One study examined nurse burnout among a group of Army nurses and found high levels of emotional exhaustion secondary to working extended hours and providing care for combat casualties (Lang, Patrician, & Steele, 2012). This treatment modality may prove very beneficial to a group of military nurses that provide care of combat casualties on a daily basis. It is common for many to overlook the stress placed on caregivers. Military nurses are in a very unique situation, whereby they provide care for U.S. military personnel, as

well as enemy military and civilian personnel. These particular situations have the potential to put military nurses in ethical dilemmas in which care must be provided to the enemy that targeted friends, colleagues, and fellow service members. Since the technology affects the brainwaves with no required action of the user, it could help minimize some of the negative outcomes associated with these types of psychological stressors.

In future BBT studies, investigators should consider much larger sample sizes that have enough participants to stratify for various outcome measure time points such as dose effect and duration of effect after intervention has

ceased. Using mp3 players that can automatically track minutes of use will help provide more objective data. For investigators who plan to conduct BBT studies in the postdeployed population, they need to be cautious given that many in this population may have sustained mild to moderate TBI. The sound technology may in fact worsen the ringing in the ears, which is one of the most common clinical presentations, and it is unclear if the manipulation of brainwave activity may worsen the clinical presentations of a TBI. Finally, adding a functional magnetic resonance imaging of the head before, during, and after using BBT would also provide great objective measures. The fact that BBT can be replicated by anyone with the proper equipment and distributed freely to the public through methods such as YouTube, Apple App store, and Apple iTunes warrants further scrutiny for quality control measures and regulatory oversight. Unfortunately, consumers currently have no way to validate if the correct brainwave frequency is embedded or if the technology is included at all for that manner.

Conclusions

Music embedded with BBT, in the theta brainwave frequency, was found to be beneficial in decreasing the effects of chronic stress exposure. Using HF and LF HRV measures, those who used BBT reported greater relaxation with increased parasympathetic activation and decrease sympathetic response when placed under an acute stressor. The technology's portability, low cost, and ease of use make it a great alternative to other methods often used to decrease stress.

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Clinical Resources

- AcousticSheep LLC. SleepPhones: <http://www.sleepphones.com>
- Medcore: Heart rate variability analysis system. http://medi-core.com/download/HRV_clinical_manual_ver3.0.pdf
- Monroe Products: Introduction to Hemi-Sync technology video: <http://www.hemi-sync.com>

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CLINICAL SCHOLARSHIP

The Experience of Parenting a Child With Disability in Old Age

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Disability, parenthood, qualitative research, life course, aging

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Abstract**Background:** There are growing numbers of older parents providing ongoing care for adults with disabilities. A parent's aging calls for a redefinition of parental care practices and roles in light of his or her own changing needs.**Purpose:** The current study aims to highlight the ways in which aging parents perceive and construct their parental role to adult children with disabilities at this point in their lives.**Methods:** An interpretive phenomenological analysis perspective was used. Data collection was performed through in-depth, semistructured interviews with 20 aging parents of children with developmental disabilities, followed by a content analysis.**Results:** Four patterns of parental identity emerged: "Being happy is his responsibility; I did my part," embracing aging needs; "I can do part-time worrying," a gradual letting go of parental roles; "I'm worn out, but I keep going. What choice do I have?" bearing the brunt; "I'm an old woman changing diapers," full-time parents.**Conclusions:** The findings enable a deeper understanding of the various ways in which parents cope with aging alongside caring for an adult child with disability. Hence, this study can serve as a framework for developing tailored and differential intervention methods for these families.**Clinical Relevance:** As the world's people experience longer life expectancy, of both individuals with disabilities and their parents, nurses' education and practice should be challenged by the double sensitivities of elder's caregiving and address the unique needs of this unique population.

Parents play an essential role in the lives of adult children with disabilities (ACWDs) over the life course (Esbensen, Seltzer, & Krauss, 2012). The steady rise in life expectancy has led individuals with disabilities to live longer and grow old with their aging parents (Jeppsson Grassman & Whitaker, 2013). Thus, parents' roles demand both being aware of the ongoing needs of the ACWD, as well as tending to new needs that arise due to their own aging process. While, to a large extent, previous research and practice have focused on parents coping with disabilities in the earlier stages of life, the period of old age has yet to receive the same amount of attention (Jeppsson Grassman & Whitaker, 2013).

Parenting and the Life Course Perspective as a Theoretical Framework

The life course perspective is a theoretical framework that focuses on the historical-social process of families and individuals. It examines how individuals change over time, and how transitions and life paths are linked by way of various family subsystems over the life course (Elder, 1998). In the study of parenting, life course perspective emphasizes continuity and change in relationship patterns over the life course and suggests how parenthood and the "linked lives" of parents and children influence trajectories and changes over time (Milkie, Bierman, &

Schieman, 2008). Moreover, it considers the centrality of “social timing,” that is, the way age norms delineate activities appropriate to each stage of life, providing a sense of when people should accomplish major social role transitions (Elder, 1998). The accomplishment of these life tasks is not a given for people with disabilities. Some achieve them, whereas others do not integrate into society due to a lack of ability, skills, and social opportunities (Dew, Balandin, & Llewellyn, 2008).

Parenting a Child With Disability Through the Life Course Lens

Developmental disability is defined as a severe, chronic disability, which originated at birth or childhood, is expected to continue indefinitely, and substantially restricts individual functioning in several major life activities (Falvo, 2014).

Over the course of the natural aging process, there is generally a shift of responsibility from parent to child (Gans & Silverstein, 2006). However, in the case of families of ACWDs, parents function differently (Gilligan, Sutor, Rurka, Con, & Pillemer, 2015). The life course view of linked lives suggests that such a parenting experience can have a cumulative effect on parents in later life. Thus, this type of parenthood is often referred to as “perpetual” (Kelly & Kropf, 1995) or “eternal” (Schwartz & Hadar, 2007). Being a perpetual parent can have far-reaching and complex effects on the caregiver parent, with both positive and negative aspects, especially as the ACWD enters adulthood (Pousada et al., 2013; Schwartz & Hadar, 2007). Entering old age brings with it a new world of challenges facing the aging caregiver, only some of which have been discussed in the literature.

Two conflicting hypotheses have been proposed regarding parental response to the demands of extended caregiving. The “wear and tear” hypothesis suggests that parents become worn out by the accumulated demands of caregiving, as both their physical and psychological resources become depleted (Johnson & Catalano, 1983). This notion is supported by research claiming that as parents age, the demands of their offspring’s ongoing needs may conflict with their own growing need for assistance (Ryan, Taggart, Truesdale-Kennedy, & Slevin, 2014).

The second hypothesis is that parents develop skills as a result of their experiences, and thus adjust more successfully to their circumstances as time goes on (Willingham-Storr, 2014). Parents who received support from their son or daughter experienced greater caregiving satisfaction and less caregiving burden (Perkins & Haley, 2013; Pruchno, 2003). These ACWDs provided

considerable companionship and support to their parents as well as help with household chores (Mactavish, Schleien, & Tabourne, 1997).

Thus, it seems that aging with an ACWD cannot be viewed as simply a “negative” or “positive” experience, but rather as a complex phenomenon in which parental identity and roles change over time.

Parental Identity to a Child With Disability in Old Age

Parental identity includes parents’ beliefs regarding their roles as parents and their commitment to those roles (Simon, 1992), as well as affective, moral, integrative, and cognitive components (Partridge, 1988). One’s parental identity also dictates responsibilities, rights, obligations and social expectations (Forsyth, 1990).

After a lifetime of caretaking, in which the child with disability is at the center of the parents’ attention and identity, entering the arena of old age presents new challenges that may conflict with this parental identity (Band-Winterstein, Smeloy, & Avieli, 2014). In other words, caregiving tasks, which are no longer manageable for the aging parents (e.g., driving the ACWD, providing nursing care, etc.) might call for a drastic reconstruction of a parental identity that will better suit the current situation. Yet, aging parents’ subjective views of their caregiving roles and parental identity in old age have received scant research attention. Therefore, the aim of the current study is to explore how aging parents perceive and construct their parental identity in the new arena of old age.

Design and Methods

We used interpretive phenomenological analysis (IPA) as a qualitative method that is highly compatible for studying the psychology of health and illness and is widely used in disability studies (Smith, Flowers, & Larkin, 2009).

Participants and Sample

The participants were purposefully selected (Patton, 2002) by criterion sampling to obtain the widest possible variation of respondents among parents aging alongside an ACWD. Twenty parents (10 fathers, 10 mothers), 61 to 89 years of age, participated in the study. The age range of the adult children with disability was 25 to 62 years, half of whom resided at home. Adult children were diagnosed with three types of developmental disabilities: cerebral palsy, autism, and intellectual disability

Table 1. Participants

	Family unit	Name	Age (years)	Type of disability	Residence
1	Johnson	Father: Aharon	75		Family home
		ACWD: Bruce	45	Intellectual disability	Family home
2	Kaplan	Mother: Lea	75		Family home
		ACWD: Gil	38	Cerebral palsy	Independent
3	Brown	Father: Joshua	66		Family home
		ACWD: Alex	37	Cerebral palsy	Family home
4	Cameron	Father: Michael	63		Family home
		ACWD: Sean	25	Autism	Family home
5	Reynolds	Mother: Felicity	89		Nursing home
		ACWD: Karen	58	Intellectual disability	Sheltered housing facility
6	Grasso	Mother: Olivia	64		Family home
		ACWD: Alfred	38	Autism	Family home
7	Tal	Mother: Mira	63		Family home
		ACWD: Timothy	40	Autism	Family home
8	Gray	Father: Dave	68		Family home
		ACWD: Josh	41	Intellectual disability	Sheltered housing facility
9	Simpson	Mother: Helen	61		Family home
		ACWD: Rebecca	25	Cerebral palsy	Family home
10	Hunter	Father: Dan	80		Family home
		ACWD: Ron	58	Cerebral palsy	Sheltered housing facility
11	Zilbar	Mother: Liz	87		Family home
		ACWD: Ethan	62	Cerebral palsy	Sheltered housing facility
12	Dew	Mother: Rosa	85		Family home
		ACWD: Daphne	60	Autism	Independent
13	Scott	Mother: Gail	71		Family home
		ACWD: Niel	43	Intellectual disability and CP	Family home
14	Forsyth	Father: Clayton	75		Family home
		ACWD: Rob	40	Autism	Sheltered housing facility
15	Werner	Father: Will	80		Family home
		ACWD: Gina	55	Intellectual disability	Sheltered housing facility
16	Mcafee	Father: Lenard	76		Family home
		ACWD: Harlan	39	Intellectual disability	Family home
17	Busfield	Mother: Jenney	82		Nursing home
		ACWD: Roger	56	Intellectual disability	Sheltered housing facility
18	London	Father: Eric	87		Nursing home
		ACWD: Amy	52	Autism	Independent living
19	Inbar	Father: Abraham	64		Family home
		ACWD: Ben	32	CP	Family home
20	Smith	Mother: Ruth	63		Family home
		ACWD: Mike	40	CP	Family home

Note. ACWD = adult child with disability; CP = cerebral palsy.

(Table 1). The sampling criteria were as follows: all participants were Hebrew speakers, with no cognitive deterioration, and good verbal capabilities. The final sample size (20 participants) was determined according to the richness of the individual cases (Smith et al., 2009).

Data Collection

Data collection was performed via in-depth, semistructured interviews using an interview guide. This included several content categories: family relationship throughout the years; day-to-day life with disability over the

years; aging alongside a child's disability; and reflecting on the lifelong experience of raising a child with a disability.

Procedure

Participants were recruited through nongovernmental organizations. From the outset, the study topic was considered sensitive; therefore, special provisions were made to ensure informed consent and confidentiality (Dickson-Swift, James, Kippen, & Liamputtong, 2007). Each participant signed a written consent form, which included

maintaining participants' anonymity. All identifying details were changed to preserve participants' confidentiality. The study was approved by the Institutional Review Board Ethics Committee at the University of Haifa in Israel. Face-to-face interviews took place at the participants' location of choice. Each interview lasted approximately an hour and a half, was tape-recorded, and was later transcribed verbatim.

Data Analysis and Trustworthiness

Data analysis was performed according to the IPA, as suggested by Smith et al. (2009). All researchers were involved in analyzing the data. First, each researcher read the transcripts a number of times in order to become as familiar as possible with the text. At this stage each reading includes pinpointing significant statements, for example, identifying a wide range of parental feelings about ACWDs. The next step involved grouping the statements into themes, including quotes that capture the essential quality of the participants' experiences and perceptions, for example, gathering quotes relating to the parents' roles in the child's life. The following step involves identifying connections that are emerging, clustering them together, and conceptualizing them. During the text analysis, the researchers discussed and recognized the ways in which accounts from participants were similar but also different, that is, parents view themselves as eternal parents, but each parent constructs his or her role differently at this point. The data were organized based on four agreed-upon patterns of parental identity identified in participants' narratives (Smith et al., 2009).

Trustworthiness was achieved through the use of reflexivity (Finlay, 2011). We established "bracketing" by reflecting on our experiences, biases, and prejudices regarding disability, disability, and aging (Gearing, 2004; Tufford & Newman, 2010) along all the stages of the study.

Results

While the obligation to eternal parenting is present in the parental narratives of all the study's participants, aging and old age become a central concern in the experience of parents of adult children with disability. Parental narratives reveal four evolving patterns of parental identity, reshaped over the years by the changes accompanying old age: "Being happy is his responsibility; I did my part", embracing aging needs; "I can do part-time worrying," the gradual letting go of parental roles; "I'm worn out, but I keep going; what choice do I have?" bearing the brunt; "I'm an old woman changing diapers," full-time parents in old age.

"Being Happy Is His Responsibility; I Did My Part," Embracing Aging Needs

The first parental narrative reveals a complete change of focus—a shift from a caretaking orientation to being increasingly focused on the aging self and its needs, as illustrated in the following quote:

I've been through a lot; I was sick, my husband was sick, (we underwent) surgeries, and now this—breast cancer. I never thought I would get sick again, and at my age. Being happy is his responsibility; I did my part. I don't know what else to do with him; I have fought all my life. I dedicated my life to him, nothing for me, nothing! There was no night and no day—and for what? Nothing! Nothing came out of him, we are both broken; I sacrificed my entire life. We could have had a good life if it weren't for him . . . before I would never have said such a thing, but now I say what's in my heart. . . . He's not happy, being unhappy today is being ungrateful towards me . . . he has some responsibility, too . . . , he should come and say thank you, mother, for the beautiful, fulfilling and meaningful life you have given me! (Liz, 87, mother of Ethan, 62, person with cerebral palsy)

As Liz approaches the end of her life, she tries to achieve closure regarding a lifetime spent raising a child with disability. Old age brings new insights that change Liz's view on parenting: her power as a parent is limited; she can move heaven and earth, but she cannot control her son's happiness. It seems that this insight is both exasperating and liberating, as she understands that she must let go of her unfulfilled expectations and create her own personal closure. By so doing, she allows herself to feel a wide array of negative feelings such as all the anger, regret, and bitterness that were never expressed over the years.

"I Can Do Part-Time Worrying," The Gradual Letting Go of Parental Roles

Parents in this category still perceive themselves as caretakers, giving the disability a lot of dominance in their family's life. However, as aging takes its toll, parents begin to reassess their caregiving model:

Rebecca needs to be turned over three or four times a night, every time she wakes up someone has to wake up with her . . . I did it for years, every single night, waking up and turning her over. When I was younger it wasn't a big deal, I would do it and go back to sleep, now it's not as simple; I get up and can't go back to sleep . . . for the past few months, a paid caretaker has been doing it. I had a baby intercom, which I gave her.

On weekends, it's still me. I felt: that's it, no more, just no, enough! I can do part-time worrying, I'm a 61-year-old woman, I deserve a good night sleep. (Helen, 61, mother of Rebecca, 25, person with cerebral palsy)

Years of maintaining this routine have become, at this stage of Helen's life, an exhausting burden. As a result, Helen reflects and reassesses her parenting position and changing needs. Giving the paid caretaker the baby monitor serves as a metaphor for the delegation of partial responsibility. It seems that aging and its manifestations becomes a significant part of her everyday caring routine, which raises questions regarding her own abilities, needs, and desires in the context of lifelong parenthood to an ACWD.

"I'm Worn Down but I Keep Going, What Choice Do I Have?" Bearing the Brunt

Aging parents in this category demonstrate feeling stuck in a "dead end" situation, expressed by exhaustion, frustration, and fatigue:

We're not getting any younger, you know . . . my back is broken, I'm worn down but I keep going; what choice do I have? Sometimes he doesn't hold himself at all; it's like picking up a 60-kilo sack of potatoes. I receive treatments—chiropractics, acupuncture, you name it—but nothing works, I've been holding him like this for years. Now we have a paid caretaker, because I can't do it alone. But it's still a full-time job for me, I do the cleaning, the cooking; I drive him to the day center . . . I spend 20 hours a week driving; who else can do it? Only me. (Gail, 71, mother of Neil, 43, person with intellectual and physical disability)

Gail attributes her health problems to a lifetime of caring for her child with disability. As old age approaches, her distress becomes exacerbated, leading her to take care of her own problems and hire some help. However, these actions neither provide a real sense of relief nor resolve Gail's complex daily struggle, as she continues to carry most of the burden.

"I'm an Old Woman Changing Diapers," Full-Time Parents in Old Age

Parents in this category try to overlook old age and emphasize eternal caretaking as a central parenting experience:

He's wearing diapers, and calls me in to change it; usually it works out fine, but sometimes I'm not quick enough and everything gets messy . . . I have to react immediately. . . . Sometimes I look at myself, I'm an old

woman changing diapers. . . . I'm constantly attuned to his needs: What is he doing? What does he need? It's another kind of parenting. He's a 38-year old-child who you still have to tuck into bed at night, wipe his bottom. He'll always remain my baby, never grow old . . . I can hug him and kiss him, tell him he's the apple of my eye. . . . (Olivia, 64, mother of Alfred, 38, a person with autism)

Olivia describes an ongoing and inseparable bond that ties her to her child—they are a single unit in a dyadic relationship. Despite the fact that Olivia acknowledges that her son is a grown man, she perceives and preserves an ongoing "mother-baby" bond, which enables her to view her parenting at this stage of her life in a positive and satisfying way.

Another version of overlooking old age is presented by Dave:

I do everything possible to postpone aging, so I can go on being here for him, doing what I do. Josh's disability somehow keeps me young; I have to be available for him, to help him, take him places. I can't get old, I can't be tired. I see some of my peers; they've all grown a belly and are vegetating in front of the TV. But I want Josh to experience a full life, so I take him to run marathons, I take trips with him, we go out to restaurants so he can experience good food. . . . (Dave, 68, father of Josh, 41, person with intellectual disability)

Dave acknowledges old age as a distant and theoretical possibility that is not a liable option for him due to his son's ongoing needs. This demands that he perform "young behaviors" in the physical sense, such as running a marathon and taking trips. The phrase "I want Josh to experience a full life" expresses a total and endless commitment and Dave's strong bond to his child. It seems it preserves Dave's youth.

Discussion

The concept of eternal parenting embraces broad and complex parental experiences in the contexts of parenting, aging, and disability. This is illustrated by four parental identity patterns, which emerged from the parents' narratives: "Being happy is his responsibility; I did my part," embracing aging needs; "I can do part-time worrying", a gradual letting go of parental roles; "I'm worn out, but I keep going, what choice do I have?" bearing the brunt; and "I'm an old woman changing diapers," full-time parents in old age.

All of the parents in our study are committed to their children in a timeless and never-ending manner, even

now, in old age, and thus may be described as eternal parents (Kelly & Kropf, 1995). From a life course perspective, caring for the child with disability was the central commitment that set the tone for all familial and parental conduct; now, as the parent gets older this responsibility collides with the new arena of aging. Acknowledging the new demands posed by old age forces parents to renegotiate caring needs and resources. These findings can be understood in light of Atchley's (1989) concept of continuity and change in old age. Atchley claims that older adults attempt to preserve and maintain existing internal and external structures. They prefer to accomplish this objective by using strategies related to their past experiences of themselves and their social world. Continuity is perceived as an adaptive strategy that is promoted by both individual preference and family approval. The current typology can be viewed as coping strategies used by the parents, some of which are more adaptive than others, in which parents exhibit either continuity or change in various forms. The findings of the current study suggest that this process yields different ways of constructing parental identity in old age. The first pattern emphasizes putting the parents' own needs before those of the ACWD, acknowledging that they have fulfilled their parenting responsibilities. In this context, parents shift their focus from being oriented toward caring for their child with disability to being self-oriented. Their eternal parenting is now expressed by an ongoing concern for their child, but it is no longer the first priority.

While these parents are focused on their own needs, the second type of parental identity relates to those who are only just starting to realize the new demands of aging and the toll eternal parenting actually takes. These parents are in the process of negotiating a new balance between their changing needs and the ongoing demands of caring for the ACWD. Thus, their parental identity is characterized by a new family discourse that attempts to integrate both awareness to old age and ongoing care for the child. It seems that these parents are in the initial stages of early aging, and eternal parenting is still perceived as their main responsibility. However, instead of performing all of the caregiving tasks by themselves, they allow the inclusion of new support resources (other family members, paid caretakers) to perform some of the more strenuous caregiving demands.

While these two parental groups are aware of their own changing needs and make adjustments accordingly, for the third type of parental identity the need to self-care is associated with feelings of fatigue, burnout, and burden of care. Their experience of burden refers to an array of physical, social, psychological, behavioral, functional, medical, and economic consequences, resulting from caring for an individual suffering from chronic and

disabling conditions (Awad & Voruganti, 2008; Zarit, Todd, & Zarit, 1986). This is alarming because burden of care has been associated with various disadvantages that were expressed by this type of parents: such as depression (Rhee et al., 2008), anxiety (McCullagh, Brigstocke, Donaldson, & Kalra, 2005), deteriorating physical health (Pinquart & Sörensen, 2007), lower economic status (Wagner et al., 2011), and reduced health-related quality of life (van Exel, Koopmanschap, van den Berg, Brouwer, & van den Bos, 2005).

While the first three types of parental identities are occupied with renegotiating their caring roles in the context of their own aging, parents of the final parental identity type still perceive caregiving for their child as the central part of their lives, often overlooking their own changing needs. Thus, these parents remain locked in the same parental identity that was shaped over the years, and are seemingly immune to the passage of time.

Limitations and Recommendations for Further Study

This study focused on the parental perspective. To broaden the existing understanding of the phenomenon, triangulation can be used by participatory observation, interviews with children with disability, or interviews with other family members. In addition, this study provides a retrospective view; further longitudinal research may serve to broaden the current perspective. Finally, the research covered a wide range of disability levels; further research should perhaps focus on a particular type of disability to deepen the understanding of the consequences of disability type on parental identity.

Practical Implications

The research findings indicate that there is no unified profile of parents living and aging with an ACWD. Professionals must acknowledge these parents' wide range of feelings and reactions at this stage of their lives. The typology suggested in this study can serve as a framework for developing tailored intervention methods for aging families, which enable professionals to better understand and relate to the subjective meaning that parents attribute to raising and aging alongside disability. Each parental identity type requires different intervention methods. For example, professionals should identify parents who experience burden of care as parents at risk, in order to prevent negative outcomes. Moreover, interventions with parents from the first parental identity type should be encouraged to meet their own current needs and, at the same time, hire complementary care to deal

with the needs of the ACWD. Finally, therapy can be used to strengthen the coherency of their ACWD life narrative by encouraging a life review process (Butler, 1963).

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Clinical Resources

- Administration on Aging, U.S Department of Health and Human Services: <https://aoa.acl.gov/>
- L'Arche Canada organization for aging with disability: <http://www.aging-and-disability.org/>
- Developmental Disabilities Nurses Association: <https://ddna.org/>
- Family Caregiver Alliance national center on caregiving: <https://www.caregiver.org/caregiving>

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Effects of Messages Delivered by Mobile Phone on Increasing Compliance With Shoulder Exercises Among Patients With a Frozen Shoulder

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Key words

Compliance, frozen shoulder, mobile phone, range of motion, text messaging

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Abstract

Purpose: The aim of this study was to examine the effects of reminders, encouragement, and educational messages delivered by mobile phone on shoulder exercise compliance and improvements in shoulder function among patients with a frozen shoulder.

Design and Methods: A randomized controlled trial design was used. A convenience sample of patients with a frozen shoulder in an orthopedic outpatient clinic was recruited. All participants were instructed on how to do shoulder exercises and were provided with a printed pamphlet about shoulder exercises. Then, the intervention group received reminders, encouragement, and educational messages by mobile phone daily for the next 2 weeks, while the comparison group did not.

Findings: The intervention group had higher compliance with shoulder exercises than did the comparison group ($t = 2.263, p = .03$) and had significant improvements in shoulder forward flexion ($F = 12.067, p = .001$), external rotation ($F = 13.61, p = .001$), and internal rotation ($F = 5.903, p = .018$) compared to those in the comparison group after the 2-week intervention.

Conclusions: The text messages significantly increased patient compliance with shoulder exercises and thus improved patients' shoulder range of motion.

Clinical Relevance: Hospital or clinics can send appropriate messages to patients via text message platforms in order to remind and encourage them to do shoulder exercises.

A frozen shoulder, or adhesive capsulitis, is a common musculoskeletal disorder seen in patients 40 to 65 years of age (Kelley, McClure, & Leggin, 2009). The prevalence of frozen shoulder is 2% to 5%, and females are affected more frequently than males (Cohen & Ejnisman, 2015; Hand, Clipsham, Rees, & Carr, 2008; Kelley et al., 2009; Milgrom et al., 2008; Wolf & Green, 2002). Pain, stiffness, and restriction of the shoulder's active or passive motion

are major symptoms of a frozen shoulder (Maund et al., 2012). Some ranges of motion (ROMs) of the affected arms, such as external rotation, abduction, internal rotation, and flexion, are limited (Itoi et al., 2016; Kelley et al., 2009; Rundquist, Anderson, Guanache, & Ludewig, 2003). Symptoms of this musculoskeletal condition might have negative effects on patients' activities of daily living (ADLs), and also on patients' psychological health,

sleep, and quality of life (Ding et al., 2014; Gupta, Raja, & Manikandan, 2008).

Treatments of a frozen shoulder vary, but they can be classified as surgical and nonsurgical treatments (Itoi et al., 2016; Kelley et al., 2009). Among nonsurgical treatments, one systematic review summarized that corticosteroid injections, therapeutic exercise, shoulder joint mobilization, and acupuncture might have benefits of reducing pain and improving shoulder functions (Barrett, de Burca, McCreesh, & Lewis, 2016). In addition, a combination of corticosteroid injections with physiotherapy showed improvements in shoulder function or pain compared to corticosteroid injections alone, saline injections alone, saline injections with physiotherapy (Carette et al., 2003), and a placebo (Maund et al., 2012). These systematic review papers show that adding therapeutic exercise or physiotherapy to corticosteroid injections might produce better results of improving shoulder functions and pain. However, compliance with home-based exercises or physiotherapy among patients is low (Hardage et al., 2007; Lazo, Filipinas, & Valdez, 2003), because patients are too busy or they experience pain. It is necessary for health professionals to develop strategies for patients to improve their compliance with exercise or physiotherapy.

Mobile phones and smartphones have become daily necessities and were found to be effective in changing individual behaviors and improving health outcomes (Hall, Cole-Lewis, & Bernhardt, 2015). One systematic review revealed that text message reminders delivered by mobile phones can effectively increase outpatient attendance rates to healthcare appointments (Gurol-Urganci, de Jongh, Vodopivec-Jamsek, Atun, & Car, 2013). Text messages also improved the compliance with medication for patients with chronic diseases (Khonsari et al., 2014; Park, Howie-Esquivel, Chung, & Dracup, 2014; Thakkar et al., 2016; Vervloet et al., 2012). In addition to improving attendance rates and increasing compliance, mobile phone messaging had significant effects on weight control (Faghanipour, Hajikazemi, Nikpour, Shariatpanahi, & Hosseini, 2013; Joo & Kim, 2007; Lin et al., 2014), diabetes control (Abbas, Fares, Jabbari, Dali, & Orifi, 2015; Celik et al., 2015), and promoting exercise and physical activities in older adults (Kim & Glanz, 2013; Muller, Khoo, & Morris, 2016; Parker & Ellis, 2016). One systematic review concluded that positive behavioral changes increased after mobile phone messaging interventions (Fjeldsoe, Marshall, & Miller, 2009).

Those previous studies provide evidence that text messaging is effective in reminding patients to take medications or attend appointments, providing healthcare information, and changing behaviors, but effects on improving compliance with exercise have not been

established. Therefore, the purpose of this study was to examine the effects of reminders, encouragement, and educational messages delivered by mobile phone on shoulder exercise compliance and shoulder functional improvements among patients with a frozen shoulder.

Methods

Design, Setting, and Sample

A randomized controlled trial design was employed. A convenience sample of patients with frozen shoulder in the orthopedic outpatient clinic at one medical center in northern Taiwan was recruited. The inclusion criteria were patients who (a) had an idiopathic frozen shoulder and had completed the first dose of a synthetic corticosteroid injection (triamcinolone acetate) 1 week previously, (b) were able to perform shoulder exercises, (c) could read Chinese, and (d) had a mobile phone. The exclusion criteria were patients who (a) had planned to have surgery to manage the frozen shoulder, and (b) had impaired cognitive function. Eligible participants were assigned a number based on the order of the time when they agreed to participate in the study. Thirty-three participants with odd numbers were randomly assigned to the intervention group, and 33 participants with even numbers were assigned to the comparison group. Ultimately, there were 32 participants remaining in the intervention group and 28 participants in the comparison group (**Figure 1**), for an overall attrition rate of 9.1%.

Instruments

The instruments included a demographic and characteristics questionnaire, the Simple Shoulder Test (SST), a visual analog scale (VAS) for pain, a shoulder exercise self-reported form, active shoulder ROM measurements, and a satisfaction questionnaire.

The SST was developed by Lippitt, Harryman, and Matsen (1993) for assessing shoulder function of the affected side. There are 12 items with yes (score 1) or no (score 0) response options in the SST. Total scores were transformed into percentages and ranged from 0 to 100. A higher score indicates better shoulder function. To our best knowledge, the tool has no Chinese version, so the SST was translated into Chinese using forward and backward translations according to Jones, Lee, Phillips, Zhang, and Jaceldo's (2001) guidelines. The content validity was evaluated by seven experts, and the content validity index (CVI) was 0.975. Fifteen patients with shoulder disorders were invited to test the reliability, and Cronbach's

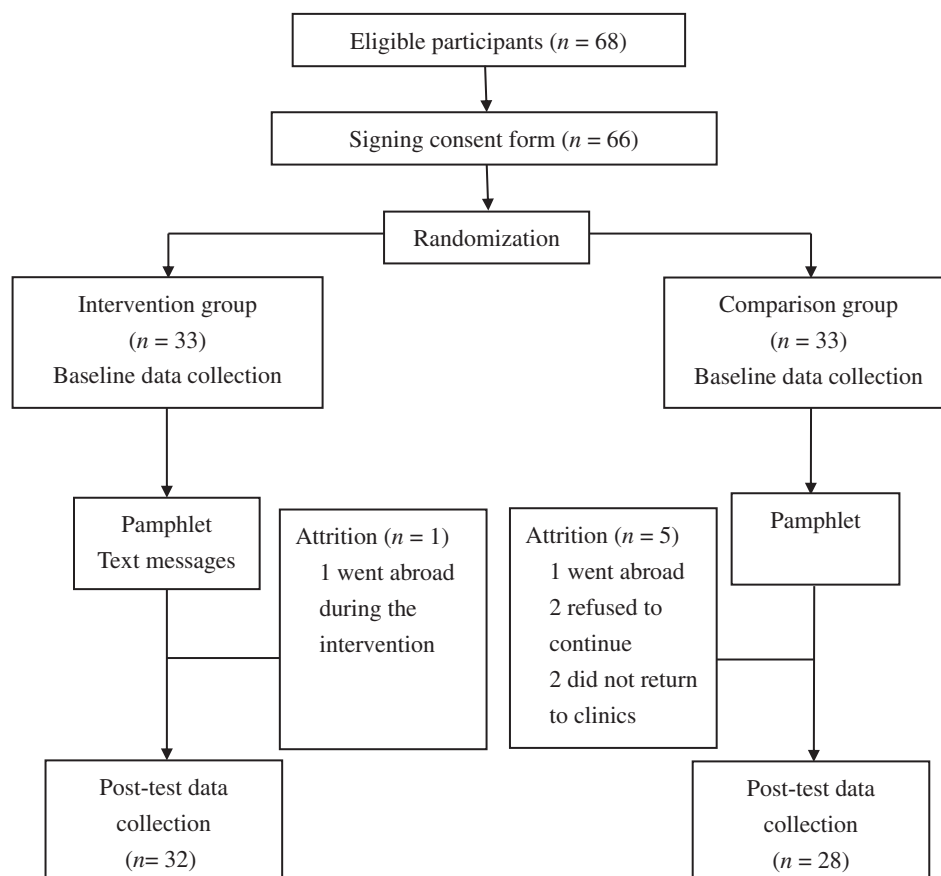


Figure 1. Study flow.

alpha was 0.871. These 15 patients were not included in the main study.

The VAS is widely used to measure the amount of pain experienced by an individual (McCormack, Horne, & Sheather, 1988), and it is valid and reliable (Williamson & Hoggart, 2005). The VAS uses a horizontal line 100 mm in length to represent the level of pain (0 on the left end, indicating no pain, and 100 on the right end, indicating the worst pain). Participants were asked to mark a point on the line they felt represented the degree of the pain they suffered. The distance between the left end of the line and the point marked by participants is the intensity of the pain they experienced. The score range of VAS is 0 to 100. A higher score indicates that participants experienced more pain.

The two-item shoulder exercise self-reporting form including “Did you do shoulder exercises today?” and “How long did you do the exercise?” was developed by the authors. Participants answered the questions every day until they came for the next follow-up session (for the third synthetic corticosteroid injection). If participants

answered yes to doing the exercise and the duration of taking exercise was at least 10 min, it was counted as one exercise day. Shoulder exercise compliance was calculated as the total exercise days divided by total days between first day of the intervention and next follow-up session, multiplied by 100%.

The active shoulder ROM measurements recorded the degrees of participants’ shoulder forward flexion, abduction, internal rotation (performed with the humerus abducted), and external rotation (performed with the humerus abducted) while the patient was standing. These ROMs were measured using a digital goniometer in a standing position by one research assistant in both the pre- and post-test.

A 15-item questionnaire on satisfaction with the intervention was also developed by the investigators and was collected at the post-test from the intervention group only. It was scored on a 5-point Likert scale (1 = *not at all satisfied*; 5 = *completely satisfied*). Scores range from 15 to 75. A higher score indicates greater satisfaction with the intervention.

Data Collection Procedures and Intervention

Baseline data were collected when a patient came to the outpatient clinic for the second synthetic corticosteroid injection. To increase patients' motivation to do the shoulder exercise, two simple effective stretching shoulder exercises (forward flexion and external rotation) suggested by one orthopedic physician were selected. During the clinic visit, the research assistant, who was trained by the physician, demonstrated the shoulder exercise to participants in both groups and also had the patient do the exercises to ensure that patients were doing the exercises correctly. Then, both groups were instructed to do these two exercises every day for 5 min each time after showering or after putting a hot compress on the shoulder until the next follow-up visit. They were also given a printed pamphlet illustrating these two shoulder exercises. Afterwards, the intervention group received the reminders, encouragement, and educational messages by mobile phone daily for the next 2 weeks. The 14 text messages were entered into the text message platform in advance and were sent automatically at 20:00 hours or at another time as preferred by the participants. The comparison group received no text messages. An example of text messages is presented in **Table S1** (available with the online version of this article). Post-test data were collected when a participant came to the clinic for the third injection (about 2 weeks later). The data collection period was from September 2014 to March 2015.

Data Analysis

Data were analyzed using SPSS 19.0 (SPSS Inc., Chicago, IL, USA). The level of significance was set to .05. A descriptive analysis was conducted by computing the mean (*M*), standard deviation (*SD*), and percentage. A *t* test and chi-squared test (Fisher's exact test) were used to compare differences in the demographic and characteristics information. An analysis of covariance (ANCOVA) was performed to examine the effectiveness of the text message intervention. In the current study, the effect size (computed by selecting the ANCOVA analysis, with a power of 0.8, and an alpha of .05) was .44.

Ethical Considerations

This study was approved by the institutional review board (IRB) of one university (no. 201406032). The hospital's approval was also obtained. All participants signed an informed consent form before baseline data were collected. Participants' rights were protected by following the requirements of the IRB.

Results

Demographics, Characteristics, and Outcome Variables

The average age of patients was 57.5 (*SD* = 8.5) years, and 61.7% were female. The majority of patients were married (93.3%). Over half of patients had a high school education or less (53.3%), had no job (56.7%), were the responsible person for household tasks (51.7%), and had experience with shoulder injuries (56.7%). Thirty-eight (63.3%) patients did not engage in regular exercise, and those who did do regular exercise (36.7%) spent an average of 2 hours per week exercising. The majority of patients took no pain medications (80%) and received no physiotherapy (70%; **Table 1**).

There were no differences in demographic or characteristic variables, SST, VAS, or degrees of three shoulder ROMs (abduction, internal rotation, and external rotation) between the intervention group and comparison group at the baseline according to the *t* test and chi-squared (Fisher's exact test) analysis. However, the degree of shoulder forward flexion in the intervention group was more limited than that of the comparison group ($t = -2.096$, $p = .04$). Outcome variables of shoulder ROMs were calculated by the mean score change (the level of improvement of shoulder function), so differences in shoulder forward flexion between the intervention group and comparison group at the baseline would not affect the subsequent analysis.

Shoulder Exercise Compliance

After the intervention, shoulder exercise compliance (96.63%) in the intervention group was significantly higher than in the comparison group (85.2%; $t = 2.263$, $p = .03$).

Effect of Text Messages on Outcome Variables

An ANCOVA was used to examine the effectiveness of the text-based intervention. There were significant differences in improvements in the degrees of shoulder forward flexion ROM ($F = 12.067$, $p = .001$), external rotation ROM ($F = 13.61$, $p = .001$), and internal rotation ROM ($F = 5.903$, $p = .018$). However, there were no differences in the SST ($F = 0.152$, $p = .698$), VAS ($F < .001$, $p = 0.994$), or improvement in the degree of shoulder abduction ROM ($F = 1.393$, $p = .243$; **Table 2**).

Table 1. Participants' Demographics and Characteristics, and Differences Among These Variables Between the Two Groups at Baseline ($N = 60$)

Variable	Total	Intervention ($n = 32$)	Comparison ($n = 28$)	t	p
	Mean (SD)	Mean (SD)	Mean (SD)		
Age (years)	57.5 (8.5)	56.1 (7.5)	59.0 (9.4)	-1.306	.197
Time spent on household tasks (hours/week)	1.8 (2.1)	2.1 (2.2)	1.4 (2.0)	1.363	.178
Working time (hours/week)	29.0 (20.8)	33.0 (17.5)	24.6 (23.5)	1.599	.115
Exercise time (hours/week)	2.0 (2.8)	2.3 (3.0)	1.7 (2.6)	0.929	.357
Variable	n (%)	n (%)	n (%)	χ^2	p
Gender				0.020	.887
Male	23 (38.3)	12 (37.5)	11 (39.3)		
Female	37 (61.7)	20 (62.5)	17 (60.7)		
Marital status ^a				0.808	.369
Married	56 (93.3)	29 (90.6)	27 (96.4)		
Single	4 (6.7)	3 (9.4)	1 (3.6)		
Educational level				2.530	.112
High school or less	32 (53.3)	14 (43.8)	18 (64.3)		
Above high school	28 (46.7)	18 (56.3)	10 (35.7)		
Working status				2.677	.102
No	34 (56.7)	15 (46.9)	19 (67.9)		
Yes	26 (43.3)	17 (53.1)	9 (32.1)		
Person responsible for household tasks				1.632	.201
No	29 (48.3)	13 (40.6)	16 (57.1)		
Yes	31 (51.7)	19 (59.4)	12 (42.9)		
Exercise				0.463	.496
No	38 (63.3)	19 (59.4)	19 (67.9)		
Yes	22 (36.7)	13 (40.6)	9 (32.1)		
Experience with a shoulder injury				0.205	.651
No	26 (43.3)	13 (40.6)	13 (46.4)		
Yes	34 (56.7)	19 (59.4)	15 (56.7)		
Taking pain medications				0.109	.741
No	48 (80.0)	26 (81.3)	22 (78.6)		
Yes	12 (20.0)	6 (18.8)	6 (21.4)		
Receiving physiotherapy				0.115	.735
No	42 (70.0)	23 (71.9)	19 (67.9)		
Yes	18 (30.0)	9 (28.1)	9 (32.1)		

^aFisher's exact test.

Satisfaction Level With the Text Intervention

The average score of the satisfaction level with the text intervention was 4.9 ($SD = 0.24$) out of 5, with a range of 4.84 to 4.97 points in the intervention group.

Discussion

Due to pain and adhesion of joints, patients with a frozen shoulder have limitations of shoulder ROMs. Rundquist et al. (2003) found that the degrees of flexion, abduction, external rotation (performed with the humerus abducted), and internal rotation (performed with the humerus abducted) were $116.9^\circ \pm 22.1^\circ$, $98.4^\circ \pm 25^\circ$, $33.5^\circ \pm 15.5^\circ$, and $17.8^\circ \pm 17.9^\circ$, respectively, among 10 patients with frozen shoulder. Another

study also reported $122^\circ \pm 8^\circ$, $105^\circ \pm 13^\circ$, $32^\circ \pm 16^\circ$, and $22^\circ \pm 13^\circ$ for those four degrees of ROM among 40 patients at baseline (Yang, Chang, Chen, & Lin, 2008). Compared to the current study, the average degrees of the four ROMs ($133.73^\circ \pm 19.41^\circ$, $115.17^\circ \pm 21.58^\circ$, $54.21^\circ \pm 20.23^\circ$, and $33^\circ \pm 14.91^\circ$, respectively) at baseline were greater (about 10° to 20° greater) than the degrees reported in Rundquist et al.'s and Yang et al.'s (2008) studies. The possible reason might be that participants had already received the first dose of synthetic corticosteroid injection treatment (only two patients had had steroid injections in Yang et al.'s study) and had come back for the second injection, so there might have already been slight improvements in pain and shoulder ROMs. In addition, a digital goniometer was used to measure the degree of the ROM in the current study, and it can

Table 2. Effectiveness of the Mobile Phone Text Message Intervention ($N = 60$)

Variable	Intervention group ($n = 32$)		Comparison group ($n = 28$)		F	p
	Pre-test Mean (SD)	Post-test Mean (SD)	Pre-test Mean (SD)	Post-test Mean (SD)		
SST	41.15 (15.68)	73.33 (12.99)	35.26 (19.90)	72.76 (17.88)	0.152	.698
VAS	62.01 (22.45)	12.38 (16.14)	71.21 (20.15)	13.73 (15.51)	<0.001	.994
Forward flexion (°)	128.95 (22.33)	148.91 (11.49)	139.19 (13.89)	146.89 (10.52)	12.067	.001**
External rotation (°)	51.08 (17.89)	73.21 (13.13)	57.78 (22.40)	64.50 (16.91)	13.61	.001**
Internal rotation (°)	30.54 (13.69)	58.58 (23.50)	35.81 (15.97)	49.39 (20.51)	5.903	.018*
Abduction (°)	110.79 (23.83)	136.70 (18.54)	120.18 (17.80)	136.20 (17.98)	1.393	.243

SST = simple shoulder test; VAS = visual analog scale.

* $p < .05$; ** $p < .01$.

measure the degree to the second decimal place, so the measurement data might have been more precise.

Compliance with shoulder exercises was significantly higher in the intervention group compared to the comparison group. This demonstrates that the reminders, encouragement, and educational text messages benefited patients' adherence to shoulder exercises. Although there are few studies on text-based interventions for exercise compliance, compliance with medication of patients with chronic diseases was found to increase after receiving text messages (Khonsari et al., 2014; Park et al., 2014; Thakkar et al., 2016). Similarly, text messaging can effectively increase outpatient attendance rates for healthcare appointments (Gurol-Urganci et al., 2013). Those studies implied that text messaging can serve as a reminder for patients to take their medicines or attend appointments. In addition, studies showed that text messages can promote older persons' exercise (Muller et al., 2016) and physical activity (Kim & Glanz, 2013; Parker & Ellis, 2016).

Due to having higher compliance with shoulder exercises, patients' shoulder ROMs, including forward flexion (an increase of 19.96°), internal rotation (an increase of 28.04°), and external rotation (an increase of 22.13°), significantly improved in the intervention group compared to the comparison group. However, the SST and VAS showed no significance between the two groups. The possible reason might be that patients in the current study had received two steroid injections before doing the shoulder exercises and felt less pain, so both groups effectively improved, and the intervention group got less benefit from the text messaging. In addition, there was no significant effect on patient's abduction ROM between the two groups. The reason might be that the simple stretching exercise taught in the current study did not emphasize shoulder abduction exercises and abduction performance is not often used in patients' daily activities.

Although there was no significance found between the two groups, the degree of abduction showed greater improvement in the intervention group than the comparison group.

Echoing the conclusions of two systematic reviews (Fjeldsoe et al., 2009; Hall et al., 2015), the current study also found that a mobile phone messaging intervention had short-term effects on changing patients' health behaviors, particularly on improving their compliance with shoulder exercise. This finding extends what is known about the impact of text messaging in promoting health behaviors. Through individual behavioral changes, health-related outcomes were found to be effective, such as regulated weight (Faghanipour et al., 2013; Joo & Kim, 2007; Lin et al., 2014), controlled diabetes (Abbas et al., 2015; Celik et al., 2015), less skin damage after behaviors related to sun protection (Robinson et al., 2014), lower low-density lipoprotein cholesterol level, lower systolic blood pressure, lower body mass index, more physical activity, and reduced smoking (Chow et al., 2015), as well as improved shoulder ROMs in the current study. In addition, patients in the intervention group were highly satisfied with this text-based intervention in the present study and also expressed their willingness to continue receiving similar messages in the future.

Study Limitations

A text-based intervention revealed short-term effects in the current study, but the long-term effects of the intervention need to be further investigated. In addition, the compliance report form was recorded by patients themselves, so it might not have exactly recorded patient's actual behaviors and might have over- or underestimated them. Future studies should consider better tools to record the frequency and duration of patients' exercise in order to measure compliance. Due to consideration

of the popularity of smartphone use among patients, only text messages through mobile phones were sent in the current study. If smartphones become more popular in the future, one might consider sending text, audio, pictures, and videos instead of text-only messages to patients or use mobile-messaging applications such as WhatsApp, Line, Instagram, or Facebook Messenger to interact with patients. This will make the delivered messages more vivid, more interactive, and easier to understand.

Conclusions

Reminders, encouragement, and patient educational text messages significantly increased patient compliance with shoulder exercises and thus improved patients' shoulder ranges of motion. It is suggested that hospitals, clinics, and institutions can automatically send appropriate messages to patients via text message platforms in order to remind and encourage them to do shoulder exercises. Furthermore, this affordable, flexible, effective, and convenient delivery method can possibly be applied to other prescribed home-based exercise among patients with different kinds of diseases or conditions.

Acknowledgments

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Clinical Resources

- American Academy of Orthopaedic Surgeons: <http://orthoinfo.aaos.org/topic.cfm?topic=a00071>
- Mayo Clinic: <http://www.mayoclinic.org/diseases-conditions/frozen-shoulder/basics/definition/con-20022510>

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web site:

Table S1. Samples of Text Messages

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HEALTH POLICY AND SYSTEMS

Quality of Work Life, Nurses' Intention to Leave the Profession, and Nurses Leaving the Profession: A One-Year Prospective Survey

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Key words

Intention to leave the profession, mediator, leaving the profession, quality of work life

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Abstract

Purpose: To examine the associations among quality of work life, nurses' intention to leave the profession, and nurses leaving the profession.

Design: A prospective study design was used.

Methods: Participants were 1,283 hospital nurses with a purposive sampling in Taiwan. The self-reported questionnaire consisted of three questionnaires: the Chinese version of the Quality of Nursing Work Life scale, an intention-to-leave profession questionnaire, and a demographic questionnaire. Records of nurses leaving the profession were surveyed 1 year later. Data were analyzed by descriptive statistics and inferential statistics.

Findings: As many as 720 nurses (56.1%) had tendencies to leave their profession. However, only 31 nurses (2.5%) left their profession 1 year later. Nurses' intention to leave the profession mediated the relationship between the milieu of respect and autonomy, quality of work life, and nurses leaving the profession.

Conclusions: The milieu of respect and autonomy describing the quality of work life predicts the nurses' intention to leave the profession, and together these predict nurses leaving the profession.

Clinical Relevance: This study illustrates that nurse managers could provide effective interventions to ameliorate the milieu of respect and autonomy aspect of quality of work life to prevent nurses from leaving their profession.

Nurses' turnover is a critical matter impacting health organizations globally (Duffield, Roche, Homer, Buchan, & Dimitrelis, 2014). Nurses' turnover rates differ between Australia (15.1%), Canada (19.9%), the United States (26.8%), and New Zealand (44.3%) (Duffield et al., 2014). Nurses leave the profession for many reasons, such as seeking a new job, childcare, or early retirement (Duffield, Aitken, O'Brien-Pallas, & Wise, 2004; Flinkman, Leino-Kilpi, & Salanterä, 2010). If nurses

withdraw from the profession, nurse staffing will be insufficient (Buchan & Aiken, 2008; Parry, 2008). Insufficient nurse staffing leads to poor patient outcomes, like increased patient mortality and infection rates (Aiken et al., 2015; Blegen, Goode, Spetz, Vaughn, & Park, 2011). In Taiwan, of the 269,361 nurses in 2017, only 61.1% were employed in nursing, and in the year of 2016, the nurse turnover rate was 9.09% and the vacancy rate was 3.99% (Taiwan's National Union of

Nurses' Associations, 2017). Because of Taiwan's changing social structure, rapidly aging population, and rising incidence of critical illnesses, the demand for nursing is continuing to grow rapidly. This is exacerbating the problems related to insufficient nursing manpower (International Council of Nurses, 2016).

The definition of quality of work life (QWL) is workers' satisfaction with their working life, and it is affected by an individual's feelings and perceptions (Mosadeghrad, Ferlie, & Rosenberg, 2011; Nayak & Sahoo, 2015).

Few studies have explored nurses' intention to leave the profession (Flinkman et al., 2010). Few concerns have been given on the associations among QWL, nurses' intention to leave the profession, and nurses leaving the profession. The aim of this study was to examine the associations among QWL, nurses' intention to leave the profession, and nurses leaving the profession.

Literature Review

Nurses' Intention to Leave the Profession

The rationale behind a decision to nurses leaving the profession is multifaceted. In a study based on 284 nurses residing in Florida in the United States, Borkowski, Amann, Song, and Weiss (2007) described how nurses with less than a master's degree or male nurses were inclined to think about quitting their profession. In a study based on 6,469 hospital nurses in seven European countries, Li et al. (2011) found that nurses have reward frustration with higher turnover intentions. Nurses appear to leave their profession in their early career (Barron & West, 2005). In a prospective study based on 1,417 nurses in Sweden, Rudman, Gustavsson, and Hultell (2014) found that every fifth nurse strongly intended to leave their profession after 5 years. In a qualitative study based on 15 registered nurses in Finland, Flinkman and Salanterä (2015) found that young nurses in the first years of their career are particularly stressed, and they have stronger intentions to leave the profession when nursing is a less desirable alternative career choice.

Quality of Work Life and Nurse Turnover

The dimensions of QWL are inconsistency in nursing (Vagharseyyedin, Vanaki, & Mohammadi, 2011). The dimensions of QWL are "leadership and management style/decision-making latitude," "shift working," "salary and fringe benefits," "relationship with colleagues," "demographic characteristics," and "workload/job strain" (Vagharseyyedin et al., 2011, p. 786). Studies have demonstrated that QWL is associated with nurses' turnover intentions (Lee, Dai, Park, & McCreary, 2013;

Mosadeghrad et al., 2011). In a study based on 1,283 hospital nurses in Taiwan, Lee et al. (2013) found that nurses' QWLs were significantly negatively associated with nurses' intention to leave. Mosadeghrad et al. (2011) determined from a survey of 740 nurses in Iran that there were negative correlations between QWLs and nurses' turnover intentions.

Based on a literature review cited in the preceding paragraphs (Lee et al., 2013, 2014; Mosadeghrad et al., 2011), the relationships were among QWL, nurses' intention to leave the profession, and nurses leaving the profession, and a conceptual framework was developed (**Figure 1**). Nurses' intention to leave the profession was hypothesized to be the mediator variable between QWL (the independent variable) and nurses leaving the profession (the dependent variable; see **Figure 1**).

Methods

This study used a 1-year prospective design. Institutional review board approval was obtained (no. 120201 and no. 130306).

Sample

Purposive sampling was used with the inclusion criteria of nurses in the front line. Three questionnaires were given to 1,283 hospital nurses in 2012, and the effective response rate was 96% (1,231/1,283). Nurses were followed up in 2013, and the loss rate was 4.1% (50/1,231).

Measures

In 2012, three questionnaires were developed: the Chinese version of the Quality of Nursing Work Life scale (C-QNWL; Lee, Dai, McCreary, Yao, & Brooks, 2014), an intention-to-leave profession questionnaire, and a demographic questionnaire. In 2013, records of nurses leaving the profession were surveyed. The C-QNWL consisted of 41 items with seven subscales scored on a 6-point Likert scale (6 = *strongly agree*, 1 = *strongly disagree*). The seven subscales are "Supportive Milieu with Job Security and Professional Recognition," "Work Arrangement and Workload," "Work/Home Life Balance," "Head Nurse's/Supervisor's Management Style," "Teamwork and Communication," "Nursing Staffing and Patient Care," and "Milieu of Respect and Autonomy" (Lee et al., 2014). The internal consistency reliability of the seven subscales (Cronbach's $\alpha = 0.72\text{--}0.89$) and the total scale (Cronbach's $\alpha = 0.93$), and the concurrent validity and construct validity of the C-QNWL were found to be acceptable (Lee et al., 2014). The intention-to-leave profession questionnaire consisted of two items: "give up

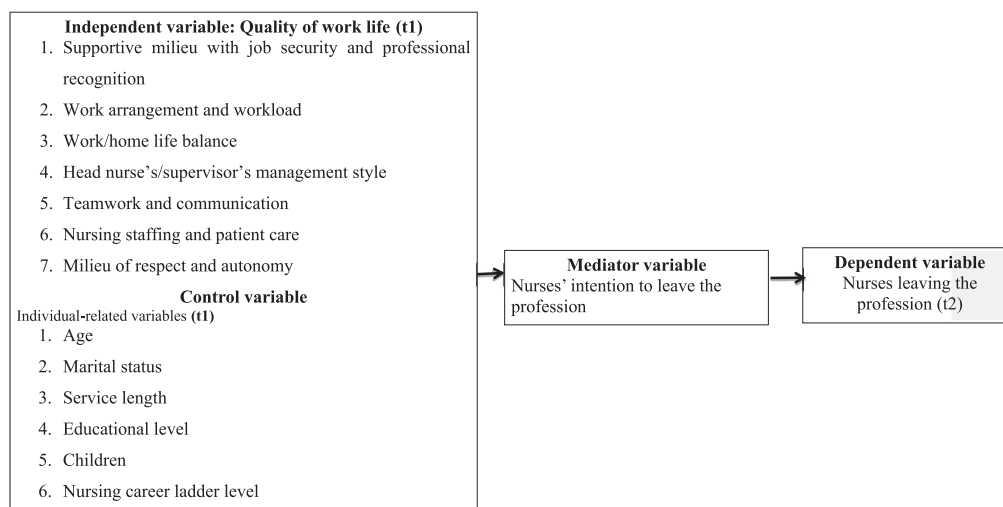


Figure 1. The conceptual framework of quality of work life, nurses' intention to leave the profession, and nurses leaving the profession.

nursing" and "change to another non-nursing unit in the hospital." The response options of the intention-to-leave profession questionnaire were *never* (1 point), *in 1 year* (2 points), *in a month* (3 points), *in a week* (4 points), and *every day* (5 points). According to the highest response options, the intention to leave the profession response options were categorized into *no* (1 and 2 points) and *yes* (3, 4, and 5 points; Simon, Muller, & Hasselhorn, 2010). A demographic questionnaire included six individual-related variables (age, marital status, service length, education, children, and career ladder) and two work-related variables (unit and teaching hospital). Records of nurses leaving the profession were surveyed from the nursing department and the head nurses.

Data Collection

In 2012, three questionnaires were given to the nurses. Nurses could decide whether to fill out the questionnaires. A research assistant went to the workplace to retrieve the sealed envelope of questionnaires every week. An incentive payment of around US\$3 was given to the participants. In 2013, data were collected on nurses leaving the profession.

Data Analysis

IBM® SPSS® English version 20 (IBM Corp., Armonk, NY, USA) was used to analyze the data. The descriptive statistics (means, ranges, medians, percentages) were tested to examine the demographic variables, QWL, nurses' intention to leave the profession, and nurses leaving the profession. The inferential statistics (correlation analysis, chi-square tests, *t* tests, binary logistic

regression analysis, and cumulative logistic regression analysis) were performed to examine the associations among QWL, nurses' intention to leave the profession, and nurses leaving the profession.

A mediator effect was tested by three regression equations for statistical significance (Bennett, 2000). The three regression equations were that the independent variable is a significant predictor of the mediator variable (the first equation), the independent variable is a significant predictor of the dependent variable (the second equation), and both the independent and mediator variables were entered into the regression equation simultaneously (the third equation; Bennett, 2000). In addition, in the third equation, two conditions must be met if a mediator effect is present: (a) the mediator variable is a significant predictor of the dependent variable, and (b) the direct relationship of the independent variable to the dependent variable is less significant than in the second equation (Bennett, 2000; **Figure 2**).

Results

Analysis Among the Demographic Variables and Nurses Leaving the Profession

The mean age of the participants was 29.2 years, and the mean service length was 6.57 years. The majority (65.9%) of nurses had bachelor's degrees or higher educational levels. For most cases, there were no statistically significant differences ($p > .05$) between individual- or work-related variables and nurses leaving the profession. However, the service length variable was associated with statistically significant differences in nurses leaving the profession ($t = 2.242$, $p = .025$; **Table 1**). Correlations

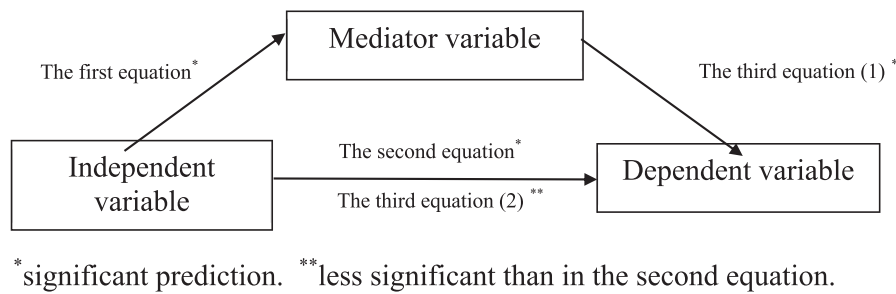


Figure 2. A statistical model of a mediator effect. *Significant prediction. **Less significant than in the second equation.

Table 1. Analysis Among Individual-Related Variables, Work-Related Variables, and Nurses Leaving the Profession (N = 1,283)

Variables	M (SD)	Range	Median	n ^a (%)	Nurses leaving the profession	
					χ^2/t	p
Age (years)	29.2 (4.94)	20–60	28		1.463	.144
Service length (years)	6.57 (4.94)	0.42–31.4	5.67		2.242	.025
Marital status					0.717	.397
No				838 (65.3)		
Yes				403 (31.4)		
Educational level					0.13	.718
Diploma or lower				395 (30.8)		
Bachelor's or high				846 (65.9)		
Children					1.393	.238
No				926 (72.2)		
Yes				307 (23.9)		
Nursing career ladder level					4.259	.235
N				220 (17.1)		
N1				375 (29.2)		
N2				502 (39.1)		
N3 or N4				139 (10.8)		
Work unit					2.197	.70
Ward				422 (32.9)		
Obstetrics/pediatric ward				390 (30.4)		
Intensive care unit				169 (13.2)		
Emergency room				185 (14.4)		
Respiratory care unit				117 (9.1)		
Teaching hospital					1.267	.26
No				266 (20.7)		
Yes				1,017 (79.3)		

^aTotal numbers amount to less than 1,283 because of missing data.

exist between age and QWL ($r = -.109 \sim .071, p < .05$), and service length and QWL ($r = -.131 \sim .092, p < .05$).

and childcare; no nurses in this study left for management or education positions.

Nurses' Intention to Leave the Profession and Nurses Leaving the Profession

The average score of nurses' intention to leave the profession was lower than the midpoint on the rating scale ($M = 2.93, SD = 1.14$), indicating nurses, on average, considered leaving the nursing profession almost monthly. After nurses' intention to leave the profession variable was categorized into no and yes, more than half of the nurses (56.1%) described tendencies to leave their profession. When followed up 1 year later, very few nurses (2.5%) actually had left the profession. The reasons for nurses leaving their profession were taking rest

Mediator Effect of Nurses' Intention to Leave the Profession Between Quality of Work Life and Nurses Leaving the Profession

To test the mediator effect, the total QWL scale and seven QWL subscales were input into three regression equations. In the first equation, the milieu of respect and autonomy aspect of QWL was a significant predictor of nurses' intention to leave the profession ($X = 0.761, p < .001$). In the second equation, the milieu of respect and autonomy aspect of QWL was a significant predictor of nurses leaving the profession ($X = -0.54, p = .011$). In the third equation, two conditions were met: (a) nurses'

Table 2. Results of Regression of Quality of Work Life (QWL) on Nurses Leaving the Profession With Mediation Effect of Nurses' Intention to Leave the Profession

Dependent variable Independent/mediator variable	First equation ^a			Second equation ^b			Third equation ^b		
	Beta	Wald chi-square	<i>p</i>	Nurses leaving the profession			Nurses leaving the profession		
				Beta	Wald chi-square	<i>p</i>	Beta	Wald chi-square	<i>p</i>
Independent: Total QWL	1.663	219.068	<.001	-0.508	2.554	.110	0.007	.000	.985
Mediator: Nurses' intention to leave the profession							0.534	8.131	.004
Independent: Supportive milieu with job security and professional recognition QWL	1.082	188.222	<.001	-0.258	1.239	.266	0.068	0.075	.784
Mediator: Nurses' intention to leave the profession							0.512	8.207	.004
Independent: Work arrangement and workload QWL	0.825	111.675	<.001	-0.175	0.487	.485	0.087	0.121	.728
Mediator: Nurses' intention to leave the profession							0.508	8.998	.003
Independent: Work/home life balance QWL	0.741	128.299	<.001	-0.399	3.659	.056	-0.197	0.813	.367
Mediator: Nurses' intention to leave the profession							0.434	6.463	.011
Independent: Head nurse's/supervisor's management style QWL	0.610	68.411	<.001	-0.125	0.287	.592	0.076	0.105	.746
Mediator: Nurses' intention to leave the profession							0.503	9.167	.002
Independent: Teamwork and communication QWL	0.534	38.165	<.001	0.103	0.127	.722	0.259	0.837	.360
Mediator: Nurses' intention to leave the profession							0.516	10.026	.002
Independent: Nursing staffing and patient care QWL	0.917	186.509	<.001	-0.304	2.118	.146	-0.007	0.001	.976
Mediator: Nurses' intention to leave the profession							0.522	8.252	.004
Independent: Milieu of respect and autonomy QWL	0.761	111.277	<.001	-0.54	6.413	.011	-0.335	2.153	.142
Mediator: Nurses' intention to leave the profession							0.405	5.605	.018

Note. Boldfaced values indicate the mediation effect was supported.

Control variable = service length.

^aCumulative logistic regression.

^bBinary logistic regression.

intention to leave the profession was a significant predictor of nurses leaving the profession ($X = 0.405$, $p = .018$) and (b) the direct relationship of the milieu of respect and autonomy aspect of QWL to nurses leaving the profession was less significant ($X = -0.335$, $p = .142$) than in the second equation ($X = -0.54$, $p = .011$; **Table 2**).

Discussion

Nurses' Intention to Leave the Profession and Nurses Leaving the Profession

More than half of the nurses surveyed (56.1%) had tendencies to leave their profession. The result is higher than reported in previous studies on nurses' intention to leave the profession. In a study based on 2,119 nurses in Germany, Simon et al. (2010) found that 18% of nurses considered leaving the profession. Based on data presenting 525 nurses at two hospitals in northern Italy, Cortese (2013) found that 14.6% of nurses reported leaving

the profession. The reason may have been that nurses' overtime issues are related to nurses' intention to leave the professions. The average overtime of a day shift is from half an hour to 2 hr in Taiwan (Taiwan's National Union of Nurses' Associations, 2017). The other reason may be that in this study, nurses' mean age was less than 30 years; young nurses have stronger tendencies to leave their profession (Flinkman & Salanterä, 2015). Additionally, in this study, nurses had a high tendency to leave their profession, but a small proportion actually left the profession. A decision to leave a profession is multifaceted and is viewed as a process that evolves over time after searching for or evaluating alternatives (Duffield et al., 2004; Morrell, 2005).

Mediator Effects of Nurses' Intention to Leave the Profession

In this study, the research hypothesis was partially supported, namely, nurses' intention to leave the

profession is a mediator variable between the milieu of respect and autonomy aspect of QWL and nurses' professional turnover. Only the milieu of respect and autonomy aspect of QWL is a significant independent variable. This result is similar to previous studies reporting the associations between nurses' autonomy and nurses' intention to leave the profession. In a study based on 525 nurses in two hospitals in northern Italy, Cortese (2013) found that professional status and autonomy were inversely correlated with nurses' intention to leave the profession. In a study of 255 nurses, Papathanassoglou et al. (2012) reported that nursing autonomy was inversely correlated with nurses' turnover intention. In a study based on 178 teaching hospital nurses in Brisbane, Australia, Finn (2001) found that nurses' professional autonomy was an important component correlated with nurses' turnover intention. The reason could be that autonomy is related to power relations between physicians and nurses (Galbany-Estragués & Comas-d'Argemir, 2016). Under Taiwan's Nursing Personnel Act, one of the nursing scopes of practice is that nursing is medical assistance (Taiwan Ministry of Health and Welfare, 2015). Nurses follow the instructions of physicians, and this could make nurses feel they have less latitude in making decisions about patients' care.

Our study found that nurses' intention to leave the profession played a mediator role and thus gave full details of how the milieu of respect and autonomy aspect of QWL can develop into nurses leaving the profession. To ameliorate the milieu of respect and autonomy to prevent permanent nursing manpower loss, practical and applicable ways of doing so should be added. These could include building shared governance models (Vagharseyyedin et al., 2011), changing nurses' professional education, and changing job assignments between physicians and nurses by altering their authorities and responsibilities (Varjus, Leino-Kilpi, & Suominen, 2011).

Conclusions

This study demonstrates that more than half of Taiwanese nurses described having the intention to leave their profession; however, only a minority of Taiwanese nurses reported professional turnovers 1 year later. This study also gave evidence that the nurses' intention to leave the profession was a mediator between the milieu of respect and autonomy aspect of QWL and nurses leaving the profession. This study illustrates that nurse managers could provide effective interventions to ameliorate the milieu of respect and autonomy aspect of QWL to prevent nurses from leaving the profession for Taiwanese nurses. This study was delivered at seven acute

care hospitals; thus, these findings were not representative of all nurses in Taiwan. This can be viewed as the limitation of this study. In the future, a study is needed to analyze how the milieu of respect and autonomy affects nurses' intention to leave and nurses' turnover.

Clinical Resource

- International Council of Nurses. 2016 ICN Asia workforce profile: http://www.icn.ch/images/stories/documents/pillars/sew/Datasheet_Nursing_Wosrkforce_Profile_AWFF_2016.pdf

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PROFESSION AND SOCIETY

Developing Abilities to Navigate Through the Grey Zones in Complex Environments: Nurses' Reasons for Applying to a Clinical Ethics Residency for Nurses

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Key words

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Abstract

Background and Purpose: Nurses face complex ethical issues in practice and have to determine appropriate actions. An inability to conceptualize or follow a preferred course of action can give rise to moral uncertainty or moral distress. Both moral uncertainty and moral distress are problematic for nurses and their patients. A program designed to increase nurse confidence in moral decision making, the clinical ethics residency for nurses (CERN), was offered selectively to nurses affiliated with two academic medical centers. This is a report of the analysis of their application essays.

Design: Over a 3-year period, 67 application essays were analyzed using conventional content analysis. Applicants comprised one third advanced practice nurses (APNs) and two thirds staff nurses. They were asked to describe their reasons for interest in the CERN and how they would apply the knowledge gained.

Methods: For conventional content analyses, no theoretical presumptions are used; rather, codes are identified from the data in an iterative manner and eventually collapsed into themes. Initially, broad themes were identified by the CERN team. Subsequently, in-depth and recursive readings were completed by a subset of three members, resulting in refinement of themes and subthemes.

Findings: The overarching theme identified was "developing abilities to navigate through the 'grey zones' in complex environments." Three subthemes were: (a) nurses encountering patients who are chronically critically ill, culturally diverse, and presenting with complex circumstances; (b) nurses desiring enhanced ethics knowledge and skills to improve quality of care, understand different perspectives, and act as a resource for others; and (c) nurses supporting and facilitating patient-centered ethical decision making.

Conclusions: Findings are consistent with those appearing in the international literature but provide a more cohesive and comprehensive account than previously, and hold promise for the development of educational and policy strategies to address moral distress and uncertainty.

Clinical Relevance: This study is relevant to clinical practice in its verification of the need nurses have for ethics knowledge, skill refinement, and application through communication. These findings affirmed the challenge that nurses feel in communicating their ethical concerns in an effective and engaging way and their commitment to advocacy and improvement in the quality of care for patients.

Contemporary complex healthcare environments pose problems for all healthcare professions related to meeting professional care goals. The inability to provide good care, regardless of reason, is distressing to nurses, and they often are not sure how to negotiate the difficulties to facilitate good patient outcomes (Austin, 2012; Ulrich, Hamric, & Grady, 2010). The emotional response to being unable to provide good patient care has been labeled moral distress (MD; Corley, Elswick, Gorman, & Clor, 2001; Corley, Minick, Elswick, & Jacobs, 2005; Jameton, 1984). The concept of MD has gained heightened visibility over the past few decades. Implications of MD for nurses, healthcare providers, and ultimately patients have been fairly well documented; less is known about how the problem should be addressed. Thus, while this study is about reasons that a cohort of U.S. nurses gave for wanting to participate in a clinical ethics residency, emerging themes are likely to have implications for the education of healthcare professionals internationally.

As the frontline providers of care, nurses are more frequently at risk for MD than many other professionals. There are several reasons for this: (a) a historical lack of power related to their place in the healthcare hierarchy (Austin, Lemermeyer, Goldberg, Bergum, & Johnson, 2005); (b) more sustained time spent with patients permits them to recognize when patient wishes are not being honored; and (c) they may encounter ethical problems on a daily basis (Milliken & Grace, 2015). Moral agency, the ability to act to resolve practice problems, can reduce the negative effects of MD (Carnevale, 2013; Grace, Robinson, Jurchak, Zollfrank, & Lee, 2014; Robinson et al., 2014; Woods, 2014). Intending to fortify nurses' moral agency and reduce the ill effects of MD, the Clinical Ethics Residency for Nurses (CERN) was developed by the authors (Grace, Robinson, Jurchak, Zollfrank, & Lee, 2014).

The CERN consisted of a multimodal pedagogical approach to learning (Curran, 2014; Mezirow, 2000). Applicants were from two academic medical center and affiliates. Both experienced advanced practice and bedside nurses were eligible. Recruitment was achieved by e-mail, poster advertisements in key areas of the institution, flyers in internal publications, presentations at leadership meetings, and word of mouth. The resulting cohort of selected applicants numbered 19, 24, and 31, respectively, for years 1, 2, and 3 of the program (2010–2013). Sixty-seven applicants in total were accepted and completed the program. Registered nurses (RNs) and advanced practice nurses (APNs) or supervisory nurses were represented at an approximate ratio of 2:1 (RNs to APNs). The applicants had been asked to describe why they wished to be considered and how they would apply the new knowledge. The research question

to be answered by the analysis was: What motivated nurses to apply to the CERN program? The analysis of their reasons for wishing to be in the program provides an integrative picture of their experiences and may reflect nurses' experiences more broadly as supported by emerging studies. Findings reported in extant literature about nurses' experiences in their work environments include the nature of ethical issues encountered, their experiences of MD, and their needs for more education and skills. In this article, we describe the methodology and analysis of CERN application themes and discuss the implications for this and derivative programs.

Methods and Rigor

Aim

Our aim was to describe the reasons that point of care and advanced practice RNs gave for wishing to be accepted into the CERN program. The program aimed to build confidence in participant ethical decision making, reduce MD, and enhance retention.

Study Design

The prospective applicants understood the general nature and aims of the CERN program and that it required a commitment of 8 hr per month over a 9-month period followed by 16 hr of mentored practica. They were asked to answer two questions in a short essay format. The essays were collected from the cohorts of 3 consecutive years (2010–2011, 2011–2012, and 2012–2013). A qualitative analysis was performed on descriptive content from 67 application essays written prior to acceptance into the program.

Questions

Participants were asked to describe their interest in participating in an ethics residency and how they would anticipate applying new knowledge in the clinical setting.

Applicants

Flyers inviting applications were distributed throughout the two institutions and their affiliates, including outpatient departments and clinics. E-mail invitations were sent to all nurses in the two institutions and their affiliates. One criterion for participation was support of the nurse manager, supervisor, or administrative executive to release the applicant for 8 hr once a month. The sample comprised 67 RNs (mean age 46 years) who volunteered to participate in the CERN.

Data Analysis

While the CERN program itself was firmly and necessarily based in a theoretical framework (Grace et al., 2014; Robinson et al., 2014), the authors agreed that analysis of applicant essays would best be carried out from a theoretically naïve position. We wanted to understand their reasons from their perspectives. Conventional content analysis was considered appropriate for this particular task as it facilitates the emergence of themes directly from the data (Hsieh & Shannon, 2005). In conventional content analysis, researchers use an iterative process to identify units of information and assign a code or label. With each successive reading, patterns are identifiable and prior codes can be collapsed or refined into patterns and themes (Hsieh & Shannon, 2005, p. 1278). All authors were initially involved in reviewing all the essays and offered their perspectives about both codes and broad patterns that were identifiable from these preliminary reads. As the process progressed, a subgroup refined and (where necessary) expanded the thematic analysis. Three of the authors reread all data thoroughly to obtain a sense of the whole. Next, data were read word by word independently by each author. Analysis involved highlighting exact words and phrases that captured applicants' motivations for seeking enrollment in the CERN. The group of three read together the first 20 narratives to establish the initial coding scheme. The group alternated independent and group coding, meeting periodically until all 67 narratives were read together and consensus on coding was reached. New codes were assigned when text could not be categorized using the initial code list that was generated inductively. Finally, the group identified main themes and subthemes.

Trustworthiness (Credibility, Dependability, Confirmability, Transferability)

The trustworthiness of the study was evaluated using Lincoln and Guba's (1985) criteria. Credibility was supported through the competence of the researchers and members of the team with qualitative research expertise. Member checks (with 10% of the sample) and peer debriefing also contributed to accepting the trustworthiness of the emerging themes. All seven applicants who reviewed the resulting themes and subthemes strongly agreed with the identified themes; members further agreed that from their perspective all reasons for applying had been captured. An audit trail of data and key decisions was maintained supporting confirmability and transferability. Further, iterative processes of analysis and reflection on the data enhanced dependability. Dependability of the data was also enhanced by the

research group's deliberative and ongoing challenges of, or requests for clarity about, each other's assumptions, preconceptions, and biases related to the emerging themes.

Ethical Issues

The CERN faculty had sought and received institutional review board approval to analyze and report data throughout the program, including the applicants' pre-admission essays. Applicants were informed how their confidential data would be managed and that all data would either be reported in the aggregate, or when quotes were used these would not be traceable to the participant. Names were de-linked from the demographic information and evaluation data. A code was assigned to each participant and this was used throughout for evaluation purposes. Only the principal investigator (PI), program evaluator, and PI's assistant had access to the linked names and codes, which were kept in a secured area in the PI's office.

Findings

The applicants were predominantly female (92%), White (95%), non-Hispanic (100%), staff nurses (68%), educated at the baccalaureate to graduate levels (83%), with an average of 20 years of experience. Almost one third were APNs or nurse leaders. Applicants were employed in one of two academic medical centers in the northeastern United States or their affiliates. Participant practice areas included a variety of critical care units, including neonatal intensive care; emergency departments; acute care, pediatric, and psychiatric units; and gerontology, case management, oncology outpatient, and clinical research units, among others. A number of applicants were nurse managers, nurse practitioners, and supervisors.

The research team identified an overarching theme, three major themes, and several subthemes. Each of these are discussed below and illustrated with participant quotes. The major themes are concepts that were ubiquitously present in the data even when the applicants varied in the terms they use to describe them. Direct quotes from the applicants are designated as A1, A2, A3, and so on. Where pertinent, the type of setting or role of the applicant is provided, but identifying details are omitted. Terms used in the theme titles were for the most part one or more participant's own language but represent ideas that emerged from many of the essays. For example, in the overarching theme, the expressions *navigate*, *grey zones*, and *complex environments* came directly from the essays of several applicants.

Overarching Theme: Developing Abilities to Navigate Through the “Grey Zones” in Complex Environments

Applicants’ broad reasons for wishing to be accepted into the CERN program were that they wanted to develop their knowledge and skills to be able to navigate through the “grey zones” in increasingly complex practice contexts. They described the many grey zones that present or within which they find themselves stranded. Grey zones are complex situations where the right action is not clearly evident, it is difficult to judge benefits over harms, or there are conflicts among the healthcare team or the team and others. Stated differently, there are areas of ethical ambiguity as in a dilemma, or the nurse knows what should be done but there are complex barriers to carrying out the action, or more information is needed but is hard to obtain. In some situations, the resources required may not be readily available or easily accessible. “[Nurses] struggle with how to handle the legal and ethical dilemmas they face” (A1). The complexity and grey zones the nurses described were present across settings and patient populations. Grey zones involved patient, family, and healthcare team scenarios related to patients with physiological and psychological illness, suffering from social injustices or poor social conditions and combinations of problems, language problems, or where there were conflicts among the different stakeholders including patient, family, and the healthcare team. For the APNs, a responsibility to assist colleagues and staff nurses in managing unit problems often emerged, as captured by one clinical nurse specialist’s (CNS’s) essay:

The patients are complex with multiple issues occurring simultaneously [discussing one critically injured patient whose mother was a healthcare proxy and was pushing for more interventions] ... the nurses struggled with the discomfort that the patient was experiencing as a result of the care they were providing ... treatments provided offered little hope. I feel the Clinical Ethics Residency for Nurses will help to provide me with the tools I need to assist the nurses through this process. I hope to gain increased knowledge of ethical principles, strategies to navigate through the grey areas, and confidence to assist the staff ... provide the skills they need to clearly voice their concerns, utilize appropriate resources, and become stronger patient advocates. (A4)

Related to the problem of conflicts among stakeholders, which can increase complexity and detract from attending to the best interests of the patient, a critical care staff nurse asserted,

I often find myself in the middle of issues within our ... team where it seems difficult to come to consensus and consistently act in the best interest of the patient. Surgeons are notoriously a challenging group to deal with due to the nature of what they do for a living since they often see things in black and white. Nurses as holistic practitioners are more apt to see the gray areas where answers are not so clear-cut and solutions are not so easy to come by. (A24)

The overarching theme “developing abilities to navigate the grey zones in complex environments” is reflective of the three major themes we discovered. These themes and their subthemes are discussed next.

Theme 1: Nurses Are Encountering Patients Who Are Chronically Critically Ill, Culturally Diverse, and Present With Complex Circumstances

The majority of applicants wrote about a change they have noticed in the types of patients encountered in practice and how the problems associated with caring for increasingly “chronically critical patients” (A1) tax their ability to provide good care, especially when there are additional obstacles. These are patients who in the past would not have survived but due to biotechnological advances their lives are now prolonged for weeks and months. Such patients may even return home, but the prognosis is not always clear, long-term sequelae are difficult to predict, and decision making is challenging for all involved. There are complex issues of confidentiality and who can be told about the patient’s circumstances when there is risk to someone other than the patient. For example, A34 noted issues with patients “who are HIV positive and do not want their spouse to know.” There are also patients and patients’ families who expect miracles, as reported by one participant: “an elderly woman with late stage esophageal cancer persisted in trying every option ... she eventually died in agony” (A44). Another reported on her work with psychiatric patients suffering from concomitant medical issues who refuse to accept care or take their medicines (A39). On the one hand, she wanted to respect the autonomy of these patients; on the other, she was not sure that permitting refusals was actually in the patient’s interest. Others talked about the increasing diversity of beliefs and values encountered, and the need for nurses to try to understand the perspectives of those from cultural backgrounds different from their own. When values seemed to conflict, the nurses were not always sure how to proceed. Several applicants noted care issues surrounding those who are in the country without valid documents and thus not

entitled under U.S. laws to societal “safety net” supports or subsidized insurance. For such patients, difficulties may be encountered in adequately ensuring ongoing care after discharge. Two subthemes were distinguished related to this theme.

Subtheme 1a: Nurses struggle to manage varied types of conflicts in the practice environment. The complexity of the environment gives rise to various types of conflicts that the applicants frequently feel unable to mediate on behalf of the patient. The presence of conflicts adds to the complexity of the patient’s situation and obscures the way to a good resolution—a way through the grey zones. Conflicts arose among team members, family members, and between family members and team members. Tensions could also present in practice situations as a result of provider inexperience and their unwillingness to seek guidance. For example, “circumstances arise where family members, patients, and the healthcare team all seem to be on different pages... . Inexperience and short-rotation of our physician counterparts” also give rise to conflicts (A45).

Aligned with but different from the problem of how to mediate conflicts in the interests of their patients, the nurses wanted to develop more sophisticated skills in ethical decision making in order to isolate the important issues and work towards solutions. They were often unsure what their role should be in contributing to the medical team’s ethical decision making, as in Subtheme 1b.

Subtheme 1b: Nurses ethical decision making is typified by ambiguity and questioning, “Is this the right decision?” The applicants wrote that the increasing complexity surrounding patients and the care environment made them feel unsure about their ethical decision-making skills. They experienced ambiguity related to decisions that they were faced with making. As an example, ambiguity about prognosis or goals of care gave rise to questions such as, “What is the best thing to do?” Knowing the right thing to do was further complicated by the increasing availability of interventions that may resolve one issue without improving a patient’s quality of life. One nurse declared, “The problem lies with dealing with the many differing beliefs and backgrounds around the patient seeking honest advice” (A49). Several applicants, especially those in supervisory or case-management roles, noted the many persons for whom they saw themselves as having responsibilities, without being clear about who or what should be prioritized. A nurse case manager wrote, “I am the hub of a many spoked wheel ... the patient, their family, the medical team, the administration of the hospital, the nursing staff, the insurance company etc.” (A51). Another

said, “Like many healthcare workers, I have found myself questioning the ethical implications of decision without having full knowledge or understanding where to turn for help. Could I have done more? Is that the right decision?” (A52). Additionally, A20 talked about the problems related to undocumented and uninsured patients. How should one think about this issue? What is the role of the nurse in trying to ensure good care? Theme 1 reflects the applicants’ personal desires to improve their knowledge base in order to navigate the grey zones effectively; Theme 2 extends that concern to providing support for others.

Theme 2: Nurses Desire Enhanced Ethics Knowledge and Skills to Improve Quality of Care, Understand Different Perspectives, and Act as a Resource for Others

This major theme reflecting reasons for applying to the program was a desire to build knowledge and skills for improving decision making, providing better care, and acting as a resource for others. The applicants alluded to the need to advocate for good care and “to better care for [one’s] patient population on a daily basis” (A6). They wanted to be able to support their colleagues, patients, and families, and act as a resource. Despite many having reported in their demographic information that they had received some basic ethics education and some more advanced ethics education, they considered this inadequate for ensuring good practice contemporarily. One CNS noted “it is often challenging to identify the actual ethical problem, making it difficult to proceed to the next step” (A4). Additionally, a significant number of applicants wanted to enrich themselves personally and professionally and increase their ability to understand the perspectives of others. “[As someone] who has an established set of values it is often challenging to be sure you are advocating based on the values of your patient and family” (A28). “I look forward to ... opening myself up to other points of view” (A37). Four subthemes are differentiated below and reflect what applicants hoped to learn. Several applicants reported being aware that while their intuitions serve increasingly diverse populations, it could be difficult to understand the perspectives of those patients or families whose values or cultures were radically different than their own.

Subtheme 2a: Nurses aspire to broaden their perspectives. Nurses wanted to better understand others’ ethical frameworks, language, and principles in order to assist decision making. Some wrote of their desires to be able to think more broadly about situations and to understand the perspectives of patients and colleagues with

diverse backgrounds or with beliefs that diverged from their own. A56 wrote, “I am looking for a skill set that enables me to think clearly and morally, to appreciate the perspectives of others” (A56). This was seen as especially important for “A culture like ours which is demographically and philosophically very diverse gives rise to difficult issues. Interested to hear other nurses’ perspectives” (A57). The nurses recognized that they may not always understand why another might have radically different beliefs and worried that they may respond inappropriately. For example, A44 stated,

I want to be able to recognize when it is right to speak up, how to differentiate my own values from those of the patient and who I can talk to when I feel that their needs aren’t being met

Along with understanding different perspectives, the applicants hoped for a structure that could help them look at, analyze, and address practice issues. They wanted to better understand ethical language and principles and,

[Have] the chance to develop stronger and deeper expertise in helping clinical caregivers sort through complex, competing ethical dilemmas . . . when alternatives seem endless and debatable, how to use ethical thinking to narrow choices so a decision can be made, alternatively how to use ethical thinking to broaden perspectives and slow down the decision making when dilemmas have been oversimplified. (A30, a psychiatric APN)

A nurse supervisor (A7) wrote that she had a desire to “to increase my knowledge, broaden my perspective on ethical issues, participate in discussions, and develop a strong foundation for present and future ethics consultation.” Another applicant wanted to “benefit from increased knowledge re: ethical practice and real-life application of principles” (A20) in order to provide quality patient care. How to actualize broadening their perspective, understanding ethics language and decision-making frameworks, was a subtheme related to providing quality care and providing resources for others.

Subtheme 2b: Nurses want to develop advocacy and communication skills to enhance ethical practice. The majority of applicants expressed the hope that they would gain the skills to be able to speak up, articulate concerns, advocate, access resources, educate, and support others. One intensive care unit (ICU) staff nurse, in recounting her feelings of inadequacy in a situation, noted,

I was taking care of a patient once who was young, was unable to speak for himself, still married but

separated from his wife who was the decision maker. There was conflict in the family of why she was making decisions for her husband who would have been outraged if he knew . . . it was my role . . . to navigate through. I know if I had better skills, communication and otherwise I would have done a better job. (A19)

Another applicant who was relatively early in her career wrote of her concerns that she was not always an effective advocate for her patients, stating,

I have watched medical professionals give subpar care [to] an illegal alien, [the] uninsured, [a] criminal . . . [they put] a dollar sign and their success numbers before a patient’s best interests . . . I long to have the skills to truly advocate for my patients. (A54)

Applicants also wrote of the difficulties involved in having necessary but difficult conversations with patients or patients’ families. For example, an oncology nurse hoped that the CERN would “provide me with the ability to speak to the moral requirement we possess within this profession to guide our patients and families openly, honestly and with the utmost compassion and empathy” (A41).

Subtheme 2c: Nurses desire to increase professional and personal development. Many applicants spoke of their drive to develop themselves professionally as well as personally. A significant number wrote of the two desires as interrelated. One staff nurse wrote “on a personal level I would like to improve myself as a nurse” (A2). Another wrote that she was “very excited to think of what [CERN] could do for my practice and my life” (A46). This theme is consistent with an unpublished study by one of the authors whereby in end-of-course evaluations from an advanced practice nursing ethics course (12 years of data) students consistently highlighted how learning to think critically and analyze difficult situations led to both personal and professional enrichment. One nurse working with oncology and bone marrow transplant patients said “I believe that CERN will better me both personally and professionally . . . to take the knowledge and skills gained from CERN and share them with other nurses and practitioners on my floor” (A61).

Subtheme 2d: Nurses hoped to learn how to manage the emotional aspects of their work. Many of the essays alluded to the emotional aspects of their work and how this could have lingering effects upon them in terms of sadness and distress. The damaging effects of MD have been explored in the literature. However, this concept was not articulated as such in the

essays. One applicant, in talking about a dying adolescent where a decision had been made to withhold nutrition and hydration, wrote, “I have never forgotten the distress and sadness of my colleagues in their belief that . . . they were contributing to her death” (A58, APN). Emotions are generally understood as important for motivating ethical action, but strategies to manage overwhelming or uncontrolled emotions are needed to conceptualize appropriate actions. Another APN noted the difficulties inherent as nurses “strive to help the patient navigate a hopeful course as they manage their own feelings, frustrations and concerns” (A13, CNS), and a direct care staff nurse summarized “over the past several years I personally have faced countless situations that have challenged me emotionally” (A28). A concrete example was given by a neonatal ICU nurse. A mother was not being told the truth about her baby having a positive blood culture, and this “caus[ed] distress to the nursing staff because they are the ones at the bedside forming a relationship with this family based on trust and honesty” (A29). Another nurse attributed “much of the ‘burn out’ in nursing [as being] caused by the frustration we feel in caring for patients suffering at end of life. It is difficult emotionally and physically” (A4).

Theme 3: Nurses’ Ultimate Purposes Oriented Toward Supporting and Facilitating Patient-Centered Ethical Decision Making

Theme 3 reflects the applicants’ desires to meet their professional responsibilities for patients, including influencing the environment of care to focus on the patient and to keep the patient’s needs central. Individually they wanted more clarity of vision and better communication skills in order to adequately articulate the nature of their concerns about the care a patient was receiving. They recognized the importance of supportive environments in ensuring that ethical decision making, individual or team, remained centered on the patient. The majority of applicants saw the importance of having both a big picture perspective of complex situations and keeping the patient in the center of their concerns. They desired to engage consistently in good practice in the interests of quality patient care and good patient outcomes. They saw the support and facilitation of decision making by the healthcare team, patients, and families as a critical ability and an important aspect of their advocacy role.

Subtheme 3a: Nurses’ wishes to be able to enhance their advocacy role. We reported earlier in this article on nurses needing knowledge and skills to advocate well for individual patients. However, this subtheme is about their ultimate aims of quality patient care

and thus has broader implications for influencing the environment of care. Implicit as well as explicit in their descriptions are several understandings of advocacy. Some saw advocacy as arguing for the rights of patients to make their own decisions when social, economic, or even expediency concerns were detracting from this goal. In discussing a patient who wanted to maintain control of her life as her muscular dystrophy developed, but was obstructed by members of the team, A21, a staff nurse, said “I want to advocate for the rights of patients for self-determination and dignity, while balancing insurance and financial challenges.” Other nurses noted that their sometimes long-term relationships with patients required a variety of skills. A neonatal ICU nurse (A29) noted, “we develop caring relationships and become the advocates for these small patients and families . . . having strong communication skills for difficult conversations [with the family and the team] is essential.” Many nurses, not just those with advanced practice qualifications, noted their desire to serve as a resource for others encountering difficult situations and helping them to remain focused on providing for the patient’s good. A CNS in a medical surgical setting, wrote:

The nurse is obligated to speak for the patient who is unable to speak and ensure that the care provided is appropriate . . . I would like to transfer the knowledge I gain to the staff nurses . . . providing them with the skills they need . . . [to] become stronger patient advocates. (A4)

The same CNS exemplified the hope of many applicants, writing, “I would like to develop a more formal approach to the discussion of ethical issues through a unit based ethics rounds” and in “developing unit based ethics experts who can assist their peers . . . voice their concerns, utilize appropriate resources, and become stronger patient advocates” (A4). The advocacy included ensuring quality patient care more broadly.

Subtheme 3b: Nurses wanted to ensure quality patient care and good patient outcomes. Nurses clearly described the need to ensure good patient care and good outcomes for patients even at the end of life. This subtheme is captured in a segment from a research nurse’s essay: “I hope to apply this knowledge into my clinical practice where I can begin to improve the quality of patient care and patient outcomes” (A5). Many worried that all too often circumstances conspire against giving quality care:

It is often said that calling in the appropriate resources will “take too much time,” be “too much trouble” or that “they don’t understand oncology nursing.” With a

greater depth of knowledge, I will help to reduce these barriers to providing the best care possible. (A27)

They saw conflicting beliefs and values as also tending to militate against good care and hoped to gain strategies that would allow them to “help offer support to negotiating the diversity of beliefs among healthcare providers to offer the best care for the patient” (A49). Many talked about the need to influence the unit or department environment to become more supportive of patient-centered care. A57 hoped that the program would “help me fulfill what I believe is the ultimate goal of all of us . . . the delivery of clinically as well as ethically excellent patient care.”

Subtheme 3c: Nurses aimed to facilitate and support colleagues’, patients’, and families’ decision making. Essays included a hope that the CERN would give them the knowledge and skills to support ethical decision making broadly or would help to refine the knowledge and skills they already possessed. For example, one participant wrote:

This is one of the areas I would like to have a better grasp of and become knowledgeable in—decision making and thought processes The program could help me become a better mentor to the unit and to the younger nurses. (A14)

A labor and delivery room charge nurse was concerned with “helping my colleagues become the carpenters of their own ethical framework” (A31). An oncology nurse participant hoped “to learn a practical approach to help my patients figure out their rights and make thoughtful informed decisions” (A49). The need for inclusivity in hearing the perspectives of all involved was recognized as critical for quality patient care:

A systematic approach to an acceptable position for all involved is mandatory. [Patient care is often] a complex puzzle that needs diligent effort to recognize all facets involved and the importance of each to each party involved . . . critical to ensure patients and families have education about choices. [It will be] advantageous [for me] to complete the clinical ethics residency for nurses as a support for the department. (A10)

Discussion

The themes and subthemes described are supportive of the growing body of literature describing challenges for nurses posed by the nature of contemporary practice environments (Austen, 2007; Milliken & Grace, 2015;

Rodney et al., 2002). Derived from the essays of nurses in different specialty areas and levels of education and responsibilities, they paint a panoramic picture of difficulties faced and the perceived knowledge and skills needed to practice ethically. While it is generally accepted that ethics education is very important for nurses at all levels of practice (American Association of Colleges of Nursing, 2008, 2011; Gastmans, 2002; International Council of Nurses, 2012), what this should entail and how it should be incorporated into nursing education, initial and ongoing, is less clear (Grace & Milliken, 2016; Grace et al., 2014; Peirce & Smith, 2008; Robinson et al., 2014; Zakaria, Sleem, & Seada, 2016). Findings support contemporary thinking that adequate ethics education must address three aspects foundational for moral agency—the ability to bring about a good (Grace, 2014): the development or refinement of personal and professional characteristics facilitative of moral agency, knowledge of ethics language and associated analytic tools, and the ability to influence those changes necessary to achieve the profession’s goals of quality patient care. These three areas permit professional advocacy. Professional advocacy has been defined as “actions taken to further nursing’s purposes on behalf of individual patients and actions taken to expose and redress underlying problems that are inherent in the larger contexts of institutions, policymaking and the health care delivery system” (Grace, 2001, p. 161).

Although the applicants were from a wide range of settings and different levels of practice, there was a consistency in their overall descriptions of reasons for seeking admission to the CERN program. From the analysis of applicants’ motivations, a broad, and yet fairly detailed, picture is painted of nurses’ daily work and the challenges they face in providing good care. Even knowledgeable nurses and those with strong prior ethics education expressed a need for ongoing knowledge and skill refinement for application in practice. This finding is consistent with a needs assessment undertaken in 2008 by the CERN PI and project evaluator prior to gaining funding. The Nurse Self-Perceived Competency in Ethics Survey ($N = 820$) found that despite many having had prior ethics education, they felt inadequately prepared to deal with many of the issues they faced (Grace et al., 2014).

With regard to Theme 1, contemporary environments are fluid, and new types of problems are always arising; thus, nurses need to be able to respond quickly, accurately, and with confidence. They need to know what resources can be accessed for ongoing reinforcement of knowledge and skills. They need a safe place to discuss issues with others. This is especially true when there is ambiguity in a current situation or doubt about past actions.

Certain problems require unit (or even system level) solutions and a collaborative environment. In the time between exposure to initial ethics teaching in undergraduate or graduate curriculum and actual practice, nurses experience an erosion of knowledge in ethics or uncertainty about its application in practice. The complexity of the practice environment, as well as the infinite human variability that characterizes clinical care, create an “ethics gap” in which the need for extension and refinement of initial skills and knowledge in ethics is recognized. They need ways to keep the “moral spaces open” (Walker, 1993) and the skills and language for what to say in those open spaces. Theme 2 highlights the range and types of challenges nurses experience and the skills and knowledge needed to dissect and articulate the nature and nuances of a given issue, support others in their ability to articulate their concerns, and advocate for the best interests of the patient to be foremost. There was a perception that applicants’ grasp of ethical language and analytic tools needed reinforcement or refinement to manage complex patient care situations. This theme is congruent with prior research (Doane, Pauly, Brown, & McPherson, 2004; Varcoe, et al., 2004; Woods, 2014) and with philosophical arguments about the value of using ethical language and tools to uncover and present the nuances of ethical problems (Grace, 2014). More work is needed to understand how and where this content should be taught (Laabs, 2015) and reinforced. Additionally, many nurses reported recognizing the limits of their understanding of the perspectives of others, finding themselves conflicted when choices were being made contrary to their values or when they had trouble understanding the nuances of a disparate culture. They expressed a desire to improve their capacity for effective communication, including being able to articulate the source of their own ethical misgivings and intuitions. In addition, several appreciated the variety of perspectives that legitimately populate the work of a multidisciplinary team (Shannon, 1997) and the challenges of communicating in an effective and engaging way about ethical concerns. Handling one’s emotions can be particularly difficult, but is necessary to the project of advocating effectively. A certain level of emotional involvement is a necessary motivator for ethical action, but an inability to manage one’s emotions clouds reasoning (Scott, 2000). The emotional experience of MD is linked to the lack of power to affect a good resolution. Moral agency—the ability to bring about a good—on the other hand has been proposed as likely to lessen MD (Grace & Milliken, 2016; Liaschenko & Peter, 2016).

Finally, the nurses appreciated the connection of effective ethics engagement to quality patient care, the third theme in our analysis. The much-discussed concerns about quality in health care attune nurses to the

need to respond effectively to the issues they encounter in practice that require ethical knowledge and skill to address. Many applicants talked about needing the skills, resources, and knowledge to speak up on behalf of patients when their concerns were not being acknowledged or were suppressed for a variety of reasons. Many acknowledged the need for advocacy, which is urged as a responsibility of nurses by the American Nurses Association’s (2015) Code of Ethics for Nurses With Interpretive Statements. While various definitions of advocacy exist (Grace, 2001; Rainer, 2015), at minimum it involves ensuring the patient’s voice is represented and that the patient remains the central focus of decision making. Two levels are implied: first, how one should manage an immediate problem, and second, how to optimize the environment of a unit, clinic, or institution. Thus, these nurses perceived they needed to be able to provide decision support to patients and their families or surrogates and also support their colleagues within a supportive environment.

Strengths and Limitations

This is the first article to provide an analysis of nurses’ motivations for seeking admission to a nursing ethics residency program, thereby constituting a significant addition to the nursing literature on nursing ethics education. Because the nurses were from a variety of settings and levels of practice, we believe that insights from this study could have transferability to nurses practicing in a variety of contexts throughout the United States and internationally. More research, however, is needed to test this proposition.

It is important to note that these findings were generated from the written descriptions of those applicants who were eventually accepted for the CERN program and practicing in a metropolitan area. Thus, there is selection bias. The applicants were diverse in terms of practice environments, but the sample lacked gender, racial, and ethnic diversity, constituting a limitation of the study findings.

Clinical Resources

- American Association of Critical-Care Nurses. Resources for ethics/moral distress: <http://www.aacn.org/wd/practice/content/ethic-moral.pcms?menu=practice>
- American Nurses Association: <http://www.nursingworld.org/MainMenuCategories/EthicsStandards/Resources>

- AMN Healthcare. 10 best practices for addressing ethical issues and moral distress: <http://www.amnhealthcare.com/latest-healthcare-news/10-Best-Practices-Addressing-Ethical-Issues-Moral-Distress/>

Conclusions

This analysis of a substantial number of essays revealed a set of themes that have been supported in the literature internationally, but not in such a cohesive or comprehensive form. Evident from the themes is the desire for three different types of knowledge and skills. There is a universal desire to improve their knowledge of ethical analysis and decision making to help them with the increasingly complex environment in which patient care takes place. Many hoped for enhanced personal and professional growth, including a better grasp of how their own beliefs and values interface with diverse cultures and/or divergent beliefs and values from their own. Most expressed a desire to support colleagues in their ethical decision making with the end goal of remaining focused on the needs of their patients and providing quality patient care. Thus, the overarching theme is that of a desire to gain the skills that would permit them to better navigate a path through the grey areas of practice. These grey areas may be caused by factual or ethical ambiguity, or by conflict. The ultimate aim of this is quality patient care in the face of environmental complexity, other difficulties, or ambiguity.

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PROFESSION AND SOCIETY

Impact of Providing Compassion on Job Performance and Mental Health: The Moderating Effect of Interpersonal Relationship Quality

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Abstract

Purpose: To examine the relationships of providing compassion at work with job performance and mental health, as well as to identify the role of interpersonal relationship quality in moderating these relationships.

Design and Methods: This study adopted a two-stage survey completed by 235 registered nurses employed by hospitals in Taiwan. All hypotheses were tested using hierarchical regression analyses.

Findings: The results show that providing compassion is an effective predictor of job performance and mental health, whereas interpersonal relationship quality can moderate the relationships of providing compassion with job performance and mental health.

Conclusions: When nurses are frequently willing to listen, understand, and help their suffering colleagues, the enhancement engendered by providing compassion can improve the provider's job performance and mental health. Creating high-quality relationships in the workplace can strengthen the positive benefits of providing compassion.

Clinical Relevance: Motivating employees to spontaneously exhibit compassion is crucial to an organization. Hospitals can establish value systems, belief systems, and cultural systems that support a compassionate response to suffering. In addition, nurses can internalize altruistic belief systems into their own personal value systems through a long process of socialization in the workplace.

Although some studies have observed negative impacts of compassion such as compassion distress and compassion fatigue on nurses (Figley, 2002; Sabo, 2006), an increasing number of studies have emphasized that compassion at work is associated with numerous crucial positive outcomes for employees and organizations (Chu, 2016; Grant, Dutton, & Rosso, 2008; Lilius et al., 2008). Lilius et al. (2008) found that employees who receive compassion in the workplace are more likely to report positive emotions while at work, be affectively committed to their organization, and describe their coworkers and organizations in positive terms. Grant et al. (2008) revealed that the act of providing compassion can

strengthen employees' affective commitments to their organization by reinforcing their prosocial identities as caring individuals as well as the identity of the organization as caring. Chu (2016) also determined that hospital nurses receiving more compassion at work tend to have more positive moods and are therefore likely to perform more effectively and to engage in more organizational citizenship behaviors.

However, few empirical studies have examined whether providing compassion at work can improve the provider's job performance and mental health. The purpose of this study was to narrow the research gap on workplace compassion through an examination of

the effects of providing compassion on registered nurses' job performance and mental health in a workplace setting. This study also examined whether interpersonal relationship quality can moderate these effects.

Literature Review

EBSCOhost and Google Scholar were the main databases for searching for journals. Some of the key terms used in the applied search strategies were as follows: nurse, providing compassion, job performance, mental health, and interpersonal relationship quality. The reference lists of the reviewed articles were searched for potentially relevant titles or contents.

According to Watson's (1979) theory of human caring, nursing is considered as a therapeutic interpersonal process whose essence is framed around a philosophy and science of caring. Nurses take care of patients' physical needs as well as their psychological and spiritual needs. Love, compassion, and forgiveness from patients and nurses are very important in the caring and healing process (Watson, 2008). The concepts of care and compassion clearly provide information about not only the nurse-patient relationship, but also the interaction between nurses and their managers and colleagues.

Compassion is defined as a deeper sympathy for a person's suffering and the desire to help relieve his or her pain (Schantz, 2007). Others regard compassion as a dynamic process, which has been established on the perspectives of Clark (1997) and Davis (1983), and encompasses three elements, namely attention, feeling, and reaction. These three elements are naturally linked to one another and are engendered by employees' mutual interaction and ties. At the initiation of compassion, people first pay attention to the suffering of another person, followed by experiencing emotions similar to those experienced by the person who is suffering, and subsequently helping that person to ease the suffering being felt (Kanov et al., 2004).

Evidence of a compassionate response includes providing emotional support, offering tangibles such as a tissue or glass of water, or providing a colleague work flexibility (Lilius et al., 2008). Moreover, compassion affects members' attitudes and relational perceptions beyond alleviating suffering, possibly originating from supervisors, coworkers, or the organization (Lilius et al., 2008; Lilius, Kanov, Dutton, Worline, & Maitlis, 2012).

Relationship Between Providing Compassion and Job Performance

Alessandri, Caprara, Eisenberg, and Steca (2009) suggested that the experience of providing can enhance

feelings of self-efficacy as a capable contributor. Highly self-efficacious people are likely to be very capable of effectively and successfully using and generating resources in their work environment to complete demanding tasks (Schaubroeck & Merritt, 1997). Bandura (1986) determined that people with strong feelings of self-efficacy are more able to solve threatening and difficult situations compared to people with weak feelings of self-efficacy, implying that nurses who self-identify as highly efficacious are more likely to successfully solve conflict situations with patients or cope with the emotional demands of their job (Heuven, Bakker, Schaufeli, & Huisman, 2006). In other words, people who provide compassion to others may enhance their job performance by increasing their self-perceived levels of efficacy.

Providing compassion may also generate positive emotions and thereby affect the provider's job performance. Providing compassion may be interpreted as a critical affective event in the workplace that, once initiated, can engender additional positive emotions (Weiss & Cropanzano, 1996). When people provide compassion, the emotions they feel in their relationships with others are enhanced, resulting in positive emotions (Dutton, 2003). People with highly positive mood states exhibit improved job performance compared with those without highly positive mood states (Chu, 2016).

In summary, because positive outcomes such as feelings of self-efficacy and positive emotions are derived from providing compassion to others, the job performance of employees may be improved by providing compassion in the workplace.

Relationship Between Providing Compassion and Mental Health

Female nurses are prone to more mental health problems compared with other healthcare workers because nurses work night or irregular shifts more often than other workers and are required to develop professional skills to enhance the quality of their care (Suzuki et al., 2004). Studies have associated nurses' mental health problems with job dissatisfaction (Ruggiero, 2005) and turnover intention (Zhang, Punnett, Gore, & CPH-NEW Research Team, 2014). Thus, improving the state of nurses' mental health is crucial.

Mental health was defined by the U.S. Public Health Service (1999) as "... a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with people, and the ability to adapt to change and to cope with adversity" (p. 4; see also Keyes, 2005). In the past, mental health was presumed to be the opposite of mental illness; thus, the absence of mental illness equals the presence of mental health (Chu, 2014).

However, many individuals who are free of mental disorders do not feel healthy or do not function adequately. Mental health has been alleged to be a complete state consisting of not merely the absence of mental illness but the presence of some positive mental function (Keyes, 2005).

Providing compassion may improve mental health by fulfilling basic human needs such as autonomy and social relatedness. According to self-determination theory (Ryan & Deci, 2000), people have fundamental psychological needs for autonomy, competence, and social relatedness. Ryan and Deci posited that the fulfillment of such essential psychological needs within a given context contributes to well-being, whereas the thwarting of such needs leads to ill-being.

Weinstein and Ryan (2010) claimed that the degree to which prosocial helping behaviors are volitional or autonomous predicts the effect of such behaviors on a helper's well-being. In addition, engaging in compassionate behavior at work has implications for how connected individuals feel to their organization and work colleagues (Lilius et al., 2012). When people experience greater satisfaction of their need for social relatedness, they exhibit greater psychological wellness, whereas when satisfaction of the need for social relatedness has been thwarted, people display signs of ill-being (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011).

As indicated by Lilius et al. (2008), providing compassion generates an increase in positive emotions. In a meta-analysis of longitudinal studies, Lyubomirsky, King, and Diener (2005) indicated that positive emotions are associated with improved mental health. In summary, because positive outcomes such as feelings of autonomy, social relatedness, and positive emotions are derived from providing compassion to others, the mental health of employees may be improved by providing compassion in the workplace.

Moderating Effect of Interpersonal Relationship Quality on the Relationships of Providing Compassion With Job Performance and Mental Health

Strategies for effectively moderating the relationships of providing compassion with job performance and mental health have become a salient topic for healthcare management. A relatively high quality of an interpersonal relationship is advantageous in perceiving the suffering that a colleague is experiencing (Dutton et al., 2002). The quality of connections between colleagues facilitates determining whether sufficient trust exists (Dutton, Spreitzer, Heaphy, & Stephens, 2010). Furthermore, the inner sense of security is affected (Dutton & Heaphy, 2003).

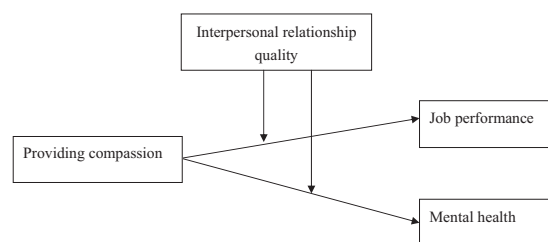


Figure 1. The conceptual framework of impact of providing compassion on job performance and mental health: the moderating effect of interpersonal relationship quality.

With sufficient trust and a sense of security, those experiencing difficulty are relatively more willing to discuss their suffering, thus increasing the speed at which others can understand their situation (Lilius et al., 2012). When the ties between work colleagues are of high quality, people are likely to be more emotionally attached to each other (Kahn, 1998), thereby facilitating noticing, feeling, and acting toward those who are suffering (Lilius, 2012; see also Dutton et al., 2014). We predict that the stronger the quality of interpersonal relationships, the stronger the willingness and opportunity to provide compassion. Thus, the positive relationships between providing compassion and job performance and mental health are strengthened.

From the preceding review of the literature, we propose the following hypotheses:

Hypothesis 1: Providing compassion positively predicts job performance.

Hypothesis 2: Providing compassion positively predicts mental health.

Hypothesis 3: Interpersonal relationship quality moderates the relationship between providing compassion and job performance, such that the positive association between providing compassion and job performance is stronger for employees who have high-quality interpersonal relationships than for those who have low-quality interpersonal relationships.

Hypothesis 4: Interpersonal relationship quality moderates the relationship between providing compassion and mental health, such that the positive association between providing compassion and mental health is stronger for employees who have high-quality interpersonal relationships than for those who have low-quality interpersonal relationships.

Conceptual Framework

Figure 1 illustrates the overall conceptual framework. Provision of compassion was the independent variable,

job performance and mental health were the dependent variables, and interpersonal relationship quality was the moderating variable. We hypothesized that staff with higher rates of providing compassion had higher job performance and better mental health. We also hypothesized that the positive associations of providing compassion at work with job performance and mental health were stronger for employees with high-quality interpersonal relationships.

Methods

Measurement

The Providing Compassion Scale. To measure the provision of compassion to others, this study adopted the five-item compassion scale developed by Lilius et al. (2003), which was adapted appropriately to the context. The scale included the following item: "While working, I often provide my peers the strength of compassion." A 6-point Likert scale was adopted, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). A higher score denotes the ability to provide a relatively high amount of compassion to others. Evidence of criterion validity was collected from a sample of 269 registered nurses employed by hospitals in Taiwan (Chu, 2016). Cronbach's α values for Chu's (2016) study and the current study were .86 and .90, respectively.

Interpersonal Relationship Quality Scale. To measure interpersonal relationship quality, this study adopted the 10-item high-quality relationship scale developed by Carmeli and Gittell (2009), which measures shared goals, shared knowledge, and mutual respect. The scale included the following item: "Mutual respect is at the basis of our relationships in this organization."

This study adopted the 10-item relationship quality scale developed by May, Gilson, and Harter (2004), in addition to the aforementioned scale, for the measurement of rewarding coworker relations. The scale included the following item: "This coworker values my input." Evidence of reliability and criterion validity was collected from a sample of 652 employees from the largest express transportation company in Taiwan (Cheng, Chang, Kuo, & Lu, 2014).

Thus, the interpersonal relationship quality scale in our study comprised 20 items. Each item is rated on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). A higher score denotes relatively high interpersonal relationship quality. Cronbach's α for the current study was 0.94.

Job Performance Scale. We measured job performance by using a four-item scale developed by

Podsakoff, Todor, and Skov (1982). Employees evaluated their job performance, which included performing more work than required and the effectiveness of time spent performing work. The developers of the questionnaire determined that the reliability of the scale was high (Cronbach's $\alpha = 0.93$). Evidence of reliability and criterion validity was collected from a sample of 250 leader-subordinate dyads drawn from the Ministry of Communication of Taiwan (Farh, Podsakoff, & Cheng, 1987). We also implemented a one-item scale (i.e., "My supervisor thinks my work is outstanding") that was developed by Ashford, Rothbard, Piderit, and Dutton (1998). Thus, the job performance scale in our study comprised five items. A 6-point Likert scale was adopted, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*), with high scores indicating high job performance. Cronbach's α for the current study was .88.

Mental Health Scale. We measured mental health according to the Lu, Kao, Cooper, and Spector (2000) short-form Chinese version of the Occupational Stress Indicator (OSI). The mental health scale has 12 items that measure contentment, resilience, and peace of mind. The scale included the following item: "Do you feel annoyed for no apparent reason on your usual workdays?" This 6-point Likert scale ranges from 6 (*strongly disagree*) to 1 (*strongly agree*), with higher scores representing improved mental health. The reliability of the Chinese version of the OSI was acceptable (Cronbach's $\alpha = 0.81$). Evidence of criterion validity was collected from a sample of 347 Taiwanese managers working for various types of organizations (Lu et al., 2000). Cronbach's α for the current study was 0.89.

Control variables. Previous studies showed that such demographic variables as marital status, age, educational level, position, and organizational tenure influence job performance or mental health (Chu, 2016; Su, Weng, Tsang, & Wu, 2009). We controlled for these before measuring the predictive effect of providing compassion at work on the outcomes of interest. Marital status and position variables are set dummy variables (1 = unmarried, 2 = married; 1 = basic nurse, 2 = head nurse, respectively), and age, educational level and organizational tenure are set continuous variables.

Sample and Data Collection

We used convenience sampling and distributed 300 survey questionnaires to registered nurses in two medical centers, two regional hospitals, two district hospitals, and three clinics in Taiwan in two stages. In accordance with the Ethical Considerations, the protocol for this

research was approved by the Institutional Review Board at Chung Shan Medical University Hospital, Taiwan (No. CS12199).

This study required participants to complete a two-stage survey, and these surveys were distributed in hard copy form. Prior to distributing the first questionnaires, we conducted telephone surveys to request whether nursing heads or administrative managers at the target hospitals who graduated from our department would be willing to distribute the questionnaires to their female nursing colleagues, and we concurrently explained the study's purpose and the sampling process. Anonymous questionnaires were used to reduce the pressure that the respondents might have felt. We only requested that the nursing heads and administrative managers leave the same recognizable mark on the upper-right corner of both questionnaires to ensure the consistent coding of individual respondents, which was necessary for future compilation.

Participants were required to answer the surveys within a week of receiving the questionnaires and then to place the completed questionnaires in the envelope attached, and seal the envelope. The individually sealed envelope was then handed over to her nursing head or administrative manager. The data gathering process was similar in two survey rounds. Finally, nursing heads and administrative managers nailed together two questionnaires from the same person and return them to the researcher. No one but the researcher had access to the hard copy questionnaires and those questionnaires were securely stored. All information will be reported as grouped data with no individual information given. The code list was destroyed once all the data was collected and analyzed.

The first-stage survey was intended to determine the participants' degree of provided compassion, the quality of their interpersonal relationships, and their demographics. A total of 263 valid questionnaires were returned. The second questionnaire was distributed to the same respondents 2 months after the first questionnaire. The second-stage survey was administered and measured the participants' job performance and mental health. A total of 241 valid questionnaires were returned. Cases without complete matched data between the two time points were removed from the study. The final sample size consisted of 235 nurses, representing a valid response rate of 78%.

All of the participants were registered nurses; the majority was aged between 31 and 40 years (54.5%), 60% were married, 57.4% had a college-level education, 42.6% had received organizational tenure within the past 5 years, 88.1% were basic nurses, and 40% worked in a district hospital.

Table 1. Descriptive Statistics and Intercorrelations Among Study Variables

Variable	1	2	3	4
1. Providing compassion	(.90)			
2. Relationship quality	.52**	(.94)		
3. Job performance	.41**	.39**	(.88)	
4. Mental health	.37**	.36**	.29**	(.89)
Mean	4.49	4.32	4.25	3.86
SD	0.71	0.67	0.86	0.87

Note. Cronbach's alphas appear on the diagonal. * $p < .05$; ** $p < .01$

Results

The nurses assessed their levels of providing compassion to be moderate (mean 4.49, SD 0.71, range = 2.00–6.00, scale 1 to 6, where 6 = *strongly agree* and 1 = *strongly disagree*). The mean scores for relationship quality and job performance were also determined to be moderate (mean 4.32, SD 0.67, range = 2.45–5.75; mean 4.25, SD 0.86, range = 1.40–6, respectively; scale 1 to 6, where 6 = *strongly agree* and 1 = *strongly disagree*). Moreover, nurses' assessment of mental health was determined to be moderate (mean 3.86, SD 0.87, range = 1.42–6; scale 1 to 6, where 6 = *strongly disagree* and 1 = *strongly agree*).

The internal-consistency reliability coefficients are along the main diagonal in **Figure 1** and indicate that all of the measurements had acceptable internal consistency, with Cronbach's alpha scores being 0.90 (5 items) for providing compassion, 0.94 (20 items) for interpersonal relationship quality, 0.88 (5 items) for job performance, and 0.89 (12 items) for mental health.

Correlation analysis (**Table 1**) demonstrated that significant correlations exist among providing compassion, interpersonal relationship quality, job performance, and mental health. Providing compassion was significantly positively correlated with interpersonal relationship quality ($r = 0.52$; $p < .01$), job performance ($r = .41$; $p < .01$), and mental health ($r = .37$; $p < .01$); whereas interpersonal relationship quality was significantly positively correlated with job performance ($r = .39$; $p < .01$) and mental health ($r = .36$; $p < .01$).

We tested Hypotheses 1, 2, 3, and 4 through hierarchical regression. The results are shown in **Table 2**. To eliminate problematic multicollinearity effects between the independent variable and the moderator, we centered these variables before testing the significance of the interaction term (Aiken & West, 1991).

For the first step, we used the control variables to account for a significant portion of the variance in job performance (9%) and mental health (13%). Both organizational tenure and position positively predicted job performance ($\beta = .19$, $p < .05$; $\beta = .20$, $p < .01$,

Table 2. Results of Regression Analyses on the Job Performance and Mental health

Dependent variables	Job performance				Mental health			
	step 1 Beta	step 1 Beta	step 3 Beta	step 4 Beta	step 1 Beta	step 2 Beta	step 3 Beta	step 4 Beta
Marital status	-.06 (-0.82)	-.09 (-1.36)	-.12 (-1.79)	-.12 (-1.80)	.24 (3.41)**	.21 (3.18)**	.19 (2.90)**	.19 (2.94)**
Age	-.00 (-0.05)	-.04 (-0.44)	-.03 (-0.38)	-.04 (-0.47)	.03 (0.37)	.01 (0.09)	.01 (0.16)	.01 (0.08)
Educational level	.02 (0.28)	.01 (0.13)	.01 (0.14)	-.00 (-0.02)	-.01 (-0.11)	-.02 (-0.24)	-.02 (-0.24)	-.02 (-0.39)
Organizational tenure	.19 (2.23)*	.14 (1.71)	.13 (1.75)	.13 (1.70)	.14 (1.66)	.10 (1.21)	.10 (1.22)	.09 (1.17)
Position	.20 (3.01)**	.16 (2.46)*	.16 (2.65)**	.15 (2.46)*	.10 (1.54)	.07 (1.03)	.07 (1.14)	.06 (0.97)
z providing compassion		.37 (6.01)**	.24 (3.54)**	.28 (4.05)**		.28 (4.55)**	.18 (2.51)*	.21 (2.96)**
z relationship quality			.26 (3.84)**	.28 (4.25)**			.22 (3.19)**	.24 (3.54)**
z providing compassion × z relationship quality				.16 (2.62)**				.14 (2.35)*
R ²	.09	.22	.26	.29	.13	.21	.24	.26
Adjusted R ²	.07	.19	.24	.26	.12	.19	.22	.23
ΔR ²	.09**	.12**	.05**	.02**	.13**	.07**	.03**	.02*
F	4.57**	10.40**	11.57**	11.24**	7.09**	9.86**	10.25**	9.83**

Note. Marital status 1, unmarried; 2, married; position 1, Basic nurse; 2, Head nurse; N = 235, P < 0.05, **P < 0.01

respectively), whereas marital status positively predicted mental health ($\beta = .24, p < .01$). This result means that longer tenured nurses had higher job performance than those with shorter tenure, whereas head nurses had higher job performance than that of nurses in nonmanagement positions. Married nurses had better mental health than that of unmarried nurses.

Providing compassion was added to the regression model for the second step. The results showed that providing compassion accounted for an additional 12% of the variance in job performance at the statistical significance level of $p < .01$ and an additional 7% of the variance in mental health at $p < .01$. Additionally, providing compassion positively predicted job performance ($\beta = .37, p < .01$) and positively predicted mental health ($\beta = .28, p < .01$). This result means that staff with higher rates of providing compassion had higher job performance and better mental health than did those with lower rates. These findings provide support for Hypotheses 1 and 2.

For the third step, interpersonal relationship quality was added to the regression model. The results showed that interpersonal relationship quality accounted for an additional 5% of the variance in job performance at $p < .01$ and an additional 3% of the variance in mental health at $p < .01$. Additionally, interpersonal relationship quality positively predicted job performance ($\beta = .26, p < .01$) and positively predicted mental health ($\beta = .22, p < .01$).

This result means that nurses with higher interpersonal relationship quality had higher job performance and better mental health than did those with lower interpersonal relationship quality.

We tested Hypotheses 3 and 4 by examining the incremental contribution of the cross-product of providing compassion and interpersonal relationship quality to job performance and mental health after controlling for the control variables, predictor variable, and moderator. For the fourth step, the multiplicative term of providing compassion and interpersonal relationship quality was added to the regression model. The results showed that the moderated interaction term accounted for an additional 2% of the variance in job performance at $p < .01$ and 2% of the variance in mental health at $p < .05$, where the interaction of providing compassion and interpersonal relationship quality positively predicted job performance ($\beta = .16, p < .01$) and positively predicted mental health ($\beta = .14, p < .05$). We assessed the nature of this significant interaction by plotting values representing plus and minus 1 standard deviation from the means for interpersonal relationship quality.

The differential effect of high and low interpersonal relationship quality on the relationship between providing compassion and job performance is shown in **Figure 2**. The impact of providing compassion on job performance was stronger ($\beta = .53, p < .01$) for

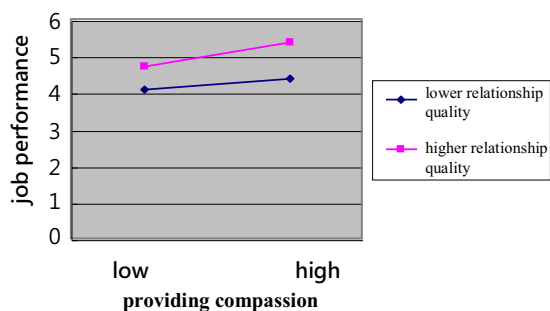


Figure 2. The moderating effect of relationship quality on the relationship between providing compassion and job performance.

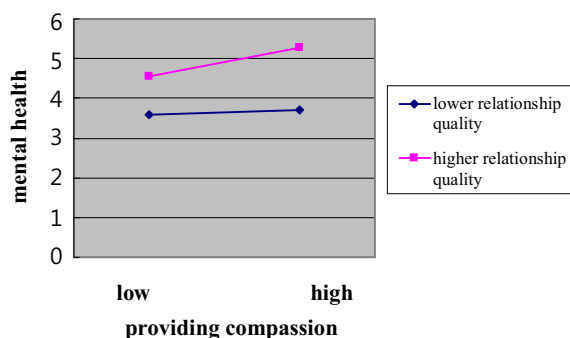


Figure 3. The moderating effect of relationship quality on the relationship between providing compassion and mental health.

employees who reported a higher interpersonal relationship quality than for those who reported a lower interpersonal relationship quality ($\beta = .34, p < .01$). Therefore, interpersonal relationship quality effectively moderates the relationship between providing compassion and job performance. This finding supports Hypothesis 3.

The differential effect of high and low interpersonal relationship quality on the relationship between providing compassion and mental health is shown in **Figure 3**. The impact of providing compassion on mental health was stronger ($\beta = .43, p < .01$) for employees who perceived a higher interpersonal relationship quality than for those who perceived a lower interpersonal relationship quality ($\beta = .11, p > .05$). This result means that interpersonal relationship quality effectively moderates the relationship between providing compassion and mental health. This finding supports Hypothesis 4.

Discussion

This study expands the existing literature by empirically examining whether providing compassion can predict the job performance and mental health of a provider, in addition to determining whether

interpersonal relationship quality can moderate the relationships of providing compassion with job performance and mental health. Chu (2016) found that nurses who receive compassion from their colleagues can perform more effectively. Conversely, the current study determined that nurses who often provide compassion to their suffering colleagues have improved job performance. The current study also found that nurses who often provide compassion to their suffering colleagues have improved mental health compared with nurses who do not. Previous studies have indicated that compassion fatigue is prevalent in nurses employed in hospitals (Figley, 2002; Sabo, 2006); however, our study revealed that the provider may experience an improvement in mental health because of the fulfillment of basic human needs such as autonomy, social relatedness (Ryan & Deci, 2000), and positive emotions (Lilius et al., 2008).

The current study also determined that interpersonal relationship quality can effectively moderate the relationships of providing compassion with job performance and mental health. Compared with those with poor-quality interpersonal relationships, people with high-quality interpersonal relationships exhibit not only a strengthened positive relationship between providing compassion and job performance, but also a strengthened positive relationship between providing compassion and mental health. In other words, when nurses have healthy interpersonal relationships in the workplace, they are more willing to provide compassion to their suffering colleagues; consequently, such nurses are likely to perform more effectively and have improved mental health. This finding supports previous studies' claims that interpersonal relationship quality benefits the development of providing compassion (Dutton et al., 2002; Lilius et al., 2012).

In addition, the instrument scores were largely moderate despite the adoption of a 6-point Likert scale in this study. However, the respondents may be inclined to respond moderately on the surveys, according to the traditional Chinese cultural doctrine that encourages "moderation" in thought (Chiu & Yang, 1987).

This study had several limitations. One limitation was that the study did not control for other factors (i.e., positive moods) that may be related to employees' job performance and mental health (Chu, 2016; Lyubomirsky et al., 2005). Therefore, future studies on the relationships of providing compassion with job performance and mental health should attempt to rule out the effects of other variables.

A second limitation was that this study used convenience sampling, and the sample size was small; therefore, our findings may not be generalizable to all nurses who experience compassion at work. Randomized

sampling with a larger sample should be conducted in the future.

A third limitation was that this study focused on providing compassion to work colleagues in need and determined that nurses who are willing to provide compassion to fellow employees in need could perform their jobs more effectively. However, the performance variable in our theoretical model was measured by the nurses themselves, indicating that some of the reported relationships in the proposed model may be inflated because of social desirability response bias. Nevertheless, an effort was made to measure this variable by using sources other than the nurses themselves, which could have reduced the effects of this bias.

A fourth limitation was that although this study's theoretical arguments and two-stage design support the relationships in this model, this causality may be more firmly established in a follow-up study that applies the same instruments with an experimental design to determine whether changes in providing compassion engender an actual change in performance and mental health outcomes.

A fifth limitation was that the scale of mental health used in this study may not provide the most complete measure of mental health; therefore, future research can explore additional aspects of a positive state of mental health (such as hedonic and eudemonic aspects, positive affect, and satisfying interpersonal relationships). Future studies can also integrate the absence of mental illness and a positive state of mental health to understand mental health more comprehensively; thus, the relationship between providing compassion and mental health can be further elucidated.

This study also demonstrated that providing compassion can enhance nurses' job performance and mental health; however, the intricacies embedded within these mechanisms are not yet fully understood. Future research may explore the mediating processes linking the provision of compassion to job performance and mental health.

Clinical Implications

Compassion is not only the essence of nursing, but also a quality that should be inherent in all nurses (Sadler, 2004). However, the daily pressures in a workplace caused by both unimportant and major occurrences as well as demands for efficiency can result in people's value being neglected (Hallowell, 1999), leading to a reduction in the extent to which employees pay attention

to, listen to, and help their suffering colleagues. This indifference, lack of support, or compassion is not only a primary reason for registered nurses to leave clinical nursing (MacKusick & Minick, 2010), but also harmful to job performance and mental health. In the context in which the provision of compassion is hindered, motivating employees to spontaneously exhibit compassion is critical for the organization.

Condon, Desbordes, Miller, and DeSteno (2013) found that meditation can increase spontaneous compassionate responses to another person's suffering. Hallowell (1999) has suggested that an organization can create a respite space or encourage humane moments to help employees alleviate their suffering. Specific practices include providing a private office where problems can be discussed, granting a day off for respite from suffering, offering a hug, sharing a story of vulnerability, or offering a card with a few words of comfort (Hallowell, 1999). Grant et al. (2008) determined that employees donating money to an organizational fund that helps employees in need reinforced the degree to which employees acquired a prosocial identity of caring for others. A prosocial identity is particularly crucial for promoting prosocial behavior. Research has revealed that when people view themselves as benefactors and these core values are salient, people increase their commitment to helping and giving (Grant et al., 2008; Grant & Dutton, 2012).

In addition, a hospital can establish value systems, belief systems, and cultural systems that support a compassionate response to suffering. Nurses can internalize altruistic belief systems into their own personal value systems through a long process of socialization in the workplace. For example, Chen Yen established the Tzu Chi Hualien hospital in Taiwan. The purpose of this hospital is to provide medical services to poor and ill people who have previously been neglected. Chen Yen asked hospital staff to provide equal attention to the spiritual and psychological health of their patients in addition to their physical condition. All staff members at this hospital are encouraged to contribute their time or money to help suffering or poor people. This humanist and compassionate culture is cultivated based on hospital teamwork. Therefore, the hospital chiefs are expected to participate in volunteer activities such as cleaning the homes of poor people (O'Neill, 2010). Compassion behaviors from the leader can reinforce values that can help people understand that noticing suffering is appropriate.

According to the results of this study, hospitals can change the climate of compassion provision through the creation of high-quality interpersonal relationships in the workplace. The quality of interpersonal relationships affects not only the likelihood of a compassionate response occurring but also the effectiveness of the response

including its speed, scope, scale, and appropriateness (Dutton et al., 2002, 2006). As a finding of this study, the greater the relationship between nurses and patients, the more effective the nurse responses of compassion are to patients, which enhances patient satisfaction as well as nursing care quality.

Conclusions

Nurses who often provide compassion to suffering colleagues have enhanced job performance and improved mental health. Creating high-quality interpersonal relationships in the workplace can effectively strengthen the positive benefits of providing compassion for both job performance and mental health.

Acknowledgments

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Clinical Resources

- Compassion Lab: <http://www.thecompassionlab.com>
- Mentally Healthy Workplace Network: <http://www.headsup.org.au/general/about-us>
- The Center for Positive Organizations: <http://www.positiveorgs.bus.umich.edu/an-introduction>

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