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Table of Contents

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Nociceptive and Neuropathic Pain Qualities in Men and Women with Acute Coronary Syndromes: A Complex Pain Presentation

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Abstract

Background: Cardiac pain arising from acute coronary syndrome (ACS) is a multi-factorial phenomenon. Historically, episodes of cardiac pain have been captured using a one-dimensional numeric pain rating scale. Lacking in clinical practice are acute pain assessments that employ a comprehensive evaluation of an emergent ACS episode. **Aim:** To examine the sensory-discriminative, motivational-affective and cognitive-evaluative dimensions of ACS-related pain. **Methods:** A descriptive-correlational, repeated-measure design was used to collect data on 121 ACS patients of their cardiac pain intensity. The (numeric rating scale-NRS 0-10 scale) measured chest pain "Now" and "Worst pain in the previous 2 hours over 8 hours" and the McGill Pain Questionnaire Short-Form (MPQ-SF) measured pain at 4 hours. **Results:** Mean age was 67.6 ± 13, 50% were male, 60% had unstable angina and 40% had Non-ST-elevation myocardial infarction. Cardiac pain intensity scores remained in the mild range from 1.1 ± 2.2 to 2.4 ± 2.7. MPQ-SF: 66% described pain as distressing and 26% reported pain was horrible or excruciating. Participants described ACS pain quality as acute injury (nociceptive pain: *heavy, cramping, stabbing*), as nerve damage (neuropathic: *gnawing, hot-burning, shooting*) and as a mixture of acute and chronic pain qualities (*aching, tender and throbbing*). **Conclusions:** Patients reported both nociceptive and neuropathic cardiac pain. It is unclear if pain perceptions are due to: i) pathophysiology of clot formation, ii) occurrence of a first or repeated ACS episode, or iii) complex co-morbidities. Pain arising from ACS requires an understanding of the interplay of ischemic, metabolic and

neuropathophysiological mechanisms that contribute to complex cardiac pain experiences.

Keywords

Acute Coronary Syndromes, Nociceptive Pain, Neuropathic Pain, Pain Descriptors, Emergency Department

1. Introduction

Complex cardiac pain presentations are problematic for patients to recognise and for clinicians to differentially diagnose as an acute coronary syndrome (ACS). "Excruciating, debilitating, throbbing, pressing, sickening; an aching kind of deep pain" have been used to describe acute chest pain experienced by individuals suffering an anginal episode or a seminal heart attack [1]. Cardiac-related pain arising from narrowed or blocked heart arteries (coronary artery disease [CAD]), resulting in myocardial ischemia, is individual and varies within a spectrum of unique symptom presentations. As is with other types of pain, cardiac pain is subjective and complex in nature and encompasses sensory-discriminative, motivational-affective, and cognitive-evaluative components [2]. Specific to the individual, these components are interconnected and sub-served by certain areas in the brain (*i.e.*, spinal cord, reticular, frontal, cortical areas), which in turn, add to the overall patient experience and perception of cardiac pain [3] [4] [5] [6].

Current understanding of myocardial ischemia and the individual perception of cardiac pain has been informed by pain science and observations from clinical research and practice [1] [3] [4] [5] [6] [7]. Myocardial ischemia results from the development of atherosclerotic plaque build up that blocks blood flow through the epicardial arteries, compromising supply of rich oxygenated, nutrient saturated blood to the heart [8] [9]. At the tissue level, lack of blood supply triggers activation of the sympathetic and vagal afferent nociceptive pain fibres [8] [9]. The individual experience of cardiac pain is complicated and relates to the cumulative effect of myocardial oxygen supply and demand imbalance, the pain mechanisms involved in the neuro-modulation of painful stimuli at the levels of the neuroaxis, peripheral nerves, spinal cord and brain [7] and changes in neuro-plasticity that occur at the peripheral and central levels resulting in central sensitization [4] [5] [6] [10].

Historically, chest pain intensity in clinical practice has been measured with one-dimensional tools such as the numeric pain rating scale (NRS) or the visual analogue scale (VAS). This limitation precludes the ability to assess and evaluate cardiac pain comprehensively and identify the various dimensions of an acute cardiac pain experience. Therefore, the purpose of this secondary analysis was to examine the sensory-discriminative, motivational-affective and cognitive-evaluative dimensions of an ACS-related pain episode.

2. Methods

2.1. Subjects/Setting

Secondary analysis was conducted on 121 ACS adult men and women, admitted to a community ED in south-eastern Ontario, Canada, for report of cardiac pain during an ACS episode. The parent study examined the relationship of pain management practices and nurses' pain knowledge and attitudes on ACS patients cardiac pain intensity and level of state anxiety, in a descriptive-correlational, repeated measures design over the first 8 hours of an ED admission [11]. Of note: this study was conducted prior to the initiation of CODE STEMI protocol within South-East-Ontario, wherein patients would routinely wait 24 - 36 hours before transfer to a tertiary cardiac center for diagnostic angiogram [12] [13].

Patients were included if they met the following inclusion criteria:1) diagnosed with unstable angina (UA) or non-ST-elevation myocardial infarction (NSTEMI); 2) Canadian Triage Acuity Scale Score of 2 (indicative of an emergent status and required assessment within 15 minutes of emergency department (ED) triage) [14]; and 3) able to speak, read and comprehend English. Additionally, eligibility criteria included cardiac chest pain of more than 20 minutes in duration and/or pain described using angina equivalent pain descriptors (*i.e.* nausea, vomiting, shortness of breath, dizziness, fatigue, chest tightness, syncope, diaphoresis), and electrocardiogram changes (ST depression or elevation) in one or more leads. Patients were excluded if they were diagnosed with ST-elevation myocardial infarction [STEMI] (emergent-requiring immediate triage and transfer within 2 to 6 hours for reperfusion percutaneous coronary intervention; had recent sternotomy for coronary artery bypass grafting, or valve replacement (as it may confound the acute pain intensity outcome, should they develop persistent post-operative pain); or if they were unable to consent verbally and in writing.

2.2. Data Collection

After initial triage and stabilization, registered nurses (RNs) working in the ED as team leaders, acted as recruitment champions identified potential patient participants to the primary investigator [PI] (SOM). Eligibility was confirmed by the PI; patients were approached and provided with a verbal and written explanation of the study. Once the consent was signed, demographic data were completed at baseline with follow-up every two hours for a total of 4 repeated measurements of cardiac pain intensity in the moment "now" and the "worst cardiac pain intensity in the previous 2 hours from follow-up". In order to capture a more thorough and comprehensive understanding of cardiac pain, at the 4-hour mark, cardiac pain was measured using the McGill Pain Questionnaire-Short-form (MPQ-SF) [2]. At the conclusion of the 8-hour study, participants' health care records were reviewed to complete and verify accurate documentation of the sociodemographic, medical history and clinical variable data.

2.3. Measurement Instruments

Numeric Rating Scale: Cardiac pain intensity was measured every two hours from

baseline with the numeric rating scale (NRS). This 11-point numeric scale measures the intensity of the pain where zero indicates no pain, 1 - 3 mild, 4 - 6 moderate and 7 - 10 severe cardiac pain intensity. The NRS has well established reliability, construct validity, and concurrent validity in cardiovascular, non-ED and ED populations [2] [15] [16] [17] [18] [19]. Concurrent validity has been evidenced by strong correlations between the NRS and visual analog scale (VAS) [15].

McGill Pain Questionnaire-Short Form (MPQ-SF) [2]: The MPQ-SF is a comprehensive pain measure with well-established reliability, validity, sensitivity, and discriminative capacity in both acute and chronic pain populations [20] [21] [22] [23] [24]. The MPQ-SF is a multidimensional pain inventory and includes items that assess the three psychological dimensions of the pain experience: sensory-discriminative, motivational-affective and cognitive-evaluative [2]. The three dimensions of pain are derived from a list of pain descriptors including a pain rating index (PRI), the visual analogue scale (VAS), and the present pain intensity (PPI) [2] [25]. The PRI is based on the rank value of words chosen among 4 subscales that describe sensory, affective, evaluative, and miscellaneous aspects of pain. The PRI of 15 verbal descriptors rated on a 4-point intensity scale (each value of descriptor is based on its position in the word set) were summed to obtain scores for sensory (1 - 11) and affective (12 - 15) quality of pain [2] [25].

Overall pain intensity was measured by the MPQ-SF present pain intensity (PPI). The PPI is the number-word combination chosen as the indicator of the overall pain intensity with a range of 0 to 5. Reported alpha coefficients for the PRI subscales are (0.78) sensory, (0.71) affective, (0.47) evaluative, and (0.82) for the total PRI. Correlation coefficients between PPI and PRI subscales were (0.90) sensory, (0.82) affective, (0.96) evaluative and (0.92) miscellaneous. For the purpose of the parent study, the VAS in the MPQ-SF was replaced with the NRS, an equally valid and reliable self-report pain measurement tool [21].

2.4. Data Analysis

SAS software 9.2 was used to analyse these data (SAS, 2009) [26]. A sample of 150 was projected as necessary to detect correlations of medium size (0.3) with 90% power and a two-sided alpha (0.05), accounting for a design effect of at least three measurements per patient and multiple patients per nurse and 25% loss to follow up. Descriptive statistics were computed (means and standard deviations for continuous variables, frequencies and proportions for categorical variables) for pre-hospital, baseline sociodemographic and clinical characteristics and the sensory and affective descriptions of cardiac pain.

3. Results

Acute Coronary Syndrome Participants: A total of 191 potential participants were approached to participate in the study. Of those, 121 consented and were enrolled; 70 were excluded (47 did not meet inclusion criteria and 23 people refused). The acceptance rate was 63%. Attrition rate was conceptualized as those patients who did not have at least one repeated measure opportunity beyond baseline. Four

per cent were lost to follow-up as 5 ACS patients did not complete at least one repeated measure. Table 1 and Table 2 provide descriptions of the pre-hospital profile and sociodemographic characteristics of the ACS sample, respectively. Women and men had equal representation, mean age was 67.6 ± 13 years, 66.1% (n = 81) were married, with 60.3% of the sample were retired (n = 73) and 97.5% were Caucasian. Most reported at least one co-morbidity (*i.e.*, hypertension 61.2%; hyperlipidemia 58.7%). Of the 121 enrolled, 59.5% (n = 72) were diagnosed with UA and 40.5% (n = 49) with NSTEMI.

Cardiac Pain Intensity: Over the 8 hours of the study, patients reported cardiac pain in the moment "Now" and the "Worst pain in the last two hours from follow up" in the mild range. At baseline, the mean chest pain score (NRS) was 2.0 ± 2.4. Over five consecutive measurement times, at two hour increments, cardiac pain intensity "now" ranged from 0.63 ± 1.6 to 1.1 ± 2.1 and the mean worst pain in the previous 2 hours ranged from 1.1 ± 2.2 to 2.4 ± 2.7.

The Present Pain Intensity Scale, contained in the MPQ-SF, measured pain intensity at the four-hour mark rating pain of 0 - 5 with 0 = no pain, 1 = mild pain, 2 = discomforting pain, 3 = distressing pain, 4 = horrible pain and 5 = excruciating pain. Sixty-six percent of the sample described their pain as discomforting and distressing which equates with a moderate level of pain. For 26% of the ACS patients, global chest pain at four hours into an acute ED admission was

Table 1. Sociodemographic characteristics of ACS sample (n-121).

Demographics	Level		
Mean Age, y (SD)	M/F	67.6	(13)
		n	(%)
Sex	Female	58	(47.9)
	Male	63	(52.1)
Marital Status	Single	16	(13.2)
	Married	81	(66.1)
	Widowed	25	(20.7)
Employment Status	Full time	21	(17.4)
	Part time	5	(4.1)
	Retired	73	(60.3)
	Unemployed/Disability	3	(2.5)
	Other	19	(15.7)
Education	Less than High School	43	(35.5)
	High School	38	(31.4)
	College/University	40	(31.7)
Racial Group	Caucasian	118	(97.5)
	Other	3	(2.4)
Smoker	Never smoked	30	(24.8)
	Non-smoker for one year or longer	70	(57.9)
	Current smoker	21	(17.3)
ACS	Unstable Angina	72	(59.5)
	Non-STEMI	49	(40.5)

Note: M = Mean; Other = Self Employed, SD = Standard Deviation.

Table 2. Pre-hospital profile and clinical characteristics of ACS participants.

Characteristic	n	%
Pre-Admission Profile		
Worst Chest Pain Severity 2 hours pre-hospital admission *M* (SD)	6.4	(2.6)
Medications		
ACE inhibitor/Angiotension receptor blockers/Renin Inhibitor	61	50.8
Anticoagulant/Antiplatelets	90	75.6
Anti-arrhythmic	13	10.8
β-Blockers	70	58.3
CA/NA Channel Blockers	12	10
Lipid Lowering Agents	71	59.2
Diuretic	37	30.8
Analgesic/Opioids	22	18.3
Other (proton pump inhibitor, H_2 receptor antagonists, insulin/oral diabetic agents)	23	19.5
Medical History		
Diabetes	31	25.8
Hypertension	74	61.2
Heart Failure	11	9.1
COPD	28	23.1
Peptic Ulcer/Esophageal Reflux	34	28.1
Liver Disease	8	6.6
Thyroid Condition	18	14.9
Persistent Pain Syndrome	49	40.5
Hyperlipidemia	71	58.7

Note: ACE = Angiotension Converting Enzyme, ACS = Acute Coronary Syndrome, β = Beta, CA = Calcium, COPD = Chronic Obstructive Lung Disease, H_2 = Histamine Parietal Cell Receptor, NA = Sodium, M = Mean, SD = Standard Deviation.

reported as horrible or excruciating; this corresponds to severe pain intensity levels (See Table 3).

Sensory and Affective Descriptors of Cardiac Pain: Men and women in this study described their cardiac pain using a mixture of neuropathic (indicative of nerve damage-chronic pain) and nociceptive (related to acute injury) pain qualities early during the first eight hours of an emergent ACS episode. The sensory descriptors included: "heavy" 57.3% (n = 63), "cramping" 34.6% (n = 38), "sharp" 30% (n = 33), "stabbing" 21.8% (n = 24); all acute pain descriptors. Patients described their pain as "aching" 35.4% (n = 39), "tender" 18.1% (n = 20), "throbbing" 14.6% (n = 16) indicating both acute and chronic pain qualities. Additionally, patients described their episode of acute chest pain using neuropathic pain descriptors which included: "gnawing" 44.5% (n = 49), "hot-burning" 27.2% (n = 30), and "shooting" 23.7% (n = 26) (See Table 4) for sensory descriptors reported by ACS participants. More than 50% of the sample used affective descriptors to

describe their ACS-related chest pain. Fifty-five point five percent (n = 61) of patients described their pain experience as tiring and exhausting, a mixture of acute and persistent pain quality descriptors. Additional affective pain quality descriptors used were: punishing and cruel (20%), sickening (28.2%), with 48.3% of this ACS sample described their acute pain as fearful in nature.

4. Discussion

Qualities of ACS-related Cardiac Pain: This study sought to provide a thorough and comprehensive description of acute cardiac pain observed during an emergent

Table 3. Global pain rating (present pain intensity [PPI]) of chest pain at 4 hours post ACS admission (n = 110).

Descriptor	ACS Patients	
	n	(%)
No Pain^	5	(4.5)
Mild^	6	(5.5)
Discomforting+	41	(37.3)
Distressing+	32	(29.1)
Horrible*	17	(15.5)
Excruciating*	9	(8.2)

Note: ^ = mild pain, + = moderate pain, * = severe pain

Table 4. Descriptors of mild–severe chest pain by ACS patients (MPQ-SF-PRI) at 4 hours post ACS admission.

Descriptor	ACS Patients (n = 110)	
	n	(%)
Sensory		
Throbbing*+	16	(14.6)
Shooting+	26	(23.7)
Stabbing*	24	(21.8)
Sharp*	33	(30)
Cramping*	38	(34.6)
Gnawing+	49	(44.5)
Hot-burning+	30	(27.2)
Aching*+	39	(35.4)
Heavy*	63	(57.3)
Tender*+	20	(18.1)
Splitting	8	(7.2)
Affective		
Tiring-Exhausting+	61	(55.5)
Sickening	31	(28.2)
Fearful	53	(48.3)
Punishing-Cruel+	22	(20)

Note: *May indicate nociceptive pain, +May indicate neuropathic pain.

episode of ACS. Overall, mild pain intensity scores were observed over time in the current study. This result may be related to the effective and timely pain management provided by skilled emergency nurses reported in the parent study [11]. Reports of mild pain may also be related to the pathophysiology of clot formation common to the two forms of ACS included in the study: unstable angina (UA) and (NSTEMI). Two kinds of obstructive thrombi can form causing myocardial ischemia; a white clot or a red clot. Characteristically, UA and NSTEMI develop platelet rich white clots in areas of high shear stress that only partially occlude the artery [27] [28] [29] [30]. Sixty percent of patients in the present study were diagnosed with UA and 40% with NTSEMI. Therefore, it was not unexpected that those with NSTEMI and UA would, perhaps, report lower NRS pain intensity ratings. NSTEMI is characterized by multiple small areas of necrosis at varying different ages [31]. Typically, patients admitted with NSTEMI do not report as severe pain compared to STEMI patients [32]. Once death of myocardial tissue occurs, typically, pain recedes and is reported in the moderate to mild pain ranges (0 - 3; 4 - 6; NRS 0/10) [32]. Conversely, STEMI patients develop red fibrin rich clots that totally occlude the vessel and cause a singular or homogenous entity; that is, necrosis of myocardial tissue occurs all at the same time [33]. This event is described as extremely painful and would result in greater pain intensity scores, not observed in the current study. Data in this study captured a relatively stable sample of ACS patients with NSTEMI and UA and not the emergent trajectory of STEMI-related cardiac ischemic event. It is unknown whether pain intensity scores would be reported within the moderate to severe range by STEMI patients compared with the current study's sample.

Mild cardiac pain intensity scores may also be related to a first time or recurrent ACS event. Given the increased prevalence of repeated/cumulative ACS events [34], it may be plausible that the observed mild NRS intensities may be attributed to those with repeated ACS events. In this study, first time or repetitive ACS events were not captured. It is not clear if increased myocardial scar tissue from past myocardial insult, injury, or death of tissue may have prevented transmission of noxious input, thereby altering pain perception. Furthermore, we currently do not know if those with repeated ACS events are more likely to develop persistent pain and would describe their acute pain with more neuropathic pain qualities rather than acute injury descriptions. This would require a more in-depth exploration. To date, no studies were found that examined first time or repeated ACS event and cardiac pain intensity. However, in emergency settings portable echocardiography is typically used to evaluate myocardial wall thickness, motion at rest and aids in differentiation of UA and NSTEMI [35] and would be a useful adjunct to examine pain intensity differences, stratifying first time and repetitive ACS episodes among UA, NSTEMI and STEMI patients.

A third explanation for mild cardiac pain intensity scores found in this study may also relate to the percentage of men and women who had diabetes as comorbidity. Over 25% of patient participants (n = 31) had documented diabetes mellitus (DM). Evidence indicates that people with DM, over time, may develop

autonomic neuropathy and may not exhibit or report severe cardiac pain intensity [7] [36] [37] [38] [39]. Up to 70% of people with DM have some form of diabetic neuropathy [40]. Mild cardiac pain intensity found in this study in DM patients is an important finding and resonates with others who have reported atypical and/or mild pain intensity within the diabetic cardiac population [41] [42]. For example, in a descriptive-cross-sectional study, MacKenzie and Neibert examined ACS symptoms in women with and without DM [42]. Included in the sample were 64 women, (32 with DM and 32 without DM), and diagnosed with either UA or acute myocardial infarction (AMI). Patients with DM and UA or AMI were more likely to report mild sternal chest pain compared to non-diabetics ($p = 0.04$). Similarly, in Cŭ lić *et al*'s., (2002) [41] study, for the entire ACS sample (n = 1996), [42% women], admitted to the coronary care unit for first time AMI, found both men and women reported less pain severity with AMI (OR = 1.31, CI [1.11 to 1.66]) than those without DM. It was not clear whether diabetic neuropathy was controlled for in their statistical analyses.

A more nuanced examination of cardiac-related pain in ACS patients with diabetes is required. The examination of pain should include a comprehensive measure, such as the McGill Pain Questionnaire, to provide a thorough description of the subjective, sensory-discriminative, cognitive-evaluative, affective-motivational and miscellaneous aspects [2] and range of ACS-related pain symptoms. In addition to stratification of DM-ACS patients and ACS differentiation, it would be important to expand pain assessment and test participants with use of quantitative sensory testing to determine prevalence of DM neuropathy [40]. Moreover, those identified with DM-related neuropathy would be controlled for in future regression model analyses.

Sensory and Affective Qualities of ACS Pain: Examining cardiac pain utilizing a uni-dimensional pain measure limits the ability to comprehensively describe the variable qualities of the individual's ACS-related pain experience. All ACS patients were therefore asked to describe their cardiac pain using the McGill Pain Questionnaire-Short Form (MPQ-SF) [2] at the 4-hour mark during the study. Of the patient sample, men and women chose descriptors depicting chest pain as having characteristics of nociceptive and neuropathic pain qualities early in the first hours of an ED admission. Others have found similar results, McGillion *et al*., (2012) [43] in the EXPLORE study reported that their ACS sample (n = 110) post percutaneous coronary intervention (PCI), described cardiac pain with an admixture of neuropathic and nociceptive descriptors for pain at three and six months post PCI [43]. Results of the current study may be related to the inclusion criteria of an ACS sample that was composed of patients with either UA or NSTEMI. It is unclear whether patients experienced a first time or repeated ACS event that may have explained the variable pain qualities reported. We can only speculate as to whether ACS patients who were admitted with a repeated ACS event would have developed neuropathic pain over time with repeated ischemic events. This requires a longer follow up time period with a more inclusive sample of UA, NSTEMI and STEMI ACS patients in the future.

Understanding recent advancements in pain neuropathophysiology may further explain the sensory and affective pain qualities reported by patients in this study. Given the complexity of an individual pain presentation, complicated by either concurrent co-morbidities that may impact (alter) pain perception, coupled with an initial or reoccurring ACS episode, it may be best explained from what is known based on pain science. Foreman and others have elegantly explained the indirect relationship between myocardial ischemia and perceived chest pain intensity [3] [4] [5] [6] [7]. Current basic science and clinical evidence point to the variability of cardiac pain perception wherein chest pain can occur in the absence of myocardial ischemia, and, conversely, ischemic episodes can be painless, [44]-[49] typically observed in clinical practice from individuals with documented diabetes.

Men and women who have repeated angina and/or multiple cardiac events may describe their acute pain using neuropathic or nerve-related descriptors because acute cardiac pain experienced over time can lead to maladaptive processes that lead to the development of chronic or persistent forms of cardiac pain. Ongoing or repeated pain episodes cause negative changes in the nervous system such as maladaptive anaerobic glycolysis, tissue lactate production, accumulation of catabolites, and potassium efflux into the extracellular space [3] [4] [5] [6]. Acute pain, repeated episodes lead to pathological changes at the peripheral and central nervous system; these changes are collectively known as central sensitization [3] [4] [5] [6]. Sensitization of the nervous system leads to different maladaptive forms of pain perception: hyperalgesia (increase pain sensitivity), hyperpathia (augmentation of normal pain duration) and increased intensity of the pain [3] [4] [5] [6]. In all cases, transition from acute pain to chronic or persistent cardiac pain, is in part, a function of sensitization that occurs from prolonged periods or repetitive episodes of acute cardiac pain that involves a transition phase by virtue of these pathological mechanisms. This may explain why our sample reported both acute and chronic pain qualities during an acute ACS event.

In summary, patients in the current study reported mild (NRS 0 - 3) cardiac pain intensity scores over the initial 8 hours of an ACS-related event. Variable pain quality descriptors used to describe acute cardiac pain in this ACS sample were a combination of nociceptive (acute injury) and neuropathic (nerve damage-persistent pain). Possible explanations for this result have been discussed as attributed to, (a) differences in ACS sample, (b) pathogenesis of clot formation, (c) first versus repeated ACS event, and (d) diabetes as comorbidity.

Limitations: This study was conducted in a single ED setting with predominately a homogeneous Caucasian sample, with limited enrollment of only UA and NSTEMI ACS patients. Therefore, areas for future research include, 1) a larger, multisite study, applying a stratified analysis approach that would include all ACS differentiation examining pain management practices and cardiac pain intensity, 2) a larger study that would examine differences in cardiac pain presentation, in all ACS patients, with use of portable echocardiography, stratifying for first time and repeated ACS event, and 3) a larger, multisite study that thoroughly examines the diabetic-ACS pain presentation with use of quantitative

sensory testing in order to determine the prevalence of diabetic neuropathy. Controlling for diabetic neuropathy may provide an in-depth description of ACS pain presentations within the diabetic context.

5. Conclusion

The aim of this sub-analysis was to provide a comprehensive examination of the sensory-discriminative, motivational-affective and cognitive-evaluative dimensions of cardiac pain not previously captured or documented in the acute hours of an emergent ACS event. Sixty-six percent of the sample described cardiac pain as acute injury "heavy, cramping, stabbing, and sharp" (nociceptive pain). Others reported nerve-related damage pain qualities, "gnawing, hot-burning, shooting" (neuropathic pain) and a combination of acute and chronic pain qualities "aching, tender and throbbing". Further investigations are warranted to clearly describe the individual complex cardiac pain presentations as it relates to ACS designation, singular or repeated ACS event and level of co-morbidity.

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Use of Analogy by Public Health Nurses in Problem Solving for Individual Consultations in Japan: A Multiple Case Study

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Abstract

Aim: Nurses must develop good problem-solving skills (PSS) to work in the complex health care environment. This study explored PHNs' use of analogy in PSS development. The purposes of the study were to clarify how PSS developed in one area (*i.e.*, mental health) could be applied to another area (*i.e.*, maternal health) and whether new PSS could develop in response to PSS gained in another area. **Methods:** A multiple case study was conducted using interviews. We interviewed 27 consultations from eight Japanese PHNs who consulted in mental health departments before transferring to maternal health departments. The data on how PHNs applied PSS in the selection, mapping, evaluation, and learning stages of the analogy process were extracted from transcribed interviewed data and compared. **Results:** PHNs provided 59 PSS used in 27 consultations. All PHNs applied past mental health PSS to solve new problems in maternal health. They tended to select past PSS based on structural similarity and to apply PSS via low-level abstraction in serious situations or preventively to avoid causing the current situation to worsen. Notably, PHNs developed maternal health PSS by using past mental health PSS; these new PSS were derived through analogy from various failures and successes. **Conclusions:** PSS developed in one area can be applied in another area, and new PSS can develop through applying these previous PSS. Identification of structural similarities and preventive analogies must be included in nursing education, especially for nurses working in public health fields.

Keywords

Analogy, Consultation, Nursing Education, Problem Solving, Public Health Nurse

1. Introduction

Current rapid social change and the highly complex health care environment indicate a need for nurses to develop good problem-solving skills (PSS) in complex situations [1]. In Japan, the complexity of many health issues and policies has led to a rise in specialized service departments, leading to new health-related demands for public health nurses (PHN) working in the community. Increasingly, more PHNs are obtaining work opportunities in unfamiliar areas of practice, meaning that they must also solve unfamiliar problems. PHNs—and indeed all nurses working in the community—must develop high-level PSS to deal with these unfamiliar problems. These skills need to be incorporated into nursing education and practiced to produce students with flexibility and competence in problem-solving.

PSS are essential skills for nurses along with critical thinking [2]. Notably, "problem-solving" and "critical thinking" are often used interchangeably [2] [3]. Both are the focus of problem-based learning (PBL), a prominent student-centered approach in nursing education [4] [5]. In the present study, we focus on PSS using analogy, which may be an important means of solving particularly unfamiliar problems [6]. Analogy in problem solving refers to how people recognize similarities between a familiar problem (*i.e.*, the base) and a relatively unfamiliar problem (*i.e.*, the target), and apply the solution of the base to the target [7] [8]. Analogy has been examined in a variety of fields and is recognized as a key concept of relational reasoning, which holds an increasingly important place in educational practice [9].

PHNs must expend considerable time and effort to learn new PSS upon transferring departments. However, this does not necessarily mean that transferring requires PHNs to start from the beginning; indeed, PHNs can generally apply PSS acquired in previous departments. However, it has not been empirically demonstrated how PHNs apply such past PSS to new areas of practice, and whether PSS in the new areas can be developed using those learned in past areas. Identifying the characteristics of PSS using analogy in PHNs would help inform and improve nursing education strategies including PBL.

We apply the framework for analogy in this study to clarify how PHNs apply PSS from a particular area to new areas. In this study, we select the areas of mental and maternal health because of their inherent relationship: for instance, there is strong evidence that parents with mental health issues are more likely to abuse their children [10]. In Japan, the main areas of public health practice in which consultations are provided are as follows: maternal health, adult health, geriatric health, mental health, communicable diseases, intractable diseases, and handicapped persons. Recently, a new area in which consultations are provided—persons under social assistance—has emerged. Maternal health is the largest area for PHNs [11]. All of these areas are addressed by local government departments, with some governments having specific departments for each area and others having several areas covered by a single department.

1.1. Research Questions

We sought to answer two research questions. In a public health setting, how can mental health PSS be applied to maternal health PSS? Can maternal health PSS be developed using mental health PSS?

1.2. Analogy

According to Holyoak & Thagard [12], analogy in problem-solving comprises the following process: a problem-solver selects a base by retrieving information about it from memory (selection), after which they "map" the base to the target and generate inferences about that target (mapping); then, they adapt and evaluate these inferences to consider the unique aspects of the target (evaluation), and eventually learn something more general from the success or failure of the analogy (learning).

As noted in the above process, analogical thinking must begin with retrieval of an appropriate base from the massive storage of long-term memory [13]. Holyoak and Koh [14] posited that bases and targets possess two levels of similarity: surface and structural. Surface similarity refers to a resemblance between the objects in the base and target and their properties, whereas structural similarity is a resemblance between the underlying systems of relations in the base and target [15]. Generally, surface similarity is the main determinant of base access and facilitates retrieval [16], while structural similarity influences mapping and is considered the defining feature of analogy [17].

Base knowledge arises from both particular case(s) and abstract knowledge consolidated from many cases [18], [19]. Resolving ambiguous mappings in an analogy is done by employing the type of relation most relevant to the person's goal [12].

2. Methods

2.1. Design and Sample

This study employed the multiple case study design mentioned by Yin [20]. This type of case study inquiry benefits from prior development of theoretical propositions to guide data collection and analysis. The case unit of this study comprised three levels: the first level was the PHN, the second level the consultation, and the third level the PSS. The PSS were considered the main case unit because our aim was to study their applications via analogy. A case study format allowed us to use a combination of qualitative and quantitative data [20]. This study used the analogy process explicated by Holyoak & Thagard [12] as the framework.

We employed objective sampling in order to obtain PHNs who had specifically used analogy in problem-solving. Specifically, based on prior research related to analogy, we needed PHNs who had experience working in two different departments. Using analogy depends on temporal continuity [21] for accurate recall; therefore, the inclusion criteria were being a PHN who had transferred from a mental health department to a maternal health department within the past five

years (because this would ensure that their memories of the former department were fresh) and who was still working in the maternal health department (to prevent contamination of memories). We included PHNs who had initially worked in the maternal health department as well as PHNs who had worked in maternal health department before working in mental health department, because we were also interested in whether maternal health PSS can be developed using mental health PSS.

2.2. Data Collection

In the Kanto area of Japan, 12 cities had both mental health and maternal health departments in their public health system. We contacted these 12 cities in January 2014 to identify currently working PHNs who met the inclusion criteria. Of these 12 cities, seven had PHNs who met the inclusion criteria. We sent research announcement documents to one or two potential candidates in each city; if the candidates were interested, they were contacted by the first author. One candidate declined participation because she could not talk about her consultations. Thus, eight PHNs working in six cities participated in the study.

A total of 8 participants in the sample had an average age of 42.9 (range 35 - 52) and all were female. Their average years of experiences as PHNs were 18.5 (range 11 - 27) and they transferred to the maternal health department within 1 - 4 years after the mental health department. Before transferring to their current maternal health department, five PHNs had previous experience working in maternal health departments and three PHNs did not.

We asked PHNs to talk about three or four consultations that they themselves had judged to involve application of mental health PSS to maternal health PSS. A consultation in terms of public health interventions is defined as the process of seeking "information and [generating] optional solutions to perceived problems or issues through interactive problem-solving with a community, system, family or individual" [22].

The interviews were semi-structured, lasted for 90 - 120 minutes, and used an interview guide that followed the analogy process. The interview guide was pretested by two PHNs. They found that they could not speak in detail about their consultations because of how complex and long the consultations were, so the guide was modified to facilitate easier conversation. The guide consisted of the following: (1) a summary of situations involving a maternal health consultation (target) and a mental health consultation (base); (2) the similarities between the target and base, how they were connected, and whether participants had had previous similar consultations (selection); (3) how participants applied the base PSS to the target PSS (mapping); (4) whether the analogy was a success or a failure and why (evaluation); and (5) what participants learned from the analogy (learning). We asked PHNs about points (2) to (5) for each PSS used in a consultation. The structure of the analogy process in this study is shown in **Figure 1**.

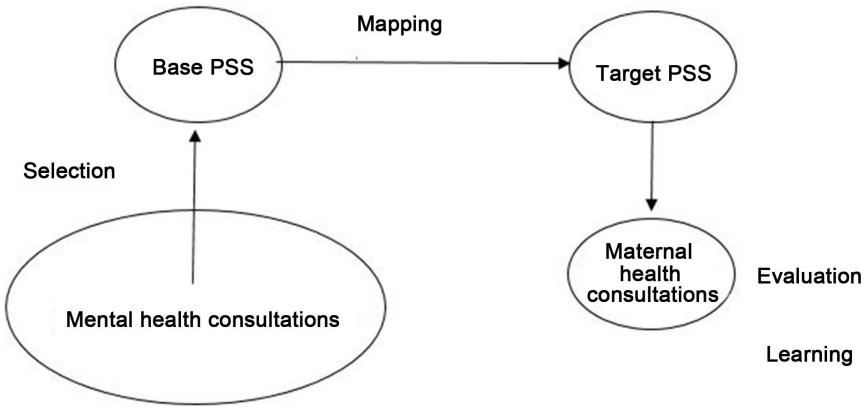

Figure 1. Structure of the analogy process in this study.

2.3. Analytic Strategy

The interviews were recorded and transcribed with the permission of the participants. The first author analyzed all of the data. The analysis of the first level of the case unit involved describing the demographic characteristics of the PHNs. Next, we confirmed the number and types of consultations as the analysis of the second level. Finally, regarding the analysis of the third level, PSS were identified and organized as follows: PSS as a target, PSS as a base, surface similarity, structural similarity, and decisive similarity in selection of the base, the presence of particular consultations as a base, mapping, evaluation, and learning. In the selection stage, surface similarity was considered to be a history of psychiatric treatment, which is an objective index of mental illness. Decisive similarity refers to PHNs' relatively intuitive judgments about the strongest surface or structural similarities between the base and target. Regarding the mapping stage, in analogy research, higher levels of abstraction enable more crucial and better applications of the analogy [23]. Therefore, in the mapping stage, we distinguished analogy in terms of high and low levels of abstraction in similarities between the base and target. A low level of abstraction indicates that the similarity of the base and target PSS is obvious, while a high level indicates that the similarity is not obvious. Because we found some shared aspects in surface and structural similarities in the selection stage and mapping patterns in the mapping stage, we created sub-items for each of these categories.

2.4. Quality Assurance of Results

Regarding construct validity, we asked interviewees to confirm case information by viewing their consultation reports. Case studies aim to expand and generalize theories (analytic generalization) rather than enumerate frequencies (statistical generalization) [20]. The sample size was enough to ensure that case findings overlapped, allowing better analytic generalization. One of the co-authors assisted with the discussion of findings by reviewing data and qualitative analysis. Regarding the reliability, two co-authors analyzed the same cases independently for two consultations. They read the transcribed data, identified the target and base PSS, and conducted the same analysis as the first author. After this analysis, they

compared their results with each other and with those of the first author. In addition, all participants were asked for member checks and all agreed with the main results of this study.

2.5. Ethical Considerations

The summary and objectives of this study, voluntary basis of participation, confidentiality, and autonomy were explained to PHNs orally and in writing. Written consent was obtained before each interview. This study was approved by the Research Ethics Committee, the Faculty of Medicine, the University of Tokyo (January 8, 2014; No. 10358).

3. Results

The analysis flow and main results are shown in Figure 2. Of the 8 PHNs (*i.e.*, the first level of the case unit), five PHNs had previous experience working in maternal health departments before transferring to their current maternal health department, and three PHNs did not. Regarding the second level of the case unit, twenty-seven maternal health consultations were reported by the eight PHNs,

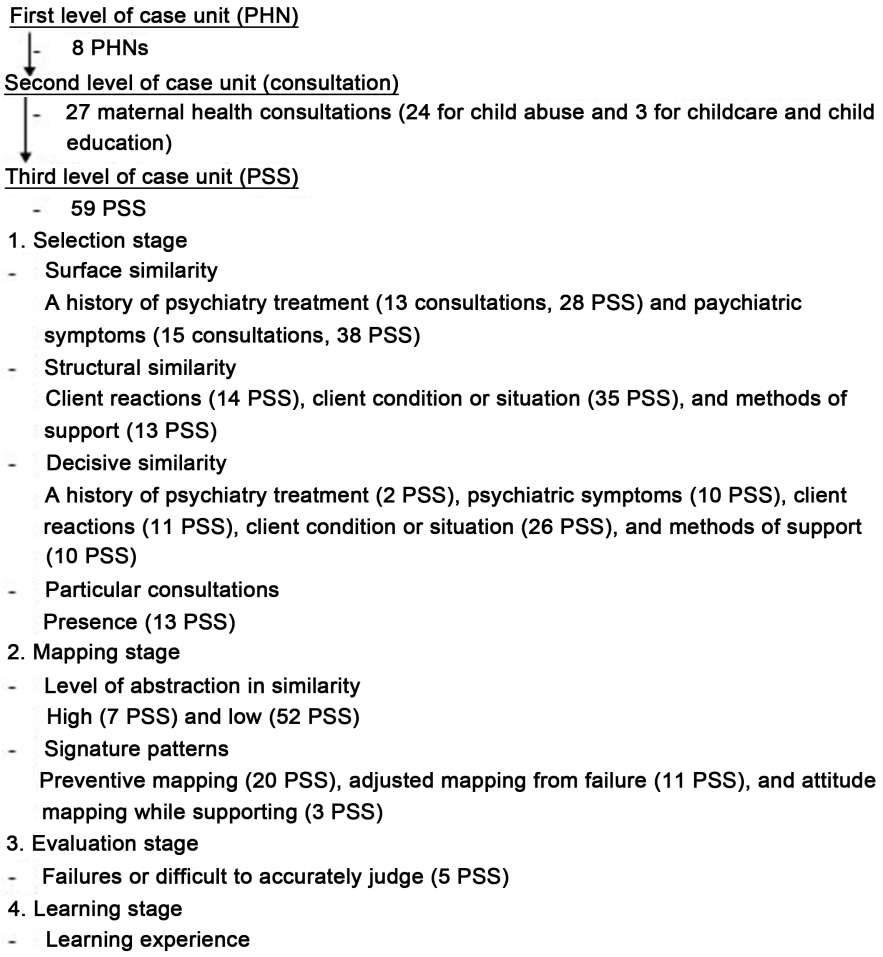

Figure 2. Flow of analysis and main results. PSS: problem-solving skill; PHN: public health nurse.

24 for child abuse prevention and three for childcare and child education. Finally, regarding the third level of the case unit, PHNs used 1 - 4 PSS with analogies per consultation. A total of 59 PSS with analogies were included as main case units for further analysis. We explained how PHNs applied the mental health PSS to maternal health PSS at each stage of the analogy process.

3.1. Selection Stage

The selection stage refers to how a PHN selects a PSS as a base by retrieving information about it from memory to solve a target current problem. We sought to understand how PHNs selected the base in terms of surface, structural, and decisive similarity, as well as the presence of particular consultations as a base.

Regarding surface similarity, we added a sub-item of psychiatric symptoms as an objective index of mental illness. A history of psychiatric treatment appeared in 13 consultations (28 PSS) and psychiatric symptoms in 15 consultations (38 PSS).

Regarding structural similarity, we created sub-items of "client reactions", "client condition or situation" and "methods of support by PHNs". Client reactions included 14 PSS and consisted of client verbal responses, facial expressions, and attitude to PHNs. Client condition or situation included 35 PSS and consisted of strange smells, clumsy, mother transferring from another area, a period of instability, self-accusation, and difficult childhood. The methods of support by PHNs included 13 PSS and consisted of step-by-step approaches, making changes to the current situation, and finding key people.

The decisive similarity in the base selection was a history of psychiatric treatment, with 2 of 27 PSS (7.4%); psychiatric symptoms, with 10 of 38 PSS (26.3%); client reactions, with 11 of 14 PSS (78.6%); client condition or situation, with 26 of 37 PSS (70.3%); and methods of support by PHNs, with 10 of 14 PSS (71.4%). We noted that structural similarities were likely to be decisive for selecting bases. Exemplars of structural similarity are shown in Table 1.

Regarding particular consultations as a base, only thirteen PSS had them, while 37 PSS had abstract knowledge acquired from many consultations. Of the particular consultations used as a base, some had not directly involved the PHNs, who had heard the information from others. For example, one PHN stated:

A mother was hospitalized with postnatal depression. I heard that she was highly impulsive. In the previous mental health department, I heard of a child whose arms were impulsively cut by the mother. I also heard that a criminal with mental disorders killed her own child. Although they were not my clients, I judged that the mother would be high risk if she was discharged (*No. 40*).

3.2. Mapping Stage

The mapping stage refers to how PHNs map the base to the target and generate inferences about that target. Analogies were distinguished by high and low levels of abstraction in similarities between bases and targets in the mapping stage. High-level abstraction was found in seven PSS, five by PHNs who had not worked in a maternal health department previously and two by PHNs who had. High-level

Table 1. Exemplars of structural similarity.

Client reactions	The mother was treated for schizophrenia ten years ago but was not being treated by a psychiatrist at the time I saw her. She said, "I am cured." The words hung over my head. I had many clients who said that in the mental health department. They did not take medicine, against medical advice, showed worse symptoms, and caused neighborhood trouble. I often took such clients to the psychiatric hospital (No. 14)
Client condition or situation	Somebody with mental illness who moved from a rural region and was unfamiliar with the area. The person was isolated and rock-faced, lacked confidence in himself, and did not issue SOS signals by himself. My first impression of the mother was similar to that for this person because she was also rock-faced and lacked confidence in childrearing. If I told her to consult me anytime, she would not consult herself. So, I tried approaching her without waiting for contact from her. This support was similar to mental health PSS (No. 13)
Methods of support by PHNs	The mother caused problems, like not picking her child from nursery school or slapped the child. The nursery school discussed whether they would give notice of child abuse to the child guidance center. They decided not to give notice. In the mental health department, I regretted not giving a warning against a violent client. This resulted in serious injury to a family member. If I did warn against the client, maybe the family member would not be seriously injured. Therefore, I negotiated with the nursery school to give a notice of child abuse so that the mother could learn what she should not do (No. 10)

abstraction was used when PHNs could not find solutions. They generated ideas for analogy and tested these ideas. In contrast, low-level abstraction was found in 52 PSS. Exemplars are shown in Table 2.

We found patterns of mapping specific to PHNs (signature patterns) in addition to standard patterns. The signature mapping patterns found were "preventive mapping," "adjusted mapping from failure," and "attitude mapping while supporting." Preventive mapping was found in 20 PSS (33.8% of 59), and involved inferring about future changes from the client's background (client situation and condition), thereby preventing health conditions, childrearing behavior, and living conditions from worsening. Adjusted mapping from failure was found in 11 PSS, nine of which overlapped with preventive mapping. This mapping pattern referred to a base PSS being judged as a failure by the PHN; then, through reflecting on this failure, the PHN adjusted the PSS. Adjusted PSS were often aimed at preventing future failures in a given situation or condition. Attitude mapping when supporting was found in three cases. This mapping pattern referred to a base PSS mapping onto a target that was not a concrete skill but rather an attitude. Exemplars are shown on Table 3.

3.3. Evaluation and Learning Stages

The evaluation stage refers to how a PHN evaluates whether the application of the base PSS to the target PSS was successful. After evaluation comes, the learning stage, wherein, the PHN learns something more general from the success or failure of the analogy. In the evaluation and learning stages, many PSS were judged as

Table 2. Exemplars of standard mapping.

Mapping with high-level abstraction in similarity	
Target	Understanding the true feelings of a mother with an autistic child
Base	Asking about early development history to understand the current situation of a client with a mental disorder
Similarity	A client's history reveals information about current situation and feelings
Mapping	Interview about mother's early development history to understand her true feelings of having an autistic child
Story interviewed	I was worried about understanding the mother's true feelings. I came up with an idea to do as a trial, which was interviewing her about her early development history. I was taught by senior PHNs that interviewing about this history is important because current situations are linked to past events. We usually do not take an early development history in the maternal health department but I interviewed the mother because I did not understand her current feelings. After that, I felt closer to her and could understand her feelings. She changed her attitude and opened up about her child (No. 56)
Mapping with low-level abstraction in similarity	
Target	Help staff involved obtain a greater understanding of a mother with intellectual disability
Base	Improving staff's understanding of a client with mental disorders through interaction
Similarity	Improving staff's understanding of a client through interaction
Mapping	Through interaction with the mother with intellectual disability, staff involved will better understand such clients
Story interviewed	It is important to watch persons with disorders in the community. Especially persons with mental disorders, who tend not to put messages out. In the mental health department, I went to the local government office with persons with mental disorders and helped staff involved to understand them. So I created opportunities for the mother to meet with staff involved and expected those involved to learn something by making a connection with us (No. 34)

Table 3. Exemplars of signature mapping for PHNs.

Preventive mapping	
Target	Pregnant woman with bipolar disorder
Base	Introduction of home help service soon after birth for a mother with a mental disorder who could not take care of her baby
Mapping	Preparing to introduce childcare services during pregnancy to prevent poor childrearing practices
Story interviewed	I took a call from a relevant agency about a pregnant woman with bipolar disorder. In the mental health department, a client with a mental disorder gave birth. However, the client could not take care of the baby, so I hastily contacted childcare services. Therefore, I predicted that the mother would find it difficult to take care of her baby. In the postnatal period, even a healthy mother will find it difficult with perverse baby and hormone imbalance. […] So I prepared early by contacting childcare services while the mother was still pregnant (No. 19)
Adjusted mapping from failure	
Target	A mother with borderline personality disorder

Continued

Base	A failure of being made to act like a messenger by a client with borderline personality disorder
Mapping	Tell in advance what can or cannot be done for the mother to prevent being asked to do what PHNs cannot do
Story interviewed	[…] The mother suffered from borderline personality disorder. So, I told her in advance what I can or cannot do. In the mental health department, a client asked me to do all the paperwork submitted to the office while I was home visiting, so I acted like a messenger. It was a failure. So I tried to not be relied on as much (No. 53)
Attitude mapping when supporting	
Target	A mother whose husband killed himself the day after the birth
Base	Attitude towards managing consultations about suicide or suicidal ideation
Mapping	Being attitude of mind for managing consultation with the mother whose husband killed himself
Story interviewed	I heard in my maternity hospital about a mother whose husband killed himself the day after the birth and required support to prevent her from committing joint suicide with the baby. In the maternal health department, other PHNs did not know how to support her and felt timid to try because of the difficulty in performing consultation. This was the first time such a mother came to the maternal health department. In the mental health department, I prepared for consultations about suicide or suicidal ideation because it was the final department where difficult consultations were delivered from other departments (No. 23)

successful by PHNs, thereby confirming their PSS for that situation. However, PHNs judged five PSS as failures or as difficult to accurately judge. This led them to reconsider how they used and/or should use analogy for these five PSS and thereby gain a learning experience. An exemplar of a PSS evaluated as a failure was presented by one PHN:

A mother interrupted her treatment for schizophrenia and said to me that she was "cured." Based on my experiences with other patients, I believed that the condition of such patients becomes worse without treatment. I tried to make her restart treatment. However, a psychiatrist recommended supporting the mother's current condition because the psychiatrist thought that the mother suffered from borderline personality disorder, not schizophrenia. I regret that I reacted too strongly to a past diagnosis (*No.* 24).

4. Discussion

We posed two research questions: how do PHNs apply past PSS to new areas of practices (*i.e.*, can mental health PSS be applied to maternal health PSS), and can PSS be developed using the PSS learned in past areas (*i.e.*, can maternal health PSS be developed using mental health PSS)?

4.1. Applying Past PSS to New Areas of Practice

All eight PHNs applied mental health PSS to maternal health PSS. We identified some characteristics regarding how to apply the PSS by analogy stage.

In the selection stage, PHNs were likely to select a base according to structural

similarity, which included client reactions, client condition or situation, and methods of support by PHNs, even if surface similarity was available. This result is supported by previous findings [15] that surface similarity is most important for determining base retrieval, but in real-world conditions, structural similarity is used more frequently. This is perhaps because PHNs often do home visits and face-to-face interviews that then become training for them in assessing clients in the clients' daily living environments.

In the mapping stage, few PSS demonstrated mapping with high-level abstraction. According to analogy research, mapping with high levels of abstraction in similarity is absolutely necessary and provides analogies with a wider range of applications [21]. In general, nurses who tend to use knowledge in more abstract ways tend to make decisions that are more creative and diverse [24]. Some attempted mapping as a trial when they were unable to find solutions to the current problem. PHNs who had not worked in maternal health departments previously were more likely to use high-level mapping, perhaps because they had fewer solutions for problems in the new department, and thus required higher-level analogies. This interpretation is supported by the finding that analogy tends to work better in uncertain situations [6]. Furthermore, consultations in this study were mainly aimed at preventing child abuse. In such serious situations, using high-level analogies as trials may be inappropriate; however, because analogy also tends to be guided by a person's goals [12], in a situation wherein, a child's life may be threatened, PHNs will doubtlessly be more motivated to achieve their goal. Thus, more secure PSS (*i.e.*, those more likely to succeed) may be provided by adjusting mental health PSS. For these reasons, PHNs do not always require high-level analogy; their use of such analogy depends on the seriousness of the problem. In sum, low-level abstractions may be appropriate for some serious problems, while high-level abstractions may be appropriate for less serious problems or problems without solutions.

Preventive mapping (or preventive analogy, hereafter) was found to be a signature analogy for PHNs. Preventive analogy is PHNs' inferring a future change in a patient's condition from their background situation and conditions, with the goal of preventing a worsening of the current situation. For instance, PHNs' motivation in a child endangerment situation is in response to the ethical implications of that situation; in other words, PHNs might act to avoid negative consequences such as joint suicide or child neglect. Preventive perspectives are important for PHNs' goals and activities and are included in key characteristic of practice of public health nursing [25] and the activities guidelines for Japanese PHNs [26]. While the finding that PHNs used preventive analogy is unsurprising, it was meaningful to confirm in a research capacity because it is important for PHNs and for educated novice students to acquire these skills during their nursing education.

4.2. Developing PSS Using the PSS Learned in Other Areas

Two findings supported that PSS can be developed using PSS learned in other areas. The first aspect concerned one of the signature analogies for PHNs, "analo-

gy developed from failures and successes". Many PSS of adjusted mapping from failure overlapped with preventive mapping, likely because PHNs learned from the failure of a mental health PSS and therefore adjusted the maternal health PSS accordingly in current new area, and used this adjusted PSS preventively in future cases. PHNs also reconsidered all maternal health PSS that they judged as unsuccessful. This might lead them to adjust this unsuccessful PSS and try it again in the future. PHNs' process of using, reflecting on, learning from their skills, and then testing new skills is reminiscent of experiential learning theory [27]. PHNs developed their skills via continuous revision of analogies in practice. Professional development cannot be truly completed, and professional skill goes beyond current highest skill [28]. PHNs can develop their own skills beyond their current levels through learning from failures and successes. We proposed that this set of skills can be practiced and taught in continuing clinical education possibly through the use of case examples and PBL.

The second finding pertains to PHNs who had worked in maternal health departments before working in mental health departments. PHNs that had experience in a maternal health department also used analogies based on mental health PSS rather than falling back on their previously used maternal health PSS. In other words, existing maternal health PSS were improved using analogies of mental health PSS. Although PHNs had transferred to a department requiring specific skills, they could develop these skills through analogy.

4.3. Implications for Nursing Education

The findings in this study on PSS using analogy may contribute to the improvement of nursing education strategies including PBL to facilitate PSS and related critical thinking skills. We found that nurses have characteristics in applying PSS that may differ from those of other professionals. If such nurse-specific characteristics reflect what nurses learn from nursing educational programs, these programs may become more effective and practical. For instance, the finding that PHNs were more likely to select a base according to structural similarity such as clients' reactions rather than surface similarity such as psychiatric symptoms, may be an important point in education. Problem examples in educational programs could include clients' reactions and situations, as it would help nurses acquire more careful observation skills, which are necessary to identify structural similarity.

Nursing students should be taught the skills for using analogy effectively. One important finding—namely, that PHNs tend to apply PSS with a low level of abstraction as a secure strategy in serious situations such as child abuse—shows the necessity of varying the abstraction of analogy depending on the situation. In other words, nursing students should learn how to use analogy differently and effectively depending on the severity of the problem. Preventive analogies are also essential PSS, especially for nurses working in public health fields. Nursing students could learn signature PSS by incorporating these skills into PBL scenarios. Current PBL scenarios used in nursing education usually include only spe-

cific problematic situations, wherein students identify target problems and, using their own initiative, demonstrate appropriate solutions. PBL using analogy would be more helpful to students because it would provide PSS learned in other areas of practice by the PHN to help solve problematic current situations. Furthermore, as shown in **Table 2**, serious situations could be prevented from escalating to critical situations by use of analogy—specifically, PSS can be retrieved according to structural similarities.

In terms of continuing education, sharing domain-specific PSS among nurses is important for overall skill development. Specifically, nurses can learn from the consultations and information of other nurses and apply these skills to their own consultations using analogy. Next, this study showed that transferring departments does not mean an interruption in skill development of nurses. If nurses who transfer departments understand this, they may become motivated to work harder, even if considerable time and effort are needed. Moreover, if nurses know their PSS can be applicable to their nursing in other departments, they may be more interested in making departmental moves, and anticipate and look for ways to use their knowledge and skill sets in new settings. Therefore, transferring departments for nurses could be viewed as a positive strategy for developing PSS and important to their career development.

Among medical doctors, computer-aided decision support systems have become popular in clinical settings [29]. One such system—fuzzy cognitive maps—can be used to help address the specific problems of mapping knowledge bases for medical diagnoses [30], and is similar to PSS using analogy in the current study. Therefore, similar computer-aided support systems can be developed for use in public health nursing in the future. Given that our findings represent knowledge accumulated from experts, it is expected that they will be useful in the development of such systems.

4.4. Limitations and Future Research

This study had some limitations. First, because we used case studies, which aim to expand and generalize theories, we cannot generalize our results statistically. A quantitative study on this topic could overcome this limitation. Second, our results are limited to the domains of mental health and maternal health. Finally, we focused only on PSS in consultation, while PHNs use many different skills in practice. How analogy affects PHNs' other skills must be studied in the future. Furthermore, more research regarding PSS using analogy is needed in other nursing departments in order to clarify the signature PSS for nurses that may contribute to the development of more effective nursing education programs.

5. Conclusion

Through a multiple case study on PSS using analogy, we clarified how PHNs applied past PSS to new areas of practice and how PSS could be developed using the PSS learned in these other areas. Specifically, they tended to select past PSS based on structural similarity and apply past PSS using a low level of abstraction of anal-

ogy during serious situations. Furthermore, they applied PSS preventively to avoid worsening the current situation. We found that PHNs developed PSS from failures and successes and by using analogy itself.

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Conflicts of Interest

The authors have no conflicting interest to declare.

Authors' Contributions

M. K. carried out the data collection and participated in study design, analysis, and manuscript preparation. T. S., A. T., S. N., and K. M. participated in study analysis and manuscript preparation. All authors read and approved the final manuscript.

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Associations of Mental and Behavioral Problems among Children Exposed to Intimate Partner Violence Previously and Visits with Their Fathers Who Perpetrated the Violence

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Abstract

Background: Intimate partner violence has long-term and negative effects on the health of mothers and children worldwide. This study aimed to identify the mental and behavioral effects of past exposure to intimate partner violence among children and examine their associations with the children's visits with their fathers who perpetrated the intimate partner violence. **Methods:** A cross-sectional study of women who had been abused by their intimate partners and had one or more children aged 4 - 18 years old was conducted from March 2015 to December 2016. Questionnaires were used to collect (1) demographic data about the mothers and children, (2) information about the children's visits with the mother's former partner (*i.e.*, father), and (3) psychological data using the Hospital Anxiety and Depression Scale and the Child Behavior Checklist/4 - 18. **Results:** The average scores and rates of internalizing, externalizing, and total problems among the children who had been exposed to intimate partner violence were: 10.8 (SD = 10.4), 26 (51.0%); 9.0 (SD = 9.0), 14 (27.5%); and 26.3 (SD = 21.5), 15 (29.4%), respectively. Children's visits with fathers who were IPV perpetrators were significantly associated with the internalizing (AOR = 12.6, $\beta = 0.56$; $p < 0.05$) and total problems scores (AOR = 17.9, $\beta = 0.48$; $p < 0.05$). **Conclusion:** Attention should focus on traumatized children exposed to intimate partner violence, and thorough and cautious assessments and decisions regarding visits with their fathers who are IPV perpetrators are essential to safeguard and improve their mental and behavioral health.

Keywords

Child Abuse, Exposure to Violence, Intimate Partner Violence, Mental and Behavioral Health, Visitation

1. Introduction

Intimate partner violence (IPV) is a serious health concern, which includes psychological (e.g., constant intimidation, belittling, and humiliation), physical (e.g., slapping, beating, and kicking), and controlling behaviors (e.g., isolating a person from family and friends, and restricting access to financial and social resources), as well as sexual violence (e.g., forced sexual intercourse) [1]. The worldwide rate of women abused by their partners is 30.0% [2], and 23.7% among the Japanese female population [3]. Children's exposure to IPV, such as witnessing or being involved in violent conflicts between parents, can cause serious mental and behavioral health issues, including Posttraumatic Stress Disorder (PTSD), mood and anxiety disorders, aggressive behaviors, self-harm, and eating and sleeping problems [4] [5] [6] [7]. Children who have been exposed to IPV may have psychological challenges for a long time after they have been separated from the perpetrator of the violence, who is often an abusive father. Several studies [8] [9] [10] [11] [12] have reported that abused women who left their abusive partners continue to struggle with severe psychological symptoms, including PTSD, anxiety, depression, and low self-esteem, which persist for a long time afterwards. However, the little information is available about the psychological mental and behavioral health of children who have been exposed to IPV due to the limited number of research studies of this problem.

Children who visited their fathers, who had perpetrated IPV, after a divorce or separation might be negatively affected, specifically their mental and behavioral health. In general, children exposed to their parents' divorce tend to be less well-adjusted emotionally, socially, and behaviorally, and exhibit symptoms, such as depression, anxiety, anger, a decline in school performance, and externalizing behaviors (e.g., aggressive and noncompliant behavior), than those in non-divorced families [13] [14] [15]. Children's adjustment after their parents' divorce has been reported to be significantly associated with certain parenting characteristics: (1) a sufficiently warm, supportive, and sensitive parenting style to meet their child's needs and (2) the use of clear and consistent expectations and discipline methods by both the custodial and non-custodial parents [14]. On the other hand, involving children in parental conflicts (e.g., encouraging a child's hostile feelings towards the other parent and allowing a child to become entangled in parental acrimony) is harmful to the child's adjustment [14]. Children exposed to IPV are more likely to be manipulated by fathers who are IPV perpetrators (e.g., fathers frequently make negative remarks to these children about their mothers and they use these children as a means to threaten the mothers). The children often feel as though they are caught in the middle of a tense situation between the

parents. They have strong feelings of anger, sadness, guilt, confusion, and helplessness when they see their fathers (*i.e.*, IPV perpetrators) after their parents' separation, which might exacerbate mental or behavioral health issues they might have [16] [17]. We hypothesized that children who had been exposed to IPV and then visited their fathers (the IPV perpetrators) after their parents' divorce would be more likely to have more adverse mental and behavioral problems than those who did not visit their fathers. The identification of these associations should help us understand and develop effective interventions and environments for traumatized children who have been exposed IPV in order to enhance their psychological health.

This study aimed to identify the mental and behavioral health issues of children who were exposed to IPV previously and their associations with the children's visits with their fathers who perpetrated the IPV.

2. Methods

2.1. Study Design and Period

We conducted a cross-sectional study from March 2015 to December 2016.

2.2. Participants

Women who had (a) one or more children 4 - 18 years old, (b) previous experience of being abused through IPV, (c) left the abusive partner, and (d) been living separately from the abusive partner were eligible for participation in this study. Women who had (a) a severe mental illness or were unable answer the study's questionnaire because of their difficult circumstances, or (b) a poor command of the Japanese language were excluded from the study. Eligible participants were chosen and recruited directly using a consent form by the staff of an IPV support center that agreed to cooperate with this study.

2.3. Procedure

First, we asked two non-profit IPV support centers to coordinate the recruitment of participants for this study and to collaborate with the researchers concerning other aspects of the study. The two centers, which are located in Tokyo, assist abused women, most of whom are IPV survivors. The centers' services include counseling, educational programs, peer, legal, and housing support, and cooperation with police, lawyers, and psychologists. Most of the IPV support staff are women and laypersons that have experienced IPV and received training and education about IPV support; one of them was a midwife. After the first two centers agreed to cooperate, their IPV support staff asked other IPV support centers across the country, including non-profit, government-sponsored, and private support centers to recruit eligible participants who visited their centers by mailing a document with an explanation of the study to the centers. The staff of the centers that agreed to cooperate with this study explained it to the women attending their centers and asked them directly if they wished to participate in it. After the women agreed to participate and signed consent forms the staff provided them with a que-

stionnaire package with instructions to complete and return it to the staff of the center. The staff collected and mailed the completed questionnaires to the researchers. The questionnaire package included two questionnaires: one for the mother and another for the child. Women who had more than one child were provided with the corresponding number of questionnaires in order to obtain responses for the each of the children.

2.4. Measures

2.4.1. Demographic Characteristics

The mothers' and children's demographic data were collected. The demographic data for the mothers included age, marital status, previous living arrangement with the former partner who was abusive, nationality (and the former partner's nationality), educational attainment, employment status, household income, number of years of enduring abuse, the number of years after separating from the abusive partner, and the number of years living without the abusive partner. The children's characteristics included age, sex, birth order, birth weight, current weight, current height, school attendance (e.g., daycare, kindergarten, elementary school, junior high school, or senior high school), medical history, custody, and previous living arrangement with their abusive father.

2.4.2. Children's Visits with Their Fathers (IV Perpetrators)

The following information about the children's visits with their fathers who were identified IPV perpetrators was collected: (a) whether they were currently visiting their fathers, (b) how often they visited, and (c) their reactions after the visits. The children's reactions to the visits were assessed using these multiple response options: happy, sad, calm, same as always, confused, angry, sad, depressed, and/or aggressive.

2.4.3. Types and Severity of IPV Experienced by the Mothers

The types and of severity of the previous IPV episodes experienced by the mothers in the study were measured using the Japanese version of the Revised Conflict Tactics Scales Short Form (JCTS2F) [18]. The JCTS2F was translated and developed by Umeda and Kawakamiin 2014 [19], who reported it to have good reliability and concurrent validity using the Buss-Perry Aggression Questionnaire, the Violence against Women Screen, and the Kessler 6. The JCTS2F has 10 items that measure respondents' experiences of abuse in IPV situations and five subscales: psychological aggression, physical assault, injury, sexual coercion, and negotiation. We used the eight items corresponding to four of the subscales (*i.e.*, psychological aggression, physical assault, injury, and sexual coercion) in this study to evaluate the types and severity of IPV that were experienced during the one-year period when the most severe abuse occurred. Responses to items that measure the frequency of violence during the one-year period range from 1 (never happened) to 7 (more than 20 times). The presence of IPV was defined as one or more incidents of violence, which were assessed via the eight items, with the following response options: 0 (no incidents) and 1 (one or more incidents). Cronbach's alpha (α) for the eight items was 0.81.

2.4.4. Anxiety and Depressive Symptoms of the Mothers

The current symptoms of anxiety and depression among the mothers were evaluated using the Japanese version of the Hospital Anxiety and Depression Scale (HADS) [20] [21]. The Japanese HADS has a two-factor structure (anxiety and depression) and consists of seven items for each scale. The range of the scores for each scale is 0 - 21 points, with higher scores indicating more adverse symptoms (*i.e.*, higher symptoms of anxiety and depression) [20] [21]. A total score of 11 - 21 points (for both of the scales) indicate definite cases of anxiety and depression. The Japanese version of the HADS has been found to have good reliability and validity among Japanese samples in medical and educational settings [22]. The reliability of the HADs in the present study was acceptable (anxiety: $\alpha = 0.86$; depression: $\alpha = 0.77$).

2.4.5. Mental and Behavioral Health Problems among the Children

Problematic behaviors among the children were assessed using the Japanese version of the Child Behavior Checklist (CBCL)/4 - 18. The CBCL has been translated into 64 languages and is widely used to assess behavior problems among children [23] [24]. The CBCL has 119 items and nine subscales: withdrawn behavior, somatic complaints, anxious/depressed behavior, social problems, thought problems, attention problems, delinquent behavior, aggressive behavior, and other problems. Three of the subscales (withdrawn behavior, somatic complaints, and anxious/depressed behavior) are categorized as internalizing problems, and two of the subscales (delinquent behavior and aggressive behavior) as externalizing problems. The total score (*i.e.*, total problems) is calculated by summing all of the nine subscales. The responses to the item are rated as 0 (not true), 1 (somewhat or sometimes true), and 2 (very true or often true). Higher scores indicate mental or behavioral problem that are more severe. A cut-off point for the each subscale is used to determine whether the severity of behavior is in the clinical range or not. The Japanese version of the CBCL, which was developed by Itani *et al.* [23], was found to have good reliability and validity. Cronbach's alphas of all the subscales were acceptable: withdrawn behavior = 0.74; somatic complaints = 0.80; anxious/depressed behavior = 0.90; social problems = 0.68; thought problems = 0.55, attention problems = 0.75, delinquent behavior = 0.73; aggressive behavior = 0.91; and other problems = 0.72. Cronbach's alphas of the two core subscales and total score were also good: internalizing problems = 0.93; externalizing problems = 0.92; and total problems = 0.97.

2.5. Statistical Analyses

Descriptive statistics were used to calculate: the demographic data of the mothers and children, information about the children's visits with their fathers, and scores on the JCTS2F (scores and rates of the presence of IPV), the Japanese version of the HADS (scores and rates of definite cases), and the Japanese version of the CBCL (scores and rates of problem behaviors in the clinical range). To compare the scores and rates on the CBCL between the children who were currently visiting their fathers and those who were not, Student's t tests and Fisher's exact tests were

used. The correlations between the scores on the CBCL and the other measures were analyzed. Finally, multivariate logistic regression analyses and multivariate regression analyses were conducted to identify the factors associated with the scores and rates on the CBCL (*i.e.*, scores for internalizing, externalizing, and total problems). The ideal number of data was 76 - 118 (the number of predictors = 3 - 10; anticipated effect size = 0.15; desired statistical power level = 0.80; probability level = 0.05) according to the sample size calculation for multiple regression. The statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 23.0 for Windows

2.6. Ethical Considerations

The study's protocol was approved by the ethical committee of the university with which several of the authors were affiliated. The participants were informed that this survey was anonymous, they could withdraw from the study at any time, and their data would be protected by storing it in a locked container. Information regarding the availability of psychiatrists, pediatric psychiatrists, and professional IPV counselors was provided for all the participants in case they wished to visit with them.

3. Results

A total of 69 women were recruited for this study; eight women were excluded because they were judged to be mentally impaired, and therefore, unable to participate. Of the 61 women remaining, 60 (98.4%) agreed to participate and 38 (62.3%) completed the questionnaire. Finally, data from 38 mothers and 51 children were used for the analyses.

3.1. Participants' Characteristics

The average age of the mothers was 42.8 years old (SD = 5.6, range = 33 - 54). All of the participants were Japanese (n = 38; 100%) and the majority was college or junior university graduates (n = 21; 55.3%). Full-time workers comprised 31.4% of the sample (n = 12), household income ranged from 0 to 2.99 million yen (n = 7; 18.9%); 15.8% of the mothers were unemployed and/or receiving welfare; 71.1% were divorced from the abusive ex-partner; and 23.7% were not divorced from the ex-partner. Regarding previous IPV experience, all of the mothers had experienced psychological aggression (n = 38; 100%) and the majority had experienced physical assault (n = 29; 76.3%), injuries (n = 30; 78.9%), and sexual coercion (n = 27; 71.1%) by their former partners. The total number of years of abuse by their partner, years since they separated from the abusive partner, and years of living separately were 9.5 (SD = 5.7; range = 0 - 25), 6.9 (SD = 5.2; range = 1 - 19), and 6.8 (SD = 5.5; range = 1 - 19), respectively. The average scores for the HADS were: anxiety = 10.6 (SD = 5.2), depression = 7.8 (SD = 4.5); the clinical cases of anxiety and depression were18 (SD = 47.4) and 12 (SD = 31.6), respectively (Table 1).

The average age of the children in this study was 11.47 years (SD = 4.3, range:

Table 1. Demographic characteristics among the mothers[a] (n = 38).

Age	n (%)	Mean (SD[b])	Range
		42.84 (5.61)	3 - 54
Marital status[c]			
Divorced	27 (71.1)		
Non-divorced	9 (23.7)		
Missing	2 (5.3)		
Used to live with the husband[d]			
Yes	37 (97.4)		
No	1 (2.6)		
Nationality			
Japanese	38 (100.0)		
Partner's nationality			
Japanese	35 (92.1)		
Educational attainment			
Junior high school	1 (2.6)		
Senior high school	5 (13.2)		
College/Junior university	21 (55.3)		
University	8 (21.1)		
Graduate school	3 (7.9)		
Working status			
Full-time worker	12 (31.4)		
Contract worker	6 (15.8)		
Part-time worker	7 (18.4)		
Housewife	1 (2.6)		
Student	1 (2.6)		
Non-working	6 (15.8)		
Be on welfare	6 (15.8)		
Household income			
0 - 2.99 million yen	7 (18.9)		
3 - 4.99 million yen	2 (5.3)		
5 - 6.99 million yen	2 (5.3)		
7 - 8.99 million yen	1 (2.6)		
Over 9 million yen	4 (10.5)		
On welfare	2 (5.3)		
Missing	20 (52.6)		
HADS (n = 36)[e]			
Anxiety score		10.58 (5.23)	1 - 19
Anxiety identified[f]	18 (47.4)		

Continued

Depression score		7.75 (4.46)	0 - 15
Depression identified[f]	12 (31.6)		
Years to be abused by the husband		9.49 (5.70)	0 - 25
Years after separation[g]		6.92 (5.17)	1 - 19
Years during living separately[h]		6.81 (5.50)	1 - 19
Abuse experience			
Psychological aggression[j]	38 (100.0)	11.19 (2.84)	5 - 14
Physical assault[j]	29 (76.3)	7.37 (4.27)	2 - 14
Injury[j]	30 (78.9)	6.43 (3.31)	2 - 14
Sexual coercion	27 (71.1)	6.89 (4.50)	2 - 14

[a]Mothers who used to be abused by their (ex)husband and already separated; [b]Standard Deviation; [c]Current marital status with their husband abused; [d]The husbands who had perpetrated intimate partner violence against the mothers; [e]Hospital Anxiety and Depression Scale; [f]The rate was calculated using the cut-off point (over 11) of the HADS; [g]Years after separating the husband who had perpetrated IPV; [h]Years during living separately with the husband who had perpetrated IPV; [i]The severity of IPV was evaluated using the Conflict Tactics Scale Short Form; [j]The rate was the presence of an IPV-related act (one or more incidences).

4 - 18), and the majority was 7 - 12 years old (n = 20; 39.2%), boys (n = 33; 64.2%), and the oldest brother or sister (n = 31; 60.8%). A total of 94.1% of the children (n = 48) were currently attending a school, 31.3% had a previous medical problem, such as allergies (n = 6) (e.g., atopic dermatitis and asthma), bacterial pneumonia (n = 1), uterus myoma (n = 1), autotoxemia (n = 1), attention-deficit hyperactivity disorder (ADHD) (n = 2), irritable bowel syndrome (n = 1), a long hospitalization due to unexplained high fever (n = 1), migraine headache (n = 1), and mother-infant separation anxiety disorder (n = 1). In addition, 42 (82.4%) mothers had custody of their children. Almost all of the children (n = 46; 90.2%) previously lived with their fathers in the same house and the average number of years of living with their fathers was 6.23 years (SD =3.6; range = 0 - 16) (Table 2).

3.2. Children's Visits with Their Fathers (IPV Perpetrators)

Nineteen (37.3%) children in the study were currently visiting their fathers. Their frequency of visits was, on average, 2.2 visits per year (SD = 2.3; range = 0.5 - 6.5). The most frequent reactions among the children after they visited their fathers were: same as always (n = 6; 33.3%), aggressive (n = 6; 33.3%), angry (n = 5; 27.7%), happy (n = 5; 27.7%), and confused (n = 4; 22.2%) (Table 3).

3.3. Children's Mental and Behavioral Problems

The children's average scores and the rates of scores in the clinical range on the Japanese version of the CBCL were: withdrawn behavior = 2.8 (SD = 3.0) and 6 (11.8%); somatic complaints = 2.5 (SD = 3.3) and 12 (23.5%); anxious/depressed = 5.7 (SD = 5.7) and 9 (17.6%); social problems = 2.8 (SD = 2.6) and 5 (9.8%); thought problems = 1.3 (SD = 1.7) and 15 (29.4%); attention problems = 4.5 (SD

Table 2. Demographic characteristics among the children[a] (n = 51).

	n (%)	Mean (SD)	Range
Age		11.47 (4.34)	4 - 18
4 - 6	8 (15.7)		
7 - 12	20 (39.2)		
13 - 15	10 (19.6)		
16 - 18	13 (25.1)		
Sex			
Boy	33 (64.7)		
Girl	18 (35.3)		
Birth order			
1	31 (60.8)		
2	15 (29.4)		
3	4 (7.8)		
4	1 (2.0)		
Birth weight (g)		3101 (445.10)	2096 - 4022
Current weight (kg)		37.44 (2.34)	12 - 78
Current height (cm)		144.63 (23.70)	95 - 182
Attending school[b]	48 (94.1)		
Medical history			
No	34 (66.7)		
Yes[cd]	16 (31.3)		
Missing	1 (2.0)		
Custody			
Mother	42 (82.4)		
Father	1 (2.0)		
Under conciliation adjudication	6 (11.8)		
Missing	2 (3.8)		
Used to live with their father			
No	3 (5.9)		
Yes	46 (90.2)		
Missing	2 (3.9)		
Years CLFP[e]		6.22 (3.60)	0 - 16
0 - 4	14 (27.5)		
5 - 9	21 (41.2)		
10 - 14	4 (7.8)		
15 - 18	2 (3.9)		
Missing	10 (19.6)		

[a]Children who had exposed to intimate partner violence in the past; [b]Attending daycare, kindergarten, elementary school, and junior and senior high school; [c]Their medical histories include: allergic diseases (n = 6) (e.g., atopic dermatitis, and asthma); Bacterial pneumonia (n = 1); Uterus myoma (n = 1); Autotoxemia (n = 1); Attention-deficit hyperactivity disorder (ADHD) (n = 2); Irritable bowel syndrome (n = 1); Long hospitalization due to unexplained high fever (n = 1); Migraine headache (n = 1); Mother-infant separation anxiety disorder (n = 1); [d]Multiple responses were available; [e]Number of years the child lived with the father in the past.

Table 3. Variables regarding the children's[a] visits to their father[b] (n = 51).

	n (%)	Mean (SD)	Range
Currently visiting their father			
No	30 (58.8)		
Yes	19 (37.3)		
Missing	2 (3.9)		
Frequency of visiting their father per year (n = 15)		2.17 (2.27)	0.5 - 6.5
Reactions after visiting their father (n = 18)[cd]			
Happy	5 (27.7)		
Fun	2 (11.1)		
Calmed	1 (5.5)		
Same as always	6 (33.3)		
Confused	4 (22.2)		
Angry	5 (27.7)		
Sad	2 (11.1)		
Depressed	3 (16.7)		
Aggressive	6 (33.3)		

[a]Children who had exposed to intimate partner violence in the past; [b]Father who used to perpetrate intimate partner violence and already separated from their mothers; [c]Their mother answered the question; [d]Multiple responses were available.

= 3.5) and 10 (19.6%); delinquent behavior = 1.9 (SD = 2.6) and 8 (15.7%); aggressive behavior = 7.1 (SD = 6.9) and 8 (15.7%); and other problems = 6.2 (SD = 5.0) (no cut-off point). Three groups consisting of 26 (51.0%), 14 (27.5%), and 15 (29.4%) children were classified as being in the clinical range of scores for internalizing, externalizing, and total problems, respectively (Table 4).

3.4. Comparison of the CBCL Scores and Clinicalrates between the Children Who Visited Their Fathers and Those Who Did Not

The average scores for the following subscales of the CBCL among the children who visited their fathers were significantly higher than those who did not visit their fathers: withdrawn behavior (4.8 versus 1.5, $p = 0.00$); somatic complaints (4.1 versus 1.5, $p = 0.03$); anxious/depressed behavior (8.4 versus 3.8, $p = 0.02$), thought problems (2.1 versus 0.77, $p = 0.02$); attention problems (6.5 versus 3.4, $p = 0.00$); other problems (7.9 versus 4.9, $p = 0.05$); internalizing problems (17.4 versus 6.8, $p = 0.00$); and total problems (37.6 versus 19.1, $p = 0.00$). In addition, The rate of children with scores in the clinical range for withdrawn behavior (31.6% versus 0.0%, $p = 0.00$), thought problems (52.6% versus 16.7%, $p = 0.01$), delinquent behavior (31.6% versus 6.7%, $p = 0.00$), internalizing problems (73.7% versus 33.3%, $p = 0.01$), externalizing problems (47.4% versus 16.7%, $p = 0.03$), and total problems (57.9% versus 13.3%, $p = 0.00$) were significantly higher among the children who were visiting their fathers than those were not visiting them (Table 4).

Table 4. Comparisons of the CBCL[a] scores and rates between the children's visits to their father or those without visiting[b] (n = 51).

	Mean (SD) n = 51	Range n = 51	Prevalence[c] n (%) n = 51	Children visiting father n = 19	Children no visiting n = 30	*p* value[d]	Children visiting father n = 19[b]	Children no visiting n = 30	*p* value[e]
				mean (SD)	mean (SD)		n (%)	n (%)	
Withdrawn	2.78 (2.96)	0 - 13	6 (11.8)	4.78 (3.62)	1.53 (1.63)	0.001	6 (31.6)	0 (0.0)	0.002
Somatic complaints	2.49 (3.32)	0 - 13	12 (23.5)	4.06 (4.50)	1.50 (1.83)	0.028	6 (31.6)	5 (16.7)	0.072
Anxious/depressed	5.66 (5.74)	0 - 21	9 (17.6)	8.39 (7.18)	3.78 (3.00)	0.017	6 (31.6)	3 (10.0)	0.298
Social problems	2.75 (2.63)	0 - 10	5 (9.8)	3.68 (3.09)	2.17 (2.26)	0.074	3 (15.8)	2 (6.7)	0.363
Thought problems	1.27 (1.73)	0 - 7	15 (29.4)	2.13 (1.89)	0.77 (1.45)	0.006	10 (52.6)	5 (16.7)	0.012
Attention problems	4.54 (3.51)	0 - 13	10 (19.6)	6.50 (3.36)	3.20 (3.07)	0.001	6 (31.6)	3 (10.0)	0.072
Delinquent behavior	1.91 (2.55)	0 - 13	8 (15.7)	2.63 (2.56)	1.43 (2.57)	0.119	6 (31.6)	2 (6.7)	0.002
Aggression behavior	7.09 (6.85)	0 - 32	8 (15.7)	8.84 (6.59)	6.00 (7.09)	0.167	4 (21.1)	4 (13.3)	0.694
Other problems	6.21 (5.04)	1 - 16	N/A	7.94 (5.25)	4.91 (4.70)	0.048	N/A	N/A	N/A
Internalizing problems	10.83 (10.43)	0 - 43	26 (51.0)	17.42 (13.17)	6.78 (6.15)	0.004	14 (73.7)	10 (33.3)	0.009
Externalizing problems	9.00 (8.99)	0 - 45	14 (27.5)	11.47 (17.85)	7.44 (9.24)	0.135	9 (47.4)	5 (16.7)	0.027
Total problems	26.25 (21.48)	1 - 84	15 (29.4)	37.63 (23.61)	19.12 (17.85)	0.004	11 (57.9)	4 (13.3)	0.002

[a]Child Behavior Checklist for 4 - 18 years; [b]Children who are currently visiting their father who perpetrated intimate partner violence and already separated from their mothers; [c]The prevalence was calculated using the cut-off points of the CBCL and represents the scores that are clinical; [d]Student-t test was used to compare the scores between the both groups; [e] Fisher's exact test was used to compare the prevalence of the children classified as clinical using the cut-off points of the CBCL.

3.5. Factors Related to the Children's CBCL Scores and Rates

As shown in Table 5, the score and dichotomous variable (0 = non-clinical, 1 = clinical), internalizing problems was significantly associated with: child's age (β = 0.42), mother's age (β = −0.32), currently visits to their father (β = 0.56), mother's anxiety (β = 0.63), and the number of years the child lived with the father in the past (β = −0.32). The adjusted odds ratios (AOR) were as follows: child's age (AOR = 1.4), mother's age (AOR = 0.7), the total score for the JCTS2F (AOR = 1.1), and currently visits to their father (AOR = 12.6). None of the variables were significantly associated with the score and dichotomous variable (0 = non-clinical, 1 = clinical), externalizing problems. Regarding the score and dichotomous variable (0 = non-clinical, 1 = clinical) of total problems, currently visits to their father (β = 0.48), and mother's anxiety (β = 0.48) were significantly associated with the score, and only currently visits to their father (AOR = 17.9). (Table 5) was for the dichotomous variables.

4. Discussion

This study reported findings about the mental and behavioral health of a sample of children who had been exposed to IPV in the past. The children's visits to their fathers who were IPV perpetrators were significantly associated with having behavioral problems, such as internalizing and total problems (β = 0.56; AOR = 12.6) and total problems (β = 0.48; AOR = 17.9), as measured on the CBCL,

Table 5. Related factors for the CBCL[a] scores and rates among the children (n = 49)[b].

	Internalizing problems[c]					Externalizing problems[d]					Total problems[e]				
	AOR[ef]	p^g	β^h	p^i	VIF[j]	AOR[ef]	p^g	β^h	p^i	VIF[j]	AOR[ef]	p^g	β^h	p^i	VIF[j]
Child age	1.37	0.04	0.42	0.01	1.51	1.03	0.77	0.03	0.86	1.53	1.38	0.05	0.26	0.13	1.51
Mother age	0.73	0.03	−0.32	0.07	1.89	1.04	0.68	0.01	0.95	1.89	0.83	0.21	−0.23	0.23	1.88
Total score of CTS2F	1.10	0.04	0.19	0.21	1.53	1.01	0.79	0.18	0.37	1.53	1.03	0.52	0.31	0.07	1.53
Currently visiting father[k]	12.56	0.02	0.56	0.00	1.13	4.72	0.06	0.27	0.13	1.16	17.90	0.00	0.48	0.00	1.13
Mother's anxiety[l]	1.31	0.07	0.63	0.02	2.28	1.03	0.83	0.22	0.38	2.34	1.30	0.08	0.48	0.03	2.28
Mother's depression[m]	0.91	0.46	−0.33	0.07	1.97	1.05	0.63	−0.06	0.80	2.05	0.99	0.93	−0.20	0.31	1.97
Years CLFP[n]	0.90	0.39	−0.38	0.01	1.18	0.98	0.83	−0.07	0.67	1.18	0.76	0.13	−0.30	0.05	1.18
Adjusted R^{2o}			0.42					0.13					0.28		

[a]Child Behavior Checklist for 4 - 18 years; [b]Children who are currently visiting their father who used to perpetrate intimate partner violence and already separated from their mothers; [c]Internalizing problems = Withdrawn + Somatic complaints + Anxious/depressed; [d]Externalizing problems = Delinquent behavior + Aggressive behavior; Total problems = the sum of the scores of all the nine subscales of the CBCL; [e]Adjusted odds ratios calculated by multivariable logistic regression analysis; [f]The dependent variable: 0 = non-clinical, 1 = clinical; [g]p values calculated by multivariable logistic regression analysis; [h]Standardized regression coefficients calculated by multivariable regression analysis; [i]p values calculated by multivariable regression analysis; [j]Variance Inflation Factor; [k]0 = non-visiting, 1 = visiting; [l]The score of the subscale (anxiety) of the Hospital Anxiety and Depression Scale; [m]The score of the subscale (depression) of the Hospital Anxiety and Depression Scale; [n]The number of years the child lived with the father in the past; [o]Adjusted R^2 calculated by multivariable regression analysis.

after adjusting for the other children's and mothers' variables (e.g., age, the severity of previous IPV, and the mother's mental status).

The average scores on the CBCL and the rates of problematic behaviors (internalizing, externalizing, and total problems scores) among the children who had been exposed to IPV were: internalizing problems = 10.8 (SD = 10.4), 51.0%; externalizing problems = 9.0 (SD = 9.0), 27.5%; total problems = 26.3 (SD = 21.5), 29.4%. All the average scores in this study were much higher than those reported in a sample of Japanese children aged 4 - 18 (N = 5159) from the general population: internalizing problems = 3.1 - 3.8 (SD = 4.2 - 4.8); externalizing problems = 3.1 - 5.3 (SD = 4.3 - 5.6); total problems = 11.7 - 16.1 (SD = 13.4 - 14.5) [23]. Previous studies [6] [25] [26] have reported that children exposed to IPV have severe mental and behavioral problems, such as high levels of anxiety, social withdrawal, depression, aggressiveness, suicidal ideation, and reduced social competence. These findings indicate that children who have been exposed to IPV continue to manifest their suffering from the past traumatic events with behavioral difficulties six years, on average, after their exposure to IPV. Bancroft [16] has cautioned that recovering from the psychological trauma and injury related to exposure to IPV among children takes a long time after they separate from their ab-

usive fathers, and that intensive and continuous psychological treatment and counseling is necessary. Healthcare professionals should recognize the importance of increasing attention to the mental and behavioral health of children who have been exposed to IPV and to providing sufficient psychological interventions and care for them in order to facilitate their recovery from the trauma.

This study found that children's visits to their fathers who perpetrated IPV were a risk factor for aggravating their mental and behavioral health problems, such as internalizing and total problems, as measured by the CBCL. A review study [25] reported that 72.7% of children exposed to IPV witnessed psychological IPV and that 90.1% were exposed to physical IPV, such as hearing verbal threats and seeing slapping and kicking. In addition, the co-existence of IPV and child abuse is quite high (60% - 75%) [27], and fathers are the most common perpetrators [17] [25]. Given these circumstances, traumatized children are likely to remember and re-experience past traumatic events when they visit their fathers who threatened them in the past. Furthermore, this study found that the children who were currently visiting their fathers reported feeling not only aggressive (11.8%), angry (9.8%), and confused (7.8%), but also the same as always (11.8%) and happy (9.8%) after visiting their fathers. Bancroft and Silverman [17] reported that children whose mothers divorced their biological fathers, who were abusive, frequently experienced complex and ambivalent feelings about their father. Their feelings were possibly due to their deep sadness, loss, guilt, loneliness, anger, and helplessness related to the consequences of the family's conflicts (e.g., divorce and living separately), past traumatic experiences, and abusive fathers, which may have caused more confusion and emotional distress among these children. These findings indicate that the possibility and conditions of children's visits with their fathers who are abusers should be determined with caution, and monitored through continuous observation of the child's psychological health and situations surrounding those who have been exposed to IPV.

4.1. Clinical Implications

This study suggests attention should be focused on the serious and long-term effects of exposure to IPV on the mental and behavioral health of children. The results of this study have demonstrated that 51.0% of the children who exposed to IPV previously have been suffering from internalization problems and 27.5% - 29.3% for externalizing and total problems at averagely six years later after separating their fathers who perpetrated IPV. In Japan, few healthcare professionals pay attention to children after separating them from their abusers because they move them to a safe place. However, the results of this study indicate that the psychological trauma of children's past exposure to IPV does not heal for a long time after their separation from the abuser. Intensive and continuous psychological interventions with interdisciplinary collaboration between healthcare professionals (e.g., pediatric nurses, midwives, public health nurses, pediatric psychiatrist, pediatricians, and clinical psychotherapists), mothers and other family members, educational professionals (e.g., teachers, and school counselors), and IPV profes-

sionals (e.g., IPV counselors) are essential for traumatized children to hasten their recovery and improve their psychological health.

This study's results also suggest that the negative impact of visiting fathers identified as IPV perpetrators on children's mental and behavioral health, such as internalizing problems ($\beta = 0.56$; AOR = 12.6) and total problems ($\beta = 0.48$; AOR = 17.9), should be acknowledged. A previous study investigating the quality of cooperation in divorced families [28] found that the level of co-parenting quality was lowest in the group with coercive and controlling IPV than in the non-IPV group. Additionally, less importance on the father-child relationship was reported in the IPV group. All professionals involved in IPV, such as healthcare professionals, legal professionals, and IPV counselors should understand that those children's visits with fathers who have been identified as abusers might exacerbate their mental and behavioral health problems. Careful and thorough assessments of traumatized children who have been exposed to IPV should be an essential first step before considering the possibility of children's visits with fathers who are known abusers. Such careful attitudes and procedures are required for cases of IPV in order to promote the safety and improve the health of the traumatized children.

4.2. Limitations and Future Research Directions

This study has some limitations. First, the characteristics of the participants in this study might be biased primarily due to the study's exclusion criteria (*i.e.*, having a severe mental illness or a family situation that was so difficult, it precluded the mother's participation). The psychological health of the participants in this study might be different (*i.e.*, better) compared to abused women in the general population. Thus, the results of this study might be biased due to the underrepresented characteristics of the sample (e.g., the severity of previous IPV and the psychological health of the mothers and children). The second limitation is the study's small sample size. Despite the researchers' attempts to recruit as many eligible participants as possible during the one and one-half year study period, the majority of potential participants (*i.e.*, abused women) experienced severe levels of distress (e.g., depression) and could not be recruited. Thus, the small sample size might have resulted in β errors and affected the results of this study. Third, this study used a cross-sectional design. Therefore, causal relationships between the variables cannot be inferred.

Despite these limitations, this study is the first to identify mental and behavioral health issues among children who were exposed to IPV, and confirm their associations with the children's visits with their fathers who perpetrated the IPV.

5. Conclusion

This study examined the mental and behavioral effects of children's exposure to IPV and their associations with the children's visits with their fathers who were known as abusers. The results of this study indicated that the children who are exposed to IPV tended to have adverse mental and behavioral effects (e.g., interna-

lizing and externalizing problems), and that visiting their fathers who were IPV perpetrators increased the risk of exacerbating their mental and behavioral health problems (*i.e.*, internalization and total problems). These findings suggest the importance of increased attention and psychological interventions for children in this population. Careful assessments and decisions about children's visits with fathers who are IPV perpetrators are essential to protect and enhance the psychological health of these traumatized children.

Declaration of Interest

Conflicts of interest: none.

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Evidence of Linkages between Patient Safety and Person-Centred Care in the Maternity and Obstetric Context—An Integrative Review

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Abstract

The aim was to evaluate the current state of knowledge pertaining to patient safety and its link to person-centred care. The international relevance of patient safety has expanded, as have the models of person-centred care. Inspired by this new trend, we collated and summarized the literature for evidence of the two topics. The study was guided by Russell, Whittemore and Knafl's integrative review framework. An electronic database search was conducted for relevant articles from 2005 to 2016. This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. The structure and process of the evaluation of the evidence are described and the findings interpreted by means of a thematic synthesis. One theme emerged: *trustful, safe communication in the relationship between the patient, family members and healthcare professionals* and two domains; *safety culture* and *multidisciplinary capacity building*. The dominant dimension in the safety culture domain is respectful communication, which implies sharing experiences that lead to a sense of control during labour and birth and is related to the women's feeling of personal capacity. The dominant dimensions in the multidisciplinary capacity building domain are collaborative teamwork, coordination and risk management, knowledge sharing and patient-centred communication. In conclusion, to enhance patient safety, it is necessary to develop patient-focused, evidence-based skills and guidelines as well as a supportive organization. Due to their interaction with patients, midwives' communication competence on the part of midwives is essential for supporting the birth

and fulfilling the women's needs and expectations.

Keywords

Communication, Integrative Review, Midwifery, Nursing, Patient Safety, Person-Centred Care, Maternity, Obstetric Care

1. Introduction

Internationally, patient safety (PS) has become a major concern in healthcare [1]. A focus on person-centred care, patient participation and PS strategies is of the utmost importance. PS is defined as the prevention of errors associated with healthcare, thereby, constituting an essential component of quality care [2]. The WHO [3] designed an implementation guide to improve the quality of care provided to women giving birth. Learning about adverse events and near-misses is essential for enhancing maternity and obstetric care [4]. A recently published review reveals that effective communication and learning from adverse events are important. Healthcare professionals' and patients' perspectives on ethical conflicts, blame and responsibility, medication errors, lack of trust and involvement should be explored [3]. This is in accordance with the WHO [5] recommendation that PS should focus on the use of quality improvement methods. Many latent and active factors at individual and system level interact to cause PS incidents. Therefore, an integrated approach to PS is necessary for maintaining quality of care. Person-centred care has been advocated as a way to improve PS [6]. Patient involvement is essential for ensuring safety. Levels of engagement can improve the relationship between healthcare professionals, patients and families in the context of person-centred care, for example, shared decision-making [7] [8] and self-management [9]. Research on person-centred care and related concepts such as person-centredness [10], patient-centred care [11], patient-close care and patient focus has grown rapidly [12], in different contexts, e.g., mental health [10], medical wards [13] and obstetric care [14]. Systematic development of a PS culture is necessary because inadequate quality of care leads to human suffering [15]. In their qualitative study of midwifery staff perceptions of safety culture, Currie and Richens [16] argue that all staff members should be given the authority to report accidents, incidents, near-misses and safety concerns. In addition, the importance of communication between healthcare providers [17], improving relationships between patients and professionals [18] [19] as well as continuity of care [20] is described in several studies.

The role of patients in their own safety has been explored in a recent review [21]. The results revealed that existing evidence was related to medication rather than patients' capability and willingness to be involved. An investigation of the patient's role in terms of her/his rights is recommended [21]. Despite these recommendations, patients are not receiving appropriate care. Therefore, to improve the field of maternity and obstetric care, a better understanding of the strategies to

reduce health risks should be developed.

There is some evidence that person-centred care may impact positively on patient satisfaction [22]. When defining person-centred nursing McCormack and McCance [23] (p. 472) presented four constructs: prerequisites, which concern the attributes of the nurse; the care environment, which means the context in which care is delivered; person-centred processes, which focus on delivering care through a range of activities; and expected outcomes, which are the results of effective person-centred nursing.

Starfield [24] reported that patient-centred care generally refers to interaction during visits and that the benefits may be episode oriented with focus on the management of diseases, especially comorbidity and the use of coding systems that reflect professionally defined conditions. In her research Starfield [24] states that patient-centred care should be complemented with person-centred care. However, some negative aspects have been reported in relation to nurses' views of the restructuring of healthcare, as it was found that it changed their professional roles and disrupted their relationships with patients and colleagues [25].

According to the Cochrane Collaboration literature, there are no accepted definitions of patient-centred care [22]. A concept analysis of patient-centred care revealed several attributes: holistic, individualized, respectful and empowering [26]. These authors stated that based on empirical evidence, the benefits of patient-centred care are improved quality of care, increased satisfaction with healthcare and enhanced health outcomes. A narrative review and synthesis revealed that the three core elements of patient-centred care are patient participation and involvement, the relationship between the patient and the healthcare professional, and the context in which the care is provided [11]. The review comprised 60 papers related to health policy, medical, and nursing literature. These components are of interest because our intention is to explore the linkages between PS and person-centred care in the maternity and obstetric care context. The present study is a part of a larger international research project on *Patient Safety in Obstetric and Maternity Care*, which is theoretically based on the WHO [1] [3] [5] recommendations.

Aim

The aim of the review was to evaluate the current state of knowledge pertaining to PS and its link to person-centred care. The review question was: What is the evidence of the relationship between PS and person-centred care in the maternity and obstetric context?

2. Search Methods

2.1. Design

This integrative review adhered to the guidelines for systematic reviews [27] [28]. The approach involved identifying, selecting and synthesizing studies with diverse methodologies and designs from a variety of sources in order to provide a more comprehensive understanding of healthcare phenomena [28]. The first task was

to identify a set of distinct descriptions of PS and person-centred care from the literature. Second, the integrative review was performed in five stages: 1) problem formulation, *i.e.*, the aim of the review, 2) literature search, *i.e.*, the search methods including the databases employed, search terms and outcome, 3) evaluation of data, *i.e.*, data extraction and quality appraisal, 4) data analysis, *i.e.*, data abstraction and 5) interpretation and presentation of results, *i.e.*, thematic analysis and synthesis [27] (p. 1). Thirdly, a series of propositions regarding the pattern of linkages between PS and person-centred care deduced from the selected papers was interpreted, resulting in a theme, domains and dimensions. Fourth, we compared the expected theory pattern with previous research. Finally, we ensured that the review was conducted in accordance with the preferred reporting items for systematic reviews (PRISMA) guidelines [29].

2.2. Search Strategy and Search Terms

Searches were conducted in online databases (CINAHL, Academic Search Premier, Webb of Science, Maternity and Infant Care, Ovid Nursing and ProQuest) from 2005 to 2016. We searched for articles that included (Major Heading (MH) "Patient Safety+") or "patient safety" and (MH "Patient Centred Care") or "patient centred care" or "people-centred health services" or "people-centred healthcare" or "people-centred health services" and (MH "Obstetric Care+") or "obstetrical care" or "maternal health services" or (MH "Nurse-Midwifery Service") or (MH "Midwifery+") or "midwifery". We also searched peer reviewed articles for (MH "Patient Safety+"), and ("Patient*" or "Person*" or "People N2cent*") and ("matern*" or "obstetr*" or "pregnan*" or "childbirth*"). In the third search we combined the above with "Communication+" or "communication" or (MH "Leadership") or (MH "Feedback") or (MH "Collaboration").

2.3. Inclusion and Exclusion Criteria

We included articles that met the following criteria: original research studies with a qualitative and/or quantitative design, published in English language as well as a maternity and obstetric context. We required articles to specifically use the term "patient safety" and excluded those that did not. Likewise, due to the range of overlapping definitions of person-centred care we only selected articles that referred to person-centred care or similar, such as patient-centred care. Studies were excluded that did not include the maternity care context. Guidance statements, review articles, educational development and study protocols were also excluded. However, the reviews that were of interest in relation to our aim were read and included in the Introduction and Discussion. This constitutes the second stage of the integrative review [27] (p. 1).

2.4. Search Outcome

We identified 414 articles before eliminating duplicates. Two additional articles were identified through other sources such as a manual search of reference lists, thus we screened 416 abstracts. 386 articles were excluded and a full text review

was conducted on the remaining 30, after which an additional 18 articles were excluded. A manual search took place in August 2016, which resulted in one article. Finally, a total of 12 articles met the inclusion criteria and were included in the quality appraisal and synthesis. **Figure 1** summarizes the results of the database search, abstract and full text screening as well as the inclusion/exclusion criteria, *i.e.*, the third stage of the data evaluation [27] (p. 1).

An overview of the included studies is presented in **Table 1**.

2.5. Quality Appraisal

The quality appraisal was conducted by applying the Critical Appraisal Skills Programme (CASP) [30], tools to determine the validity and reliability of the studies, as well as the relevance of each study to our review question. The CASP Cohort Study Checklist was used to assess the quality of the quantitative studies, while the CASP Qualitative Checklist was employed to assess the qualitative studies. For mixed-methods studies both qualitative and quantitative components of the study checklists were used. To describe the quality of evidence we used the following terms: "high quality" *i.e.*, few limitations, "moderate quality" *i.e.*, some criteria not met, and the "low quality", indicating serious limitations with only a few or no criteria being met or failure to adequately address the criteria. We did not use a checklist for the theoretical studies. Elliott and Thompson's [31] descriptions of quantitative research appreciation were employed to assess the methodological quality of the individual studies. Differences in scores were resolved by discussion, thus no study was excluded due to low quality.

2.6. Data Abstraction

We adapted the template presented by Long and Godfrey [32] to assess the quality of the empirical and theoretical studies. The rationale for choosing this template was that we were not only interested in whether the study was of high quality, but also wanted to understand whether the findings were relevant to the maternity and obstetric care context, thereby maximizing our understanding of the contextual meanings. The data from the articles were extracted by the first author (E.S.). In the third stage, four components were focused on: 1) the phenomenon studied: core elements of PS, 2) design/methodology, data collection, analysis and sample, 3) context: setting in which the care was delivered, core theoretical elements of person-centred care (or its variants, such as patient-centredness, patient-close care or patient focus, midwifery-led care, women-centred care) and 4) policy and practice implications. Each of the included articles was reviewed and evaluated independently by three of the authors. Finally, two of the authors independently appraised the Tables illustrating the results. **Table 2** presents the fourth stage, *i.e.*, data analysis of the integrative literature review process [27] (p. 1).

2.7. Synthesis

We were interested in the linkages between culture and context. The thematic analysis was followed by a process of interpretation, *i.e.*, the fifth stage leading to the

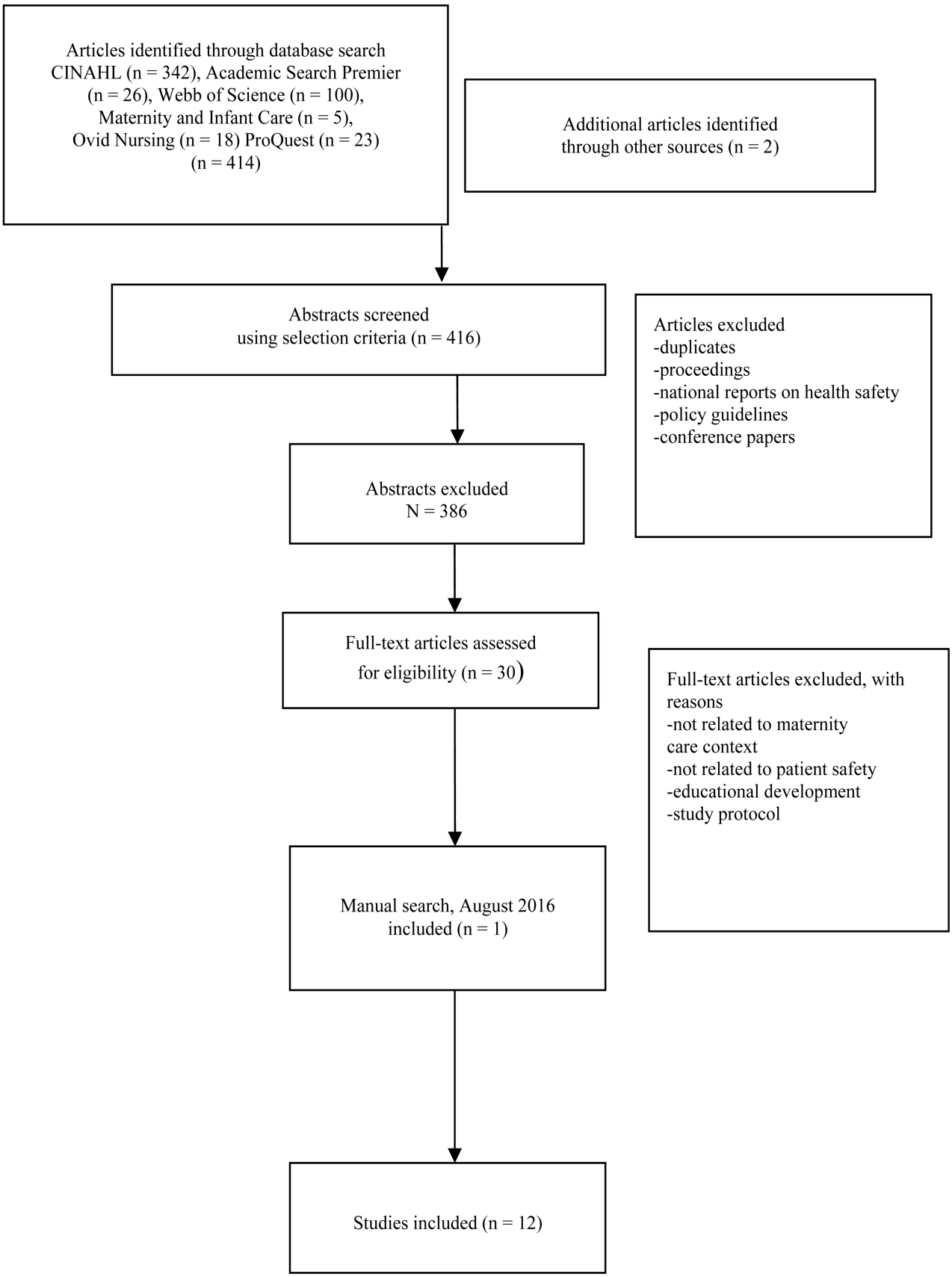

Figure 1. Data search using the PRISMA [29] flow diagram.

Table 1. Characteristics of the included studies.

Authors, year and country Design	Methods	Measurements	Key Findings
	Data collection, sample and analysis	Patient safety/quality	
Martijn *et al.* 2013 [33] The Netherlands Mixed-methodology Cohort	1000 patient records Retrospective: content analysis Prospective incident reporting, type of incident, cause, actual harm, and probability of serious harm or death. Expert postgraduate midwives reviewed safety incidents using the Prevention and Recovery Information System for Monitoring and Analysis method	Self-reported patient safety assessment instrument communication problems; patient risk assessment based on obstetric history, health status, lifestyles factors, psychosocial problems, number of contacts during care, calls for help due to medical emergency, whether or not a safety incident had occurred and description of the safety incident and actions taken	Of the 1000 patient records involving contacts, 85 contained incidents, of which 25 were found to have had a significant effect on the patient. The majority of incidents found in the patients' records concerned treatment and organizational factors
Sexton *et al.* 2006 [34] USA Cross-sectional survey	N = 4700	Self-reported measurement of teamwork climate, perceptions of management, stress recognition and working conditions	Perceptions of the teamwork climate in the labour and delivery context are affected by the environment and the role within the team. For example, the caregivers need to feel supported and be enabled to report, ask question and speak up comfortably. Conflicts should be resolved and nurses and physicians should collaborate. Good teamwork was also associated with lower levels of caregiver burnout from their work. Finally, the teamwork climate related more to perceptions of adequate staffing levels than to workload
Wagner *et al.* 2011 [35] USA Cohort comparative (prospective) Intervention study: 1) Evidence-based protocols, 2) Formalized team training with emphasis on communication, 3) Standardization of electronic foetal monitoring with required documentation of competence, 4) A high-risk obstetrical emergency simulation programme, and 5) Dissemination of an integrated educational programme among all healthcare providers	Eleven adverse outcome measures N = 217 - 1731	Self-reported instruments were used to measure the impact of the perinatal safety initiative (PSI) to evaluate and decrease adverse events and improve obstetric outcomes. A modified adverse outcome index (MAOI) was used in addition to patients' perceptions of teamwork and commitment to patient safety. The questions were 'Would you recommend the institution?" and "Did the staff work together?". Finally, staff perceptions of safety were assessed by using questions from the Safety Culture Climate Survey	The MAOI decreased significantly to 0.8% from 2% ($p < 0.0004$), which was maintained throughout the two year of intervention period. Significant decreases over time were found for rates of return to the operating room and birth trauma was found. A significant improvement was found in staff perceptions of safety ($p < 0.0001$), in patient perceptions of whether staff worked together ($p < 0.0001$), in the management and in the documentation of abnormal foetal heart rate tracings, and the documentation of obstetric haemorrhage
Hoang & Quynh 2012 [36] Australia Mixed-method approach	Cross-sectional survey questionnaire (n = 210) and semi-structured interviews (n = 22)	Self-reported instrument on preferences for different models of intrapartum care. Hospital (conventional) care, Midwifery-led care, and Planned homebirth. Interviews included questions on views of travel time to safe delivery, safety, distance from hospital and delivery type	The women preferred to give birth in a hospital setting despite having to travel for two hours. Midwifery-led care with one hour travel time was the second most preferred model

Continued

Iida *et al.* 2011 [37] Japan Cross-sectional survey (retrospective)	A package of questionnaires N = 591	Self-completed retrospective questionnaire; A researcher-developed women-centred care questionnaire, Labour Agentry Scale, Maternal Attachment Questionnaire and researcher-developed Care Satisfaction Scale	Women who delivered at birth centres rated women-centred care highly and were satisfied with the care they received compared to those who gave birth at clinics and hospitals. This was related to respectful communication during antenatal checkups and the ontinuity of care by midwives
Lyndon *et al.* 2015 [38] San Francisco USA Theoretical approach based on empirical collaborative research	Expert professionals from four organizations that care for women during labour and birth	Expert opinion No information about the instruments used in previous studies in the group's collaborative research on safety issues in labour and delivery teams	Patient safety requires mutual accountability; individuals, teams, healthcare facilities, and professional associations have a shared responsibility for creating and sustaining environments of mutual respect and engaging in highly reliable perinatal care
Larkin *et al.* 2012 [39] Ireland Qualitative descriptive study	Interviews, five focus-groups, n = 25	A qualitative analysis process was developed by focusing on expectations, opinions, experiences and emotions	Three themes were identified; "getting started", "getting there" and "consequences". Control was an important element in childbirth experiences. Women felt alone and unsupported
Raab *et al.* 2013 [40] USA Theoretical approach based on previous empirical studies	Cross-sectional survey Questionnaire n = 210 Intervention: team training, simulation, safety walk rounds. Implementation of collaborative processes	Self-reported Safety Attitudes Questionnaire	Increased collaboration can improve patient outcomes and provider satisfaction. An organization's leadership and culture will affect the outcome of collaborative efforts. Collaboration is a process that optimizes perinatal patient safety. Chain of communication
Collins 2008 USA [41] Theoretical approach	Review of claims involved in malpractice cases reported to IOM[3)]	Electronic foetal monitoring education	Multidisciplinary teamwork increases communication and can reduce the number of adverse events
Sarrechia *et al.* 2012 [42] Belgium A descriptive study using qualitative methods	Examination of the content of care pathway of documenting care, content analysis. The content was compared with 40 evidence-based of Map of Medicine files	Evidence-based key interventions	An important variation in the use of evidence-based key interventions within the obstetric care pathway applied to the baby and mother
Hamman *et al.* 2009 [43] USA Mixed-methods Case study design	Simulation-based team training interviews	Identifying latent threats to patient safety	Improving communication, access to blood products and technical competences
White *et al.* 2005 [44] USA Retrospective analysis	90 consecutive obstetrics and gynecology-related internal review of files	Identifying action, events, and environmental circumstances that appeared to contribute to the event.	Fifty percent of cases were associated with in-patient obstetrics. Factors that may have contributed to adverse events were identified in 78% of cases, while 31% were associated with apparent communication problems

overall main theme, key aspects or domains, as well as sub-themes [27] (p. 1). The selected articles were compared, grouped and qualitatively summarized in relation to the review question. The five authors read the articles, extracted terms or descriptions and validated the first draft **Table 2**. The interpretation of aspects of PS was based on the theoretical view of PS presented by the WHO [1] [3] [5]. For interpretation of components of the contexts we used the core elements of patient-centred care; patient participation and involvement, the relationship between the patient and healthcare professional, and the context in which care is provided [11] (p. 4).

3. Results

3.1. Search Results

In total, 416 abstracts were screened, resulting in the inclusion of 30 full texts, peer-reviewed articles. Following quality assessment, the final sample comprised 12 articles on PS and person-centred care. The characteristics of the 12 articles are presented in **Table 1**. Of these, nine were empirical [33] [34] [35] [36] [37] [39] [42] [43] [44] and three applied a theoretical approach [38] [40] [41]. The studies were conducted in different countries, *i.e.*, the Netherlands [33], the USA [34] [35] [38] [40] [41] [42] [43] [44], Australia [36], Japan [37] and Ireland [39].

3.2. Summary of Quality Assessment

The *designs* comprised mixed-methods [33] [36] [43], a cross-sectional survey [34] [36] [37], a cohort study (prospective, *i.e.*, implying the forward direction of the research question and retrospective, *i.e.*, meaning that when the study is planned, all or part of the data have already been collected [33] [35] [44], a qualitative descriptive study [42], review of documents, *i.e.*, a theoretical approach [38] [41] as well as an intervention case study [43] **Table 1**. The information about selection bias was unclear in terms of the representativeness of the population. Some studies failed to report confounding factors related to recruitment or analysis. Two studies were document analyses of files pertaining to medical errors or adverse events, outcomes and closed claims [41] [44].

Only two studies addressed the appropriateness of the sample size. One study had a very low response rate [36]. Most of the studies used correlational, regression statistical analyses and descriptive statisticsas well as χ^2 tests [36]. The study by Iida *et al.* [37] used the Pearson correlational coefficient to examine the relationship between variables and applied a multiple regression analysis to compare women's perception of women-centred care and their satisfaction with care during pregnancy. Convergent validity of the scale scores was measured by correlations with external teamwork related items [34]. The study by Wagner *et al.* [35] used logistic regression. In summary, the most common weaknesses of the included studies related to design, sampling and analysis. The quality of each relevant study is reported in **Table 2**.

Table 2. Evaluative overview and quality assessment of the selected articles adapted from the Long and Godfrey [32] template[1)].

Authors and year	Phenomena studied: core elements of PS* studied	Context: where the care is delivered	Context: core theoretical elements of PCC*	Policy and practice implications	Quality assessment score[2)]
Martijn *et al.* 2013 [33]	Safety culture Type of incidents	Primary care midwifery practices	Midwifery-led care	Adherence to practice guidelines for patient risk assessment, better implementation of interventions with regard to risk factors and better availability of midwives during birthing	M
Sexton *et al.* 2006 [34]	Safety culture Teamwork climate	Hospital care, labor and delivery units	Theory of safety culture. Culture understood as artifacts, values and assumptions that make an organization distinct	To explore links to clinical and operational outcomes	H
Wagner *et al.* 2011 [35]	Adverse events Perinatal safety	Hospital care, obstetrics ward	A multicomponent model: evidence-based protocols, team training, fetal monitoring, simulation program, educational program	Multicomponent safety initiatives in the healthcare system are necessary to improve PS	H
Hoang & Quynh 2012 [36]	Access to safety care	Hospital (conventional) care, midwifery-led care and planned homebirth	Three different models of intrapartum care	Women's preferences should be taken into account when planning for type of delivery.	L
Iida *et al.* 2011 [37]	Safety, sense of control during labor and birth Communication and satisfaction with care	Three different types of health facility; birth centres, clinics and hospitals	Women-centred care	Healthcare providers should consider the positive correlation between women-centred care and women's perceptions of satisfaction, in addition to continuity of care and respectful communication	H
Lyndon *et al.* 2015 [38]	Safety culture	Intrapartum care Perinatal care	Patient-centred communication	Approaches for improving communication	NI
Larkin *et al.* 2012 [39]	Women's physical safety Risk management	Hospital units Rural and city hospital	Conventional care	Quality of maternity services must encompass recognition of psychological and emotional well-being alongside physical safety	H
Raab *et al.* 2013 [40]	Safety culture	Perinatal care Three academic facilities	Collaborative model	Changing culture requires administrative support and role modeling, staff involvement and sustainment of the desire to change Sharing experiences debriefing	NI
Collins 2008 [41]	Safety culture Teamwork Medical errors Communication	Perinatal hospital units	Multidisciplinary team approach Uniform patient care strategies Patient-relevant information Collaborative approach Decision-making	Team training, rapid response teams Interdisciplinary electronic fetal monitoring course Crew resource management approach Uniformity of practice Discussion of system failures	NI

Continued

Sarrechia *et al.* 2012 [42]	Communication Coordination of care Multidisciplinary teams	17 care pathway for normal delivery All organization that submitted pathway documents consented to inclusion in the study. One member of the research team rendered the pathway documents anonymous	Donabedian's paradigm, *i.e.*, the relationship between the structure, process and outcome of care Knowledge-sharing networks	The pathway documents should be more standardized, reviewed by peers and checked for the inclusion of all interventions before used in daily practice	H
Hamman *et al.* 2009 [43]	Risks and failures in the healthcare organization Safety culture	Four in situ simulations were conducted in a community hospital, obstetric ward	Team training	Results from clinical simulations in an operational healthcare setting can help identify and resolve threats to patient safety	L
White *et al.* 2005 [44]	Risk management Communication	Hospital	Respectful approach, good communication, safe boundaries and careful communication	Analysis of claims files may help identify opportunities for improvement. Computerized physicians order entry and teamwork tools may improve information flow and help prevent miscommunication	H

*Patient Safety = PS, **Person-Centred Care = PCC or its variants, such as patient-centredness, patient-closer care or patient focus, midwifery-led care, women-centred care. [1)]Long and Godfrey [32]. [2)]Assessment quality: H = high *i.e.*, most of the criteria are fulfilled, M = moderate *i.e.*, some of the criteria are not fulfilled, and L = low *i.e.*, few or none of the criteria are not fulfilled. [3)]Institute of Medicine = IOM. [4)]Theoretical approach, expert opinion [38], implementation of programme [40] [41].

3.3. Evidence Related to Key Components of Long and Godfrey's Evaluation Criteria

Criterion No.1: the core elements of PS. All articles reporting presented PS presented patient safety culture aspects, thereby contributing to knowledge and understanding of the problems inherent in practice. Criterion No.2: design/methodology, data collection, analysis and sample are described in **Table 1**. Criterion No.3; context: setting in which the care was delivered, core theoretical elements of person-centred care. The context/settings presented were primary care midwifery practices [33], hospital labour and delivery units [34] [36] [39] [40] [41] [44], and an obstetric ward [35]. The core theoretical elements of person-centred care were midwifery-led care [33] [36], women-centred care [37], safety culture theory [34], a multicomponent model including evidence-based protocols, team training, foetal monitoring simulation and an educational programme [35] [43], patient-centred communication [38], a collaborative model [40], and a multidisciplinary team approach [41]. Two studies focused on the relationship between the structure, process and outcome of care with reference to Donabedian's paradigm [42] and a respectful approach, good, and careful communication and safe boundaries [44]. The third area centred on the sampling strategy adopted **Table 1**. The samples varied between 22 - 4700 subjects. In some studies, "Why were these informants or events chosen?" To answer the research question was not explicitly reported nor was the relevance of key events to the study aims.

Criterion No.4, policy and practice implications, the outcome criteria informing

the study *i.e.*, "What counts as 'success' or a beneficial effect?" It was possible to interpret guidelines for patient risk assessment [33], to improve PS multicomponent safety initiatives in the healthcare system [35] [39], enhance approaches to communication [38], share experiences by debriefing [40], team training [41], standardized documentation [42] and analysis of claim files to identify opportunities for improvement [44]. In summary, the perspectives of patients [33] [36] [37] [39] and professionals [34] [35] [38] [40] [41], were addressed. The quality total score of each relevant study is reported in **Table 2**. Overall, we found a range of research designs employing qualitative and quantitative approaches. They were rated as high (n = 6), moderate in quality (n = 1) and low quality (n = 2).

The selected articles described the core elements of PS, with emphasis on medical, technical and caring aspects. The person-centred care models are determined by the quality of interactions between the patient, family members and healthcare professionals, in addition to communication skills, shared understanding, decision making and emotional support. The contextual aspects of maternity and obstetric care interact with various intervention strategy components to improve PS and are enhanced by competence outcomes and the linkages to person-centred care.

3.4. Evidence of the Linkages between Patient Safety and Person-Centred Care in Maternity and Obstetric Care

One theme was revealed: *Trustful, safe communication in the relationship between the patient, family members and healthcare professionals*. Two domains; *Safety culture* and *Multidisciplinary capacity building*, emerged in the results. There were six dimensions related to the first domain, namely: Values, beliefs and trust, Respectful communication, Sense of control of labour and birth, Patient involvement, Sharing experiences and Continuity of care, while the second domain, was based on the following five dimensions: Collaborative work, Knowledge sharing, Teamwork, networking and accountability, Coordination and risk management and Patient-centred communication **Table 3**.

Domain 1: All included studies reported aspects of *Safety culture*. The study by Martijn *et al.* [33] presented evidence that availability, patient risk assessment and communication were problematic domains. Cultural aspects such as *values, beliefs and trust* in the relationship between the patient and healthcare professionals were reported [34] [36] [40]. *Respectful communication* was described in three studies [37] [41] [43]. The sub-theme *sense of control of labour and birth* was found in four studies [33] [35] [37] [39]. *Patient involvement* was included in the theme of safety culture in six studies [33] [36] [37] [38] [42] [44]. Eight of the studies highlighted the importance of *sharing experiences* [33] [35] [36] [37] [38] [40] [42] [44] while one also mentioned *continuity of care* [37].

Domain 2: The theme *Multidisciplinary capacity building* was based on the results from all included studies. This theme consisted of five sub-themes, all related to multidisciplinary work: *Collaborative work* [34] [36] [40] [41] [43], *Knowledge sharing* [43] [44] *Teamwork*, *Networking* and *Accountability* [34] [38] [40] [41]

Table 3. The synthesis of linkages between patient safety and person-centred care.

Theme: Trustful, safe communication in the relationships between the patient, family members and healthcare professionals		
Domain	Key dimensions	Sources
1. Safety culture	Values, beliefs and trust	[34] [36] [40]
	Respectful communication	[37] [41] [43]
	Sense of control of labour and birth	[33] [35] [37] [39]
	Patient involvement	[33] [36] [37] [38] [42] [44]
	Sharing experiences	[33] [35] [36] [37] [38] [40] [42] [44]
	Continuity of care	[37]
2. Multidisciplinary capacity building	Collaborative work	[34] [36] [40] [41] [43]
	Knowledge sharing	[43] [44]
	Teamwork, networking and accountability	[34] [38] [40] [41] [43] [44]
	Coordination and risk management	[33] [35] [36] [39] [42] [43] [44]
	Patient-centred communication	[35] [37] [38] [41] [42]

[43] [44]. Factors related to the healthcare organization, and leadership were *Coordination* and *Risk Management* [33] [35] [36] [39] [42] [43] [44] and finally, *Patient-centred Communication* was interpreted as involving *Capacity Building* [35] [37] [38] [41] [42].

4. Discussion

There are few studies on the theoretical and clinical importance of understanding the relationship between PS and person-centred care. To address this gap we developed an integrative review to evaluate the current state of the evidence. Findings from this review advance our knowledge and have significant theoretical and clinical implications. The key feature of PS and person-centred care in the maternity and obstetric context is *trustful safe communication in the relationship between the patient, family members and healthcare professionals*, based on two domains; *Safety culture* comprising six dimensions and *Multidisciplinary capacity building* consisting on five dimensions.

Series of propositions regarding the pattern of linkages between PS and person-centred care were identified from the selected papers, which can inform clinical assessment and interventions as they highlight the fact that communication and/or miscommunication may pose a risk to PS in the maternity and obstetric context. Similar to previous empirical studies of PS [4], this review provides strong evidence of the need for good communication between healthcare professionals and patient. If the communication process does not include the sharing of meaningful information, it may result in poor quality, uncertainty and conflict. Notably, these findings expand previous research by presenting two perspectives of PS and person-centred care, namely *safety culture* and *multidisciplinary capacity building*. The clinical implications of the findings are therefore noteworthy. The main component in the safety culture domain is respectful communication, where

the sharing of experiences leads to a sense of control during labour and birth as it relates to the women's sense of personal capacity. According to Yu *et al.* [2], other prerequisites for PS are patient involvement and continuity of care, which prevent errors. Thus, the second major finding was that the midwives' communication competences are essential due to the necessity of interacting with patients to support the birth and meet the women's needs and expectations. This is confirmed by the study by Renfrew *et al.* [45] that highlights respect, communication, knowledge and understanding for facilitating care that is tailored to women's circumstances and needs. The third major finding was that collaborative teamwork, coordination and risk management, knowledge sharing and patient-centred communication constitute an important part of the *multidisciplinary capacity building* domain. This finding is consistent with the WHO's [1], PS theory comprising five domains: Leadership and management, Patient and public involvement, Safe evidence-based clinical practices, Safe environment and Lifelong learning.

4.1. Communication

Not surprisingly, communication appears in both domains. However, the two dimensions differ in that patient-centred communication can be interpreted as a professional attitude on the part of midwives that includes sharing information and incident reporting. This is in line with Mendes and Ventura's [46] research on verbal and non-verbal communication, the ability to listen and interpret feedback, in addition to awareness of safety issues. The systematic review by Ward and Armitage [47] emphasizes the patient's voice as a key element of PS development and management.

Despite the necessity of involving patients in their own safety, the efforts to promote involvement are not focused upon. The relationship between the birth environment and midwifery practice should be explored with focus on a safe and satisfying birth. Foureur *et al.* [48] suggest studying the impact of design on communication in maternity care settings and developing a conceptual model based on the literature and understanding of design, communication, stress and care models. This is an innovative starting point for a deeper understanding of the complexity of birth and the range of disciplines necessary for safe and effective maternity care. In line with the theory of PS, person-centred care may improve quality and shared decision-making by transforming and developing decision-making through the engagement model [49] to improve health outcomes, suggesting that a new patient-centred implementation model is required. This framework focusing on the core components of evidence-based decision making through the engagement model links PS and person-centred care and has the potential to go beyond maternity care and influence other clinical areas. Central to this model is the women's active involvement in decision-making [49]. The findings from this review are in line Lyndon *et al.* [50], who demonstrated that effective multiprofessional communication in maternity care is respectful, clear, direct, and explicit. The Lyndon *et al.* [50] highlighted of the importance of improving communication by building it on an infrastructure of respect, attentiveness,

collaboration, and competence, which is in agreement with our findings.

Our findings demonstrate the need for improved communication processes in the area of care planning. Quality and safety are informed by women's experiences [51] Different levels of engagement can be discussed in relation to the importance of communication: in direct care, *i.e.*, the relationship between healthcare professionals, patients and families; on the organizational level to enable patients and their family members to influence the way the organization provides care; and in community healthcare to make it possible for patients and their family members to influence the health or healthcare strategies of public agencies [2].

Overall, this review contributes novel and important knowledge that deepens the understanding of how an organization functions or fails. It also highlights the need for system change [52], arguing that to change our behaviour within a system, we have to change the way we think about the system per se, the way knowledge is created and how we become involved in the process of knowledge translation [52] (p. 226). The Safety Model described by Macchi *et al.* [15] is based on the anticipation of undesired events and measures to ensure safe functioning. The emphasis of the non-linear model's emphasis on the organization and its dynamics calls into question linear causal thinking to explain accidents, while supporting the normal functioning of the organization in combination with the prevention of incidents and accidents. Processes to develop PS are implemented across the organization and take the organization's characteristics into account, such as communicating advice to protect against risks and for organizational development [15]. The safe management systems are embedded in the organization's culture. Entwistle and Watt [53] (p. 36) emphasize that person-centred care can be understood in terms of a single guiding idea that involves recognizing and cultivating patients' personal capabilities. Despite the differences between the definitions and characterizations, person-centred care can be related to the broad overarching ethical idea that patients should be "treated as persons" [53] (p. 29). The authors suggest the capability approach as a guiding idea, including behaviours such as respect, compassion, responsiveness to subjective experiences, and support for autonomy, thus, the intrinsic value of person-centred care. This approach constitutes a broad normative framework for the evaluation and assessment of individual well-being [54].

Qualitatively enhancing the understanding of a phenomenon by illuminating its meanings may lead to healthcare professionals adopting a more holistic approach to care. An integrated team and the way team members work together will influence communication about safety. Finally, directly involving team members in person-centred care will facilitate safe care.

4.2. Limitations of This Review, and Suggestions for Future Research

This review makes valuable and unique contributions to deepening the understanding of the links between PS and person-centred care. However, the findings should be interpreted in the light of some limitations. CASP [30] was the assess-

ment tool used for quality appraisal of observational analytic (cohort, cross sectional and case-control) [55] studies and also for the qualitative appraisal as well. As suggested by Long and Godfrey [32] (p. 184), we adapted some parts of the evaluation tool to assess the quality of the studies and reflect the uniqueness of the associated paradigm **Table 1** and **Table 2**. When developing their evaluation tool the authors focused on the following questions: The conceptual or theoretical framework: *i.e.*, "In what way does this study contribute to knowledge theory and/or practice?", the contextual aspects related to the setting in which the study was undertaken, *i.e.*, "Why this setting?", "Is it appropriate in order to examine the research question?" and "Is sufficient detail provided about the setting?", the nature of the sampling strategy adopted, *i.e.*, "Why were these informants or events chosen?" and "Are key events appropriate given the study aims?", and finally the outcome criteria *i.e.*, "What counts as 'success' or has a beneficial effect and over which time periods?" In the synthesis of the findings the reviewers were cautious when extracting the domains and dimensions from the empirical and theoretical studies. Interpretative methods were used to synthesize and integrate the findings. Essential components of the linkages between PS and person-centred care were identified. The concept of person-centred care is used interchangeably with patient-centred care, although they could vary slightly and thereby provide different information that we might have missed. However, the authors are experienced in several areas of nursing practice and have numerous years of research experience in the contexts of nursing, midwifery, and public health and health sciences. In addition, they collaborated closely and discussed the quality and the content of the findings. A further limitation is that the quality appraisal or assessment tools used are dependent on the study design and not all questions were relevant to the individual studies. In addition, the authors' understanding of research design and critique as well as knowledge of the difficulty involved in interpreting the design employed should be taken into account. Further empirical research is needed to understand the linkages between PS and person-centred care.

5. Conclusion

We conclude that there are several linkages between PS and person-centred care in the maternity and obstetric context. Healthcare professionals have an important role in delivering safe person-centred care and require knowledge, leadership, academic supervision, mentorship and financial resources to maintain quality of care and PS.

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Conflicts of Interest

All authors declare that there are no conflicts of interest with regard to this study.

Author Contributions

Elisabeth Severinsson was the project supervisor. She co-conceptualised and designed the study, drafted the initial manuscript, and approved the final manuscript. All authors contributed to the data analysis and interpretation of the results. All authors provided feedback on the draft manuscript and approved the final version. They all adhered to the criteria pertaining to roles and responsibilities in the research process recommended by the ICMJE (http://www.icmje.org/recommendations)

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Educational Game about Drugs for Visually Impaired People: A Comparison between Brazil and Portugal

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Abstract

Objective: To validate the educational board game "Drugs: playing fair" for visually impaired people in Brazil and Portugal. **Methods:** Study of apparent validation carried out in two associations for visually impaired people in Fortaleza, Brazil, and in Porto, Portugal. Thirty-six visually impaired people, 18 from each country, participated in the study. An evaluation tool with 23 items on specifications, content and motivation of the game was applied. **Results:** The scores awarded in both countries were excellent, with means varying in Brazil from 9.0 to 9.6 and in Portugal, from 8.4 to 9.2. As for the categories and subcategories, the best means in Brazil were: content (9.5); theoretical and methodological consistency (9.6) and concepts/information (9.5). In Portugal, the best means were concepts/information (9.2) and curiosity (9.2). Only two items showed a significant difference: "it allows interaction" ($p = 0.024$) and "compatible degree of difficulty" ($p = 0.012$). **Conclusion:** The educational game on drugs was validated in Brazil and Portugal.

Keywords

Validation Studies, Health Promotion, Play and Playthings, Nursing, Visually Impaired Persons

1. Introduction

The society experiences a public health problem in relation to the abuse of drugs

because new drugs are created and consumed by individuals increasingly younger. There is evidence of use of illicit drugs by college students, accounting for approximately 50% of the high-risk group [1]. Half of the students had used an illicit drug, such as cocaine, or had intake of alcohol, at least once in life [2]. Alcohol is considered a licit drug and is among the substances associated with high mortality rates due to road accidents [3].

Considering this problem and considering that the use of drugs does not depend on race, color, sex, age, and social status, activities of intervention, prevention or rehabilitation are very important, including all areas of society because any individual has the right for health and information. Thus, Visually Impaired People (VIP) who represent a considerable portion of the population should be included in this process. The last census conducted in Brazil showed that this group represented a total of 35 million people, of whom 500,000 are blind [4]. In Portugal, they were 163,515 individuals, representing 9.16% of the population [5].

These individuals make use of alcohol and are also vulnerable to drug abuse, and, therefore, it is necessary to inform this clientele in order to promote health and prevent and/or reduce the consumption of drugs, especially when there is consumption of licit drugs such as alcohol [6].

In order to achieve health promotion, it is necessary to understand the peculiarities that this clientele has, as the limited or absent sight. Resources and services that may allow decisions on their health should, therefore, be developed and used. Among these materials, there are recreational resources such as educational games intended to promote health education. However, among the artifacts that are intended for this clientele, few are directed to education on health promotion and comply with the characteristics of assistive technologies [7]. Thus, games should be accessible in order to carry out effective and efficient health promotion, capable of generating learning and promoting dialogue. To make these resources available to the public, it is essential that they be assessed and validated. In this way, reliable products with real possible impacts on health promotion may be obtained.

Because Brazil and Portugal have problems related to drug abuse and because we are aware of the importance of materials adapted for health promotion, a game about drugs [8] was developed, with content validated [9] and evaluated for effectiveness regarding the accessibility of information to people with visual impairment [10].

"Drugs: playing fair" consists in a board game with unidirectional path formed by houses with different textures, letters containing questions and answers, pins, chips and game instructions, and it is played in pairs. It contains information about definition and classification of drugs, the main signs and symptoms, protective factors and risk. The game is in Braille and ink with large typing.

The present study aimed to validate this educational game with Visually Impaired People in Brazil and Portugal.

2. Methods

Study of apparent validation carried out with the objective to prevent that the con-

struct be too primitive for these subjects and show the degree to which instrument measures what it should measure. There are three types of validation: of the content, criterion and of the construct. In this case, the validity refers to the construct "educational game" [11]. The analysis of results verifies if the objectives were achieved.

The study was conducted in two associations to VIP, one in the city of Fortaleza in Brazil and the second in Porto, in Portugal. The sample was by convenience, which entails the use of people that are more conveniently available to participate in the study. The defined inclusion criteria were ability to read in Braille or capital letters and be motivated for the game, without age restriction. Those who could not read braille or capital letters, who were unmotivated for the game, which found it difficult to understand the rules of the game or did not sign a free and informed consent were excluded. The participants were recruited from Schools and Associations for the Blind Specialized Services and, after participating in the experience with the educational game, they were asked to name other persons interested in participating.

Data collection was performed between the months of December 2012 and February 2013 in Brazil, and from April through June 2013 in Portugal. For data collection, an instrument for evaluation of the educational game on drugs was applied [12]. The instrument was answered individually. The tool included items that questioned whether the game fulfilled the educational function; the specificities with regard to mechanics and functionality; the content in matter of accessibility, theoretical methodological consistency, concepts and information; the level of motivation to evaluate challenge, fantasy, curiosity and interpersonal motivation. Responses were given on a scale of 0 to 10.

At the start of data collection, pairs were formed and the purpose of the research was explained. Then, the players received the board game. The rules of the game were made available in Braille, audio or were read aloud by the researcher. In the sequence, the game was started by touch and reading of the cards, without interference of the researcher. When the game ended, the evaluation tool was applied. The tool contained 23 items related to specifications, content and motivation of the game. The category Game Specifications are related to its applicability, if it is easy to handle and if its structure allows the individual to recognize its components. In turn, the category Content refers to the accessibility of information covered, concepts and information contained, and if there is consistency between what is stated in the cards and the theme drugs associated with the relevance of the approach. The category Motivation considers the individual's motivation to learn by inserting levels of difficulty to the questions, cognitive curiosity, as well as aspects that surprise and/or intrigue the individual.

Inclusion criteria were: being visually impaired person who read braille or can read enlarged letters. There were no restrictions regarding age, gender and level of education.

Results were organized in tables and normality and equality of variances of data were checked thorugh Kolmogorov-Smirnov and Levene tests and then the means

of the instrument between the two countries were analyzed through t-Student test. Analysis with $p < 0.05$ was considered statistically significant. Data were processed in SPSS 20.0.

The research was approved by the Ethics Committee of the Federal University of Ceará under Opinion n˚ 115,850. The study adhered to national and international standards of ethics in research involving humans.

3. Results

The study included 36 VIP, 18 from each country. It was found that the average age of Portugal (49.8) was higher than Brazil (29.1) ($p < 0.0001$). Regarding education level, the average number of years of study were similar ($p = 0.054$), but higher in Brazil (10.9 years) than in Portugal (9 years).

Table 1 shows the mean and standard deviation of categories and subcategories, comparing Brazil and Portugal.

Clearly, there was a statistical difference between Brazil and Portugal in the subcategory challenges, which received a better assessment by the Brazilian players. The following table shows the ratings of the two countries for the items of the present instrument (Table 2).

There was a statistically significant difference in "it allows interaction" ($p = 0.024$) and "compatible degree of difficulty" ($p = 0.012$). There was a difference in interaction and degree of difficulty to play the game in these items. In Brazil, the participants felt that the game allows for greater interaction and they had less difficulty in using the game.

Table 1. Game assessment according to categories and subcategories of the scores awarded by people with impaired vision in Brazil and Portugal, Ceará, Brazil, 2014.

Categories/subcategories	Mean ± SD* Brazil	Mean ± SD Portugal	*p*
Educational game	9.3 ± 0.7	8.8 ± 1.3	0.219
Game specifications	9.0 ± 1.0	8.5 ± 1.7	0.255
Game mechanics	9.1 ± 1.2	8.4 ± 1.8	0.183
Functionality	9.0 ± 1.2	8.6 ± 1.8	0.445
Content	9.5 ± 0.8	8.9 ± 1.2	0.112
Accessibility	9.2 ± 1.3	8.5 ± 1.6	0.134
Theoretical/methodological consistency	9.6 ± 0.8	9.0 ± 1.2	0.084
Concepts/information	9.5 ± 0.9	9.2 ± 1.4	0.442
Motivation	9.2 ± 0.7	8.9 ± 1.3	0.352
Challenges	9.2 ± 0.8	8.4 ± 1.3	0.041
Fantasy	9.2 ± 0.8	9.0 ± 1.3	0.468
Curiosity	9.0 ± 1.3	9.2 ± 1.5	0.678
Interpersonal motivation	9.3 ± 0.8	9.0 ± 1.5	0.416

*SD = Standard Deviation.

Table 2. Comparison between Brazil and Portugal scores for the items in the assessment of the game, Ceará, Brazil, 2014.

Questions	Mean ± SD Brazil	Mean ± SD Portugal	*p*
Clear instructions	9.2 ± 1.5	8.1 ± 2.0	0.074
Comprehensible instructions	9.1 ± 1.2	8.8 ± 1.7	0.581
Recognizable components	8.6 ± 1.6	8.6 ± 1.8	0.923
Manipulable components	9.3 ± 1.1	8.6 ± 1.9	0.183
Understandable language	9.1 ± 1.8	8.3 ± 1.8	0.247
Understandable components	9.4 ± 0.9	8.7 ± 1.9	0.129
It allows interaction	9.8 ± 0.5	8.9 ± 1.4	0.024
It enables discussion/reflection	9.6 ± 0.9	9.1 ± 1.5	0.248
It builds knowledge	9.4 ± 1.1	8.9 ± 1.7	0.308
Subject is coherent and contextualized	9.4 ± 1.0	9.2 ± 1.3	0.584
Information is relevant	9.5 ± 1.0	9.1 ± 1.5	0.362
Challenges are exciting	9.2 ± 1.5	8.6 ± 1.9	0.295
Degree of difficulty is compatible	9.3 ± 0.8	8.2 ± 1.5	0.012
It provides dynamic learning	9.2 ± 1.0	8.5 ± 1.5	0.105
Comparisons facilitate understanding	9.2 ± 1.3	8.7 ± 1.6	0.312
It stimulates imagination	9.3 ± 1.0	9.2 ± 1.3	0.890
It brings benefit to the everyday life	9.2 ± 1.1	9.0 ± 1.4	0.597
It arouses curiosity	9.1 ± 1.4	9.2 ± 1.5	0.737
Interest in playing is maintained	9.1 ± 1.3	9.3 ± 1.5	0.632
Competitiveness enhances self-esteem	8.6 ± 1.4	8.6 ± 1.7	0.914
Successes and mistakes encourage learning	9.3 ± 1.0	8.8 ± 1.6	0.323
I would play it again	9.7 ± 0.9	9.3 ± 1.6	0.392
I would indicate it to someone else	9.8 ± 0.7	9.3 ± 1.7	0.203

4. Discussion

The main results related to the profile of the subjects include the findings that there is a statistically significant difference with respect to age between Brazil and Portugal. The oldest population was found in Portugal; although statistics describe that population aging is a worldwide phenomenon.

Data from census show that, in Portugal, the elderly population, defined as people aged over 65 years has steadily increased. In 2001, this population accounted for about 16.5% of the total population, and increased to 19.9% in 2013, with a greater proportion of women. It is estimated that elderly people living in Portugal exceeded 2 million. This made Portugal the fourth country with the highest proportion of old people in 2013 [5].

When this is compared to Brazil, it is clear also that the aging process of the population in this country is identified by the narrowing of the base and expan-

sion of the top of the age pyramid. This directly influences the population aging index and this is currently happening as a result of the decline in fertility and reduced mortality [13]. In this research, despite the aging process is noticeable in both countries, the largest number of elderly was found in Portugal. Literature describes that students in this country have sought to study and work in other countries, and this attitude has become considerably more frequent since the early twenty-first century. As a consequence, this may have contributed to the high proportion of elderly people found there [14].

Among the subjects of the two countries, there was no difference in the education level, which corresponded predominantly to primary or secondary incomplete education. The Demographic Census shows significant differences between level of education of people with and without disabilities. Most of the population aged at 15 years or older that have disabilities have no education or have incomplete primary (61.1%) education compared with those people who have no disabilities (38.2%) [13]. Therefore, individuals with disabilities have no schooling or a few years of schooling.

Participants showed satisfaction in relation to the educational game. In Brazil, all scores were above 9.0 and in Portugal, these were greater than 8.4.

Challenge, characterized as antagonistic element to the action of the player that helps in attaining the game's goals, achieved significant results ($p = 0.041$). This element is intended to ensure an additional motivating factor for achieving the set goals. When these are achieved, appropriate rewards are given, such as points and items of the game [15].

Games, in their educational potential, generate in players the predisposition to learn, since situations of challenges (exploration, discovery of rules, strategizing) are created, and encourage the use of logical reasoning to solve problems. Thus, the use of games in education favors the development of logic, strategy, analysis and sometimes memory, starting from trial and error to win the stages of the game. The game also encourages learning exposed in situations and in the context in which it is involved [16].

The best assessments were obtained in the categories content and motivation. Content refers to the theme, that is, the psychoactive drugs. This theme currently affects millions of people.

Thus, the relevance and the work that may reinforce the approach of the importance of avoiding the use of these drugs and reduce or eliminate their comsumptuion by those people who are already making use of such drugs, are of paramount relevance.

Motivation and challenge inherent to the game contribute for its value to education because solving problems stimulates the basic skills and help developing superior skills [17]. The theme, drugs, is motivating and represents a challenge because of the doubts that the subjects have on the subject. For a game to be useful in the educational process, this should promote situations that awaken the interest and challenge the participant to solve problems, as well as that allow the person to make a self-assessment regarding the performance, provided the per-

son actively participates in all stages.

Concerning the assessment of the instrument items, only two out of the 23 items showed significant difference: "it allows interaction" ($p = 0.024$) and "compatible degree of difficulty" ($p = 0.012$). This means that, although with excellent evaluations, both countries had a different perception of the game. This may be related to the habit of Brazilian participants in this study to have a mean age (29.1) below the Portuguese (49.8), and use play materials or educational board games, having perhaps more interest and ease to handle the game, ultimately reflecting the allocation of higher scores to these items.

Allow interaction when people are playing is essential. When the game allows learning and promotes health, this further enhances its content and its usefulness. Dialogue is critical here, to allow exchange of information and consequently exchange of knowledge [16].

Although it is a course game, "Drugs: Playing Fair" also showed characteristics of cooperative games to open space for interaction and assistance between the players, which take precedence over the objective of winning the game. It was possible to gather in the game features such as cooperation, acceptance, involvement and fun.

Regarding the item "compatible degree of difficulty", although groups had different evaluations, it is interesting to note that the level of education did not contribute to significant differences. Thus, this finding may be associated with the fact that the content was considered difficult. This calls for the importance of interventions related to drugs, including on the part of health professionals.

The discussion on drugs should not be restricted to schools and universities, as this topic it permeates the various spheres of society. However, the debate that is carried out in schools on various topics including drugs as a manner to promote prevention and early intervention is important. The school is the gateway to adulthood [18]. However, few institutions of higher education have systematic approaches to prevent or reduce drug use [19]. Regarding the assessment of the presented game, the items "I would play it again" (9.7, 9.3) and "I would indicate it to another person" (9.8, 9.3) stood out. The highest scores were attributed to these items by both Brazilian and Portuguese participants. This demonstrates that the game is a useful tool and has good receptivity. Among the different methodologies that can be used in educational practices are those with playful character. The playful atmosphere of the games facilitates the acquisition of knowledge in a pleasant way.

The playfulness is important in all age groups, because besides the fun, it provides the process of knowledge construction, and it is one of the possible mediators of the learning process [20].

In addition to these items, others also stood out due to excellent scores awarded by the Brazilian participants, "it enables discussion/reflection" (9.6) and "relevant information" (9.5). This shows that the game favored the implementation of the learning process and mediated the link between information, discussion and reflection. Participants were able to fill gaps of knowledge, clarify doubts and reflect on the subject proposed by the game, namely, drugs and their effects.

Therefore, the game in its pedagogical aspect allows the participant to develop the ability to think, reflect, analyze, understand, make hypotheses, test them and evaluate them with autonomy and cooperation [8].

Portuguese participants valued the items "interest in playing is maintained" (9.3), "it arouses curiosity" (9.2) and "it stimulates imagination" (9.2). The game "Drugs: Playing Fair" fires the imagination by putting the participant in situations that are similar to reality, so as to promote their immersion in the context of the game. This stimulates curiosity, leaving the player motivated to advance to the following stages of the game.

On the results presented, it is emphasized, therefore, the importance of the use and application of games as an educational strategy for health. A steady increase has been observed in the production of these types of games. However, few are those designed aiming at people with disabilities.

In terms of the current scenario of technological innovations in health, a portion of the population still lives with difficulty to access educational games. In the case of persons with disabilities, particularly visual impairment, accessibility to services and information is often limited. In this context, health promotion strategies are compromised because this population is left with no choice to decide about their health, particularly when they are on the agenda to discuss sensitive issues in the family and at school, as it is the case of drugs.

One limitation of the study was the small number of people motivated to participate in the study. Board games are not regularly available to this audience. Additional efforts from researchers were made to bring blind people to engage in this innovation. It was difficult to prepare the logistics to locate people interested in the game and theme, to find a suitable place and time for two people to play, and finally to gather them to play. All this planning required energy and dedication. We strongly believe that a growing number of these specific types of games will increase interest from researchers and participants.

Thus, health education is relevant in this context. This consists currently in a multifaceted field. When analyzed from the perspective of health promotion, it denotes more than passing on information and inducing certain behaviors [7], as it is proposed by the educational game. It includes also support the people and the community, so that they may make their own analysis and become able to make their own decisions, developing critical awareness [21].

5. Conclusions

The educational game "Drugs: Playing Fair" was validated in Brazil and Portugal. In the evaluation of the game, score was attributed so that means varied in Brazil from 9.0 to 9.6, and Portugal, from 8.4 to 9.2. As for the categories and subcategories, the highest means in Brazil were obtained for: content (9, 5); theoretical and methodological consistency (9.6) and concepts/information (9.5). In Portugal, the highest means were obtained for concepts/information (9.2) and curiosity (9.2).

The game sparked interest and curiosity, sharpening the desire to discover the

content of the cards and the dynamics of the game in itself. Still, interaction between players was observed, as well as discussion of views, enabling acquisition of information and discussion of the topic.

The number of participants was the main limitation of the study, especially due to the difficulty of gathering, physically, two visually impaired people for the application of the game.

The adapted tactile educational game appears as a possibility of teaching and learning, enabling such clients to access information to aid them to decide on their health. This resource is low cost and traditional and can be used by professionals of both areas of health and education.

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Vigilance Disorders in Permanent Night Workers: The Case of the Medical Staff

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Abstract

Purpose of the work: To assess the impact of fixed night shift on the vigilance of paramedical staff. **Methods:** The present study is an exhaustive cross-sectional survey which has been conducted at the University Hospital of Monastir, Tunisia, and it is about 92 care agents working permanently the night. The study of vigilance is based on Epworth scale and Super Lab program. **Results:** The average age was equal to 42.53 ± 9.45 years with a sex ratio of 1.72. Nurses accounted for 72%. The average score of alertness assessed with Epworth scale was equal to 14.5 ± 6. The use of the Super Lab software has objectified a tendency towards the increase in the average time of reaction of accomplishment of the simple task and the positive cueing task, which was evaluated while starting the shift, during the half time of the work and at the end of the shift. In addition, the average rate of errors evaluated at the beginning, half-time and at the end of the work has increased during 3 tests (simple task, positive and negative cueing tasks) without this difference being statistically significant. **Conclusion:** The alteration of vigilance with an ascent of the error rate among fixed night shift workers is a reality, which puts in question, not only the health of paramedical staff but also the care safety provided by these teams.

Keywords

Impaired Alertness, Fixed Night Work, Healthcare Workers, Epworth Scale

1. Introduction

Sleep is a crucial time; it is a fundamental biological need for both physical and mental health. This period of day is necessary for neurons regeneration, consolidation of new memories and formation of new synapses. Sleep deprivation is

associated with decreased attention and vigilance, with impaired memory and decision making, slower reaction time and increased number of micro sleeps during wakefulness [1]. Prior investigations have demonstrated changes in vigilant attention and cognitive performance with sleep restriction and circadian phase [2] [3]. A meta-analysis of 19 research studies showed impairment in cognition, motor skills, and mood with sleep restriction [4]. Sleep restriction can cause global decreases in brain activity that adversely affects attention [5] [6]. An increased duration of wakefulness is associated with greater adverse effects on vigilant attention [7] [8] and with increasing impairment in psychomotor vigilance as chronic sleep loss accumulates [8] [9]. Circadian phase modulates vigilant performance, with improvements during the circadian day and declines during the circadian night [9].

Sleep deprivation also appears to be associated with other comorbid states such as cardio-vascular diseases [10] [11], metabolic disorders [12] [13]. It may be also associated with emotional lability with increased anxiety and depression [14]. Sleep deprivation is associated with an increased incidence of traffic accidents, comparable to driving under the influence of alcohol [15] [16].

Insufficient sleep due to night work is widely prevalent in our society [17]. These trends may be both more severe and more important in the health care industry, as patient safety can be directly impacted [18]. For nurses, the essence of activity is professional vigilance. It is the mental process that makes the informed nursing actions of assessment, diagnosis, intervention, and evaluation possible and meaningful [19]. Sever study was recognized that extended work hours affected medical [20] [21] and surgical performance [22].

To assure the continuity of care, hospital staff is ever exposed to shift work and for some to permanent night work, which can affect their sleep and vigilance states. So that, we have conducted this exhaustive descriptive study which is interested in hospital employees working permanently at night in a Tunisian university hospital in order to assess the impact of fixed night work on vigilance.

2. Materials and Methods

It is an exhaustive cross-sectional study about the hospital staff working fixed night shift hours at University Hospital of Monastir in Tunisia and carried out during three months (April-May-Jun) of 2011.

2.1. Studied Population

Study population, who are included in the first step of the study, counted one hundred and five personals. Exclusion criteria were a seniority of fixed night work less than a year and a personal history of sleep disorder. The second step consists on an objective evaluation of vigilance among a representative sample choosing via the table of homogeneous exposition group, that is defined as a group of workers who share the same exposure profile because to determinants involved, such as the environment, employment in the same department, the processes and materials they use and the tasks performed [23].

2.2. Procedure

Firstly, data collection was realized by a questionnaire filled by the physician investigator while interviewing all participants in order to ensure a good comprehension of questions and to guarantee an answer to the entire questionnaire. Secondly, an objective test of vigilance is performed for a representative group of night work nurses.

2.3. Measuring Instruments

2.3.1. Questionnaires

Data collection has been carried out thanks to a self-anonymous questionnaire containing two headings. The first topic is related to socio-professional and medical data. These details were in relation with the socio-demographic characteristics (age; gender; marital status; the work of a spouse; the number of supported children), lifestyle (consumption of tobacco and alcohol; the practice of sports activities; participation in family meetings; the distance between the place of work-home and the used means of transport) and occupational characteristics (occupational category; seniority in night shift …).

The second topic is exploring vigilance using Epworth scale. It is an 8-item self-report measure of excessive daytime sleepiness that takes several minutes to complete [24]. The ESS distinguishes between good and poor sleepers. Respondents indicate on a four-point Likert-type scale (0 = never, 3 = high chance) the likelihood that they will "doze off or fall asleep" in eight different conditions (e.g., while sitting and reading, riding as a passenger in a car, sitting and talking to someone). Responses are summed to yield a total score from 0 to 24, with higher scores indicating greater sleepiness during common daily activities [25] [26] [27] [28]. ESS total scores of > 10 have been proposed to indicate excessive daytime sleepiness and four groups will be identified:

- <10: Normal sleepiness.
- 11to 15: Slightly excessive sleepiness.
- 16 to 20: Moderate excessive sleepiness.
- 21 to 24: Significant excessive sleepiness.

2.3.2. Objective Test of Vigilance

An objective study of vigilance was carried out among a representative sample of our studied population, calculated according to the theory of homogeneous groups of exposure using "Superlab" software, version 1.5.7. It is a program of exploration of the attentional abilities, based on the study of reaction time (RT) and the errors rate (ER) during the tasks execution included in this software. Three tasks were carried out: a task of simple reaction, a task of positive subscripting, and a task of negative subscripting. For every task, the subject sees a succession of items on the screen and is called to react as quickly as possible to a "target" by pressing the right button.

The evaluation of alertness has been realized by the "Super Lab" software in 3 times: at the beginning of the night shift (between 19 - 20'o clock), mid-time of the shift (between 24 - 1'o clocks) and at the end of it (5 - 6'o clocks).

2.4. Statistical Analysis

SPSS 11.0 software is used to data entry and the analysis of results. Frequencies and percentages are calculated for the qualitative variables as well as the means, standard deviation, the medians and the extent of extreme values for the quantitative variables.

For the comparison of means, we used Student's t-test for the comparison of two means of independent series and Snedecor's f-test of parametric variance analysis for the comparison of many means. The comparison of frequencies was carried out using Pearson's chi-squared test. A value of $p < 0.05$ was regarded as significant.

3. Results

3.1. Sociodemographic Characteristics

During period study, 92 questionnaires have been collected, with a participation rate of 86.8%. The average age was 42.5 ± 9.4 years. The study population has been predominantly male with a sex ratio of 1.72. The average body mass index was 27.4 ± 4.7 kg/m^2. Among night workers, 40% of cases were found to be overweight and 22.8% were obese. Diabetes and musculoskeletal disorders were the most reported pathological history (16.3%).

Among the interviewed staff, 37.3% were smoking and 7.6% among them reported regular consumption of alcohol. The regular practice of at least a leisure activity has been reported by 22.6% of cases. Duration of trip [homework] of less than an hour was reported by 82.6% of cases.

Study population comprised four occupational categories with a predominance of nurses (79.3%). The average occupational seniority in night shift was of 5 ± 3.5 years and ranged between 1 and 30 years. Among the fixed night hospital staff, 31.5% plan to work with the same schedule until the legal retirement age. The occupational characteristics are detailed in Table 1.

3.2. Vigilance

3.2.1. Daytime Sleepiness

Epworth score mean was of 14.5 ± 6. A diurnal excessive somnolence has been noted in 53.2% of the staff (Table 2). A statistically significant relationship has been noted between Epworth scale, the frequency of family meetings ($p = 0.045$) and the trip distance home-Hospital ($p = 0.026$).

3.2.2. Objective Test of Vigilance

Among the 106 staff permanently working at night, 14 have participated in the objective study of vigilance, using the Super Lab software, and reported to have bout of sleep in 64% of cases between T2 and T3 of the assessment, ranging from 1 to 5 hours.

During the performance of the task of simple reaction (TSR), the RT has significantly increased between the beginning of the shift and at half-time of it ($p < 0.05$), whereas it decreased with a statistically significant difference between T1-

Table 1. Distribution of hospital staff according to their socio-professional characteristics.

Socio-professional characteristics		Effective	%
Age group	<45 years	46	50
	45 - 55 years	41.12	44.7
	>55 years	4.87	5.3
Gender	Male	57	61.3
	Female	35	38.7
Matrimonial state	Single	20	21.7
	Married	70	76.1
	Divorced	1	1.1
	Widower	1	1.1
Number of dependent children	0	3	4.5
	1 - 3	34	74
	>3	15	22.8
Medical history	Diabetes	8	8.7
	Hypertension	3	3.26
	Musculoskeletal disorder	7	7.6
	Others	7	7.6
Occupational categories	Nurse	73	79.3
	Laboratory agent	4	43
	Administrator	1	1.1
	Anesthetist technician	9	9.8
	Radiologist technician	5	5.4
Average occupational seniority in night shift	<10 years	25	27.2
	10 - 20 years	5	5.4
	≥21 years	58	65.9
Possible pattern for retirement	Age	29	31.5
	Private reasons	20	8.7
	Occupational reasons	8	21.7
	Health reasons	4	4.3

Table 2. Distribution of hospital staff according to Epworth score.

	Effective	%
Normal sleepiness	6	6.5
Slightly excessive sleepiness	55	59.8
Moderate excessive sleepiness	29	31.3
Significant excessive sleepiness	0	0

T3 and between T2-T3 ($p < 0.05$) at the end of it. The ER has increased from the beginning of the shift till the end of it ($p < 0.05$).

During the task with positive subscripting (PS), the RT and ER have increased from the beginning to the end of the shift ($p = 0.01$). A simultaneous tendency to the increase of these two variables between T1 and T2 and a downward trend between T2 and T3 were also found during the test of negative cueing (NC).

The difference of RT was significant between T1 and T2 ($p = 0.02$); and non-significant between T1-T3 and T2-T3 ($p = 0.285$). No statistically significant difference was observed for the ER in the practice of this test (**Table 3**).

4. Discussion

The participation rate was 86%. The refusal of participation has been explained by a large workload for certain departments (resuscitation, emergencies, pediatrics) and by lack of motivation to participate in this survey by some care agents. The decline of vigilance with an ascent of the error rate among fixed night staff has been highlighted in our study. In fact, sleep deprivation leads to a sleep debt among night workers estimated between 1 to 2 hours that causes an excessive sleepiness [29] [30] [31].

In our study, an excessive somnolence has been found among 53.26% of the care agents with an Epworth average score of 14.5 ± 6. These results differ from those reported in literature. In a comparative study of the neuro-physiological changes of attention and memorization among a group of healthy night workers, a group of night workers with sleep disorder and a group of day workers, Valentina G.; *et al*., have reported an Epworth average score respectively of 5.3 ± 3.9; 11.8 ± 4 and 4.7 ± 2.8 [32]. Somnolent subject has a deterioration of certain cognitive functions of frontal origin: attention and concentration are reduced; reflexes are slowed down, and decision is altered [33].

The high prevalence of an excessive daytime somnolence noted among our studied population can translate an accumulated sleep debt, what is correlated to a long home-hospital trip and socio-family constraints.

However, some authors reported an adaptation of workers to fixed night work [34]. This adaptation is related to a resistance to the desynchronization of the

Table 3. Objective evaluation of vigilance according to super Lab program.

	Period of evaluation					
	Reaction time (RT)			Errors rate (ER)		
	T1	T2	T3	T1	T2	T3
The task of simple reaction	355 ± 67.4 ms	359 ± 53.1 ms	350 ± 51.4 ms	2 ± 2.9	3.2 ± 1.6	3. ± 2.3
The task of positive subscripting	350 ± 101 ms	404 ± 53.5 ms	390 ± 44 ms	1.8 ± 0.7	4.5 ± 3.2	16.5 ± 5.7
The task of negative subscripting	450 ± 44.8 ms	500 ± 63.8 ms	400 ± 66 ms	14 ± 14.7	16.5 ± 15	13 ± 8

T1: the beginning of the night shift (between19 - 20'o clock), T2: mid-time of the shift (between 24 - 1'o clocks), T3: the end of it (5 - 6'o clocks). ms: millisecond.

biological clock. This resistance is fragile; it is broken as soon as the subject resumes a normal circadian rhythm during the vacations for example. The young age, the circadian typology and the motivation to work at night represented the major factors involved in the adaptation phenomenon to fixed night shift [35].

In our study, an extension of the RT between the beginning and half-time night work has been found, followed by a decline of the RT at the end of the shift.

Within the framework of a collective organization of working time, the majority of the staff participating in the objective evaluation of vigilance has had an episode of rest during the second half of the shift. The improvement of the state of objectified vigilance can be attributed to the refreshing effect of night nap. The compensatory effect of this rest on vigilance is also reported by several authors [35] [36].

The increase of ER between the beginning and the end of the night shift could be attributed to a decline in cognitive functions of the medical staff. So that, the organization of work and the planning of tasks at night in a care setting must take into account the decline in cognitive performance of the night staff in order to ensure a good quality of care and prevent the accidental risk for the patient and the staff.

This study has some limits. Objective evaluation of alertness has been carried out by the Super Lab program. Although its use is simple and easy to understand, the effect of practice and learning could constitute a bias while studying the variation of vigilance. This test was conducted with a representative sample of the study population but the number of staff who participated in the objective evaluation of alertness was low. Despite these limits, this study can be an outlet for more detailed studies.

5. Conclusions

Because of requirements of continuity of care, night work is inevitable in a hospital work. This rhythm of work obliges the paramedical staff to contrast their biological clock and disturb their internal and external sleep synchronizers.

This study has objectified a decline of alertness with an ascent of the error rate among fixed night workers that could have implications not only on health of care agents but also on the safety of patients. So, it seems necessary to reflect on the work organizations and to detect medical personnel as soon as possible, which is non-suitable for night work through regular medical checkups.

Conflicts of Interest

The authors declare that they have no conflicts of interest related to this article.

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Perceived Difficulties Regarding HIV/AIDS Services among Public Health Nurses in the Kinki Region of Western Japan: Implications for Public Health Nursing Education in Japan

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Abstract

Objective: To determine the perceived difficulties in providing HIV/AIDS services among public health nurses and to identify their correlates, we carried out a cross-sectional study in the Kinki region of western Japan. **Methods:** Structured self-administered questionnaires were distributed to all public health nurses in the region, and 1535 valid questionnaires were retrieved (valid response rate 78.7%). **Results:** More than half of the participants (52.8%) reported difficulties with HIV/AIDS services. The factors associated with perceived difficulties were having a negative attitude towards consultations on sexual matters (adjusted odds ratio [AOR] 2.2, $p < 0.001$), a perceived lack of encounters with homosexual people and people with HIV/AIDS during practice (AOR 1.6, $p = 0.002$ and AOR 1.8, $p < 0.001$), poor knowledge of sexual diversity (AOR 2.0, $p < 0.001$), lack of training in sexual diversity in public health nursing education (AOR 1.4, $p = 0.016$), and low permissiveness of the diversity of sexual behavior (AOR 2.0, $p < 0.001$). **Conclusions:** Overall, our results suggest that nursing and public health nursing education in Japan should cover sexual issues and HIV/AIDS in a more systematic way.

Keywords

Perceived Difficulties, HIV/AIDS, Public Health Nursing Education, Sexual Diversity

1. Introduction

According to the Japan Ministry of Health, Labour and Welfare's HIV/AIDS Surveillance Committee, 1056 and 473 new HIV and AIDS cases were reported in 2011, respectively. The annual number of reported HIV and AIDS cases in Japan peaked in 2008, and has since stabilized at around 1500 new cases annually. HIV is primarily transmitted through male homosexual behavior—among the reported new cases of HIV and AIDS in 2011, 68% and 55% respectively were among men who had sex with men (MSM) [1]. This situation led the Japanese government to update a special guideline on HIV and AIDS in January 2012, which emphasized the need to improve counseling and testing services for these conditions by making them more accessible to those most vulnerable to HIV infection, such as MSM [2].

In Japan, free and anonymous HIV tests and counseling are provided at public health centers of all prefectures and some large cities. These counseling and testing services are fairly well known to MSM—an Internet study in 2008 indicated that more than half of MSM who ever tested for HIV had used these services [3]. One study carried out in public health centers throughout Japan indicated that public health nurses were in charge of 84.5% of pre-counseling and 61.9% of negative results notification for HIV testing [4]. Given that public health nurses play a key role in providing these services, they are expected to be crucial in implementing HIV prevention programs throughout the country.

Despite this, many public health nurses do not appear to be confident in providing HIV/AIDS services. They consider such counseling/testing services difficult to execute, and feel hesitant, unwilling, or uncomfortable in providing these services [4]. This lack of confidence and discomfort in relation to a particular subject or activity is called a "sense of nigate" in Japanese. Specifically, a sense of nigate refers to a feeling or attitude that can be expressed as "I'm not good at …"; it can apply to people (e.g., in social psychology, a sense of nigate can be defined as an awkward and uncomfortable feeling towards specific others in an interpersonal situation) [5], actions (e.g., waking up early or speaking in public), subjects (e.g., mathematics or gymnastic class), and other phenomenas that people might face in their daily lives. A sense of nigate is synonymous with low or a complete lack of self-efficacy; however, it is more commonly used in Japanese daily lives as an excuse for not doing a particular activity. To facilitate a more universal understanding, we use the English translation of "perceived difficulties" for "sense of nigate" in this article. Thus, perceived difficulties herein refer to having unfavorable and reluctant feelings and attitudes concerning a particular subject caused by a lack of experience or knowledge and emotional reactions that are discordant with one's own values.

As mentioned above, perceived difficulties related to HIV/AIDS services and sex-related matters may be prevailing among public health nurses, which can act as an impediment to the promotion of HIV testing services at public health centers. Despite this, no study has yet directly assessed perceived difficulties related to HIV/AIDS services among public health nurses in Japan. However, there have

been studies on other populations in Japan: one study among Japanese dental health care workers indicated that the majority of them were hesitant to perform dental treatment on HIV-positive patients because of an inadequate knowledge on HIV and AIDS [6]. In another study, primary care physicians in Japan demonstrated a negative attitude towards patients with HIV/AIDS, which was due to the complexity of treatments, prejudice, and fear [7]. Furthermore, a study on Japanese nurses working at hospitals and clinics reported that 59% of subjects reported reluctance to care for a patient with HIV or hepatitis B or C virus (HBV/HCV), which might arise from a perceived risk of infection and having a prejudicial attitude [8]. In western countries, there is a large body of research on HIV-related stigma and discrimination among health care providers, including nurses, but little work has been done specifically with public health nurses [9] [10] [11]. With regard to sex-related matters, in the U.S., Eliason reported a notable silence about lesbian, gay, bisexual, and transgender issues in nursing education [12]. Overall, there is a growing body of literature on nurses' attitude towards sexual minorities, which has clear implications and suggestions for nursing education on these issues [13] [14]. However, given the lack of studies on these issues in Japan, we thought it necessary to assess the perceived difficulties regarding HIV/AIDS services among public health nurses in the western region of Japan.

We were also interested in understanding the factors that correlate with the perceived difficulties related to HIV/AIDS services in order to identify methods of reducing these difficulties. According to the existing literature, the factors underlying perceived difficulties include individuals' experience, knowledge, and values. A qualitative study on the causes of diffidence among mid-level public health nurses who were supporting people with mental disorders identified seven categories of causes, such as a lack of experience and problems with developing a perspective regarding their particular field [15]. Additionally, old age might be a factor, as evidenced by a nationwide Internet survey on prejudice toward individuals with HIV or hepatitis B and C among the working-age population of Japan [16]. A study in Taiwan showed that nurses with longer careers, self-labels of "absolute heterosexual," and high religiousness were more likely to have negative attitudes towards homosexuality [17]. Another study of physicians and physician assistants in Southeast China found that unfavorable attitudes towards people with HIV/AIDS were reported mostly by physicians from remote areas, which the authors of the study interpreted as being influenced by their educational background [18]. Given these findings, the second objective of this study was to explore the factors that correlate with perceived difficulties regarding HIV/AIDS services among Japanese public health nurses.

The objectives of this study are (1) to assess the level of perceived difficulties regarding HIV/AIDS services and (2) to identify their correlates among public health nurses in the western region of Japan. The specific hypotheses examined are as follows: (1) public health nurses with less experience in dealing with people living with HIV/AIDS or sexual minorities will report higher perceived difficulties regarding HIV/AIDS services; (2) public health nurses with less knowledge of

sexual diversity will have higher perceived difficulties regarding HIV/AIDS services; and (3) public health nurses with low permissive attitudes towards diversity of sexual behavior will have higher perceived difficulties regarding HIV/AIDS services.

2. Method

2.1. Study Design

A cross-sectional study using a structured anonymous self-administered questionnaire was carried out in the Kinki region of western Japan between November and December 2011.

2.2. Target Population

The target group of this study was full-time public health nurses working in 6 prefectures and 12 cities of the Kinki region. This region is the second largest economic zone of Japan, and is the location of metropolitan cities such as Osaka, Kyoto, and Kobe. In terms of HIV/AIDS, the Kinki region requires attention because it has the second highest number of reported HIV cases annually, following Tokyo and its surrounding region [1]. In this study, Public health nurses who were on leave at the time of data collection were excluded from the study. No other selection criterion was adopted in recruiting participants. According to the results of a pre-survey administered to local governments in the region, the target population was 1951.

2.3. Questionnaire

The questionnaire was initially designed by a research team comprising public health specialists, a pedagogist, a school nurse, and a midwife specializing in nursing education. The drafted questionnaire was reviewed and revised by several public health nursing officers, and then pre-tested with 23 public health nurses outside the Kinki region. Efforts to increase face validity of the questionnaire were made in this process. Reliability of the whole questionnaire was not statistically assessed because of time constraint. Instead, the internal consistency of some constructs was assessed after data collection.

The outcome variable, perceived difficulties regarding HIV/AIDS services, was assessed by a single item, as follows: "What is the level of your perceived difficulties (sense of nigate) regarding HIV/AIDS services?" There were four response options: "a lot," "some," "little," and "not at all." Although this might be considered somewhat subjective, it is a commonly understood feeling among Japanese people; thus, there was a high likelihood that participants would understand what the question and responses meant.

The correlates of perceived difficulties were categorized into three dimensions: experience, knowledge, and values. The experience dimension included experience with an attitude towards offering consultations on sexual matters, experience with dealing with homosexual people or people with HIV during practice, and whether or not they are friends with homosexual people.

The knowledge dimension comprised knowledge of sexual diversity and educational experiences. Participants' knowledge of sexual diversity was assessed with eight items (e.g., "Homosexuality is a mental disorder"), each with the following three response options: "yes, I think so," "no, I do not think so," or "I do not know" (Figure 1). These items were originally developed for this study. A total score on knowledge of sexual diversity was calculated by counting the number of correct answers (with a perfect score being 8). Using the median split, we categorized those with 6 points or over as the "high knowledge group" and those with 5 points or less as the "low knowledge group." For educational experience, the questions centered on whether they had learned about sexual diversity and HIV/AIDS in their public health nursing education or in any on-the-job training course. Data about the specific contents of these trainings were also collected. In addition, the questionnaire asked about their future needs related to learning about sexual matters and HIV and their favored styles of training.

The values dimension included 11 items assessing individuals' attitudes towards permissiveness of diversity of sexual behavior (Figure 2). For each item, participants responded with one of four options: "acceptable," "maybe acceptable," "may not be acceptable," "not acceptable," and "I do not know." These items and responses were derived from the HIV & Sex survey in 2000 in Japan [19]. The internal consistency of the 11 items was satisfactory ($\alpha = 0.84$). The score of permissiveness of diversity of sexual behavior was then calculated by assigning points to the response options, with "I do not know" being 0 point, "acceptable" being 1 point, and "not acceptable" being 4 points; thus, lower (higher) scores would indicate greater (lower) permissiveness. Again, using a medium split, we categorized those with a score of 27 or less as the high permissiveness group and those with a score of 28 or more as the low permissiveness group.

The obtained demographic information included age, years of working as a public health nurse, and gender. We also asked participants about their current field of work to obtain some basic background information. At the end of the

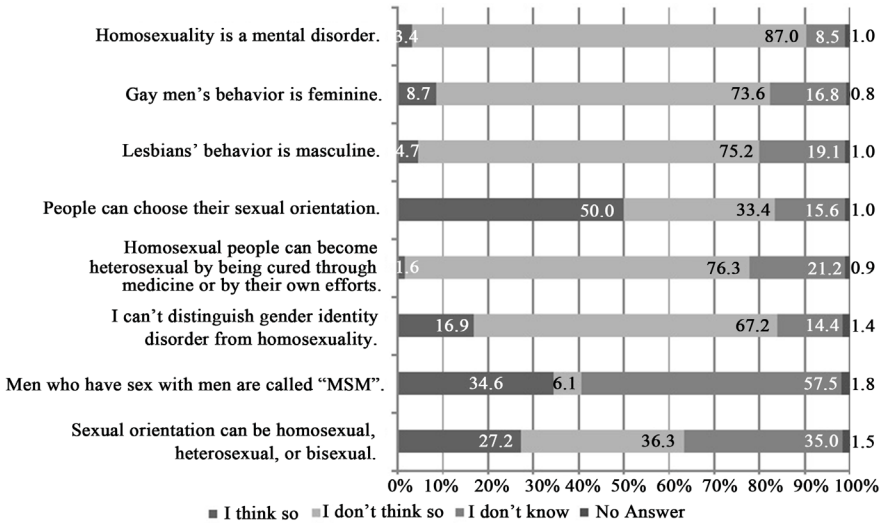

Figure 1. Knowledge on diversity of sexuality.

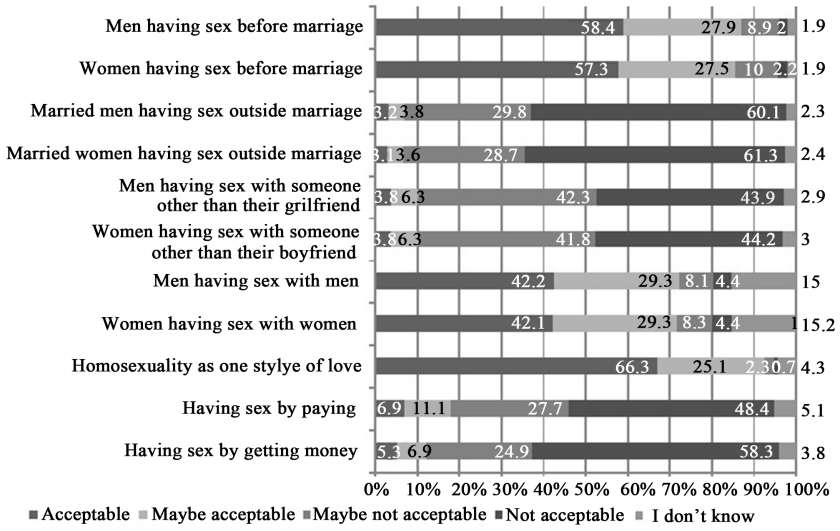

Figure 2. Attitude towards diversity of sexual behavior.

questionnaire, one open-ended question asked how they would like to interact with sexual minorities as a public health nurse.

The questionnaires were distributed and collected through local government offices in each study area. The participants completed the questionnaires on their own and then sealed the questionnaires in envelopes. They handed the envelopes to the officers in charge, who sent the envelopes to the research team by post.

2.4. Statistical Analyses

Statistical analyses were performed using IBM SPSS Statistics 20.0 (IBM Japan Corp., Tokyo, Japan). First, we calculated frequencies and descriptive statistics of all variables. Second, with perceived difficulties regarding HIV/AIDS services as the outcome variable, bivariate and multivariate associations with the dichotomous correlates were assessed using chi-square tests and logistic regression models. The threshold for significance was $p < 0.05$. Qualitative data from the open-ended question were used to complement interpretation of the numerical data.

2.5. Ethical Consideration

The study proposal was reviewed and approved by the Kansai University of Nursing and Health Sciences Research Ethics Committee (on September 29, 2011). In all research procedures, we followed the Declaration of Helsinki (amended in Seoul, 2008) of the World Medical Association and the ethical guidelines for epidemiological studies (amended on December 1, 2008) of the Japanese Ministry of Health, Labour and Welfare and Ministry of Education, Culture, Sports, Science and Technology. The purpose of this study, its procedures, the voluntary basis of participation, and the lack of any need to answer questions that they do not want to answer were written on the first page of the questionnaire. Only participants who gave their consent to participate in the study submitted their finished questionnaire. No identifying information was collected. All the administered ques-

tionnaires and memory sticks containing the study data were kept in the locked cabinet of the principal investigator.

3. Results

By the end of December 2011, 1545 questionnaires had been collected, of which 10 were incomplete and therefore omitted. As a result, we obtained 1535 valid questionnaires for further analysis (valid response rate 78.7%).

3.1. Demographic Characteristics of Participants

Participants' mean age was 40.1 years and they had worked as public health nurses for 17.0 years on average. The vast majority of participants (97.3%) were female. The fields in which they were engaged at the time of this study (multiple answers) were maternal and child health (38.0%), non-communicable diseases (25.0%), tuberculosis (23.6%), mental health (22.8%), HIV/AIDS (22.0%), cancer/lifestyle-related diseases, and other infectious diseases (20.8%).

3.2. Perceived Difficulties Regarding HIV/AIDS Services

More than half of the participants reported having perceived difficulties regarding HIV/AIDS services (with 7.4% having "a lot" and 45.4% having "some") (Table 1).

3.3. Experiences as a Public Health Nurse

The vast majority of participants (87.4%) had experience in offering consultations on sexual matters. The issues raised in these consultations included sexually transmitted diseases (83.3%), HIV (78.2%), family planning (51.4%), sexual matters for young adults and adolescents (48.8%), and sexual orientations (35.9%). With regard to the item asking about their attitude towards consultations on sexual matters, 77.7% responded "I deal with sexual matters as a duty," whereas only 14.3% responded that "I deal with sexual matters in a positive manner." The reasons for responses such as "I feel hesitant to deal with sexual matters (4.8%)" and "I do not want to deal with sexual matters" were assessed using a single question with multiple answers, which revealed that a lack of knowledge of these issues (66.3%) and never having learnt how to handle these matters (42.2%) were commonly reported.

A large proportion (49.3%) of participants had encountered homosexual people during practice, but most (59.2%) did not have homosexual people as their friends. Notably, there were high rates of "do not know" responses to these questions (36.8% and 28.0%, respectively) (Table 1).

3.4. Knowledge of Sexual Diversity and Educational Experience

Participants' responses to the items assessing their knowledge on diversity of sexuality are shown in Figure 1. There were some evident misperceptions among the participants. For example, 50% responded "I think so" to the statement "People can choose their sexual orientation," despite the fact that sexual orientation is not a choice, a notion which causes distress to many sexual minorities. Additionally,

Table 1. Demographic characteristics of participants, perceived difficulties regarding HIV/AIDS services, and experiences as a public health nurse (n = 1535).

	Number	%
Demographic characteristics		
Age		
Less than 40 years	666	43.4
40 years and more	828	53.9
No answer	41	2.7
Work experience as a public health nurse		
<20 years	841	54.8
≥20 years	686	44.7
No answer	8	0.5
Gender		
Female	1493	97.3
Male	24	1.6
Other	0	0.0
No answer	18	1.2
Perceived difficulties regarding HIV/AIDS services		
A lot	114	7.4
Some	697	45.4
Little	599	39.0
Not at all	97	6.3
No answer	28	1.8
Experiences as a public health nurse		
Offered consultations on sexual matters		
Yes	1341	87.4
No	128	8.3
No answer	66	4.3
Attitude towards consultations on sexual matters		
Deal with sexual matters in a positive manner	219	14.3
Deal with sexual matters as a duty	1193	77.7
Feel hesitant in dealing with sexual matters	73	4.8
Do not want to deal with sexual matters at all	9	0.6
Other	3	0.2
No answer	38	2.5

Continued

Encounter homosexual people during practice		
Yes	757	49.3
No	207	13.5
Do not know	565	36.8
No answer	6	0.4
Friends with homosexual people		
Yes	188	12.2
No	909	59.2
Do not know	430	28.0
No answer	8	0.5
Encounter people with HIV during practice		
Yes	497	32.4
No	310	20.2
Do not know	720	46.9
No answer	8	0.5

response rates of "I do not know" were relatively high for the statements, "Men who have sex with men are called 'MSM'" and "Sexual orientation can be homosexual, heterosexual, or bisexual" (57.5% and 35.9%, respectively).

For educational experiences, very few (12.1%) had learned about homosexuality and gender dysphoria during their public health nursing education. In contrast, 41.2% had learned of these issues after being qualified as public health nurses. Most of them had learned about HIV/AIDS in their public health nursing education (51.1%) and after they had become a public health nurse (76.4%).

Regarding their needs for future training on sexual diversity, participants reported wanting to learn how to interact with clients who were sexual minorities (66.7%), the opinions and perspectives of sexual minority clients (62.3%), and the relationships of sexual minority clients with their own communities (60.6%). Regarding HIV/AIDS, they wanted to learn the latest guidelines on treatment (81.0%), social welfare for HIV-positive people (68.5%), and the practices of HIV prevention (66.0%). One-day training courses were preferred by 60.5% of participants, and preferred educational materials were handbooks (68.7%), websites (54.3%), and pamphlets (53.7%).

3.5. Values

The results regarding permissiveness towards diversity of sexual behavior are shown in Figure 2. A fairly large number of participants considered sex before marriage as "acceptable." However, more than half of the participants considered sex outside marriage and sex in exchange for money as "not acceptable."

3.6. Correlates of Perceived Difficulties Regarding HIV/AIDS Services

The correlates of perceived difficulties towards HIV/AIDS services were identi-

fied by chi-square tests and logistic regression analysis (adjusted odds ratios [AORs]) (Table 2). In the multivariate analysis, we found that age and work experiences as a public health nurse were not associated with the outcome variable.

Regarding experience, we found that having a negative attitude towards consultations on sexual matters (i.e., treating it as a duty, feeling hesitant, and not wanting to consult at all) (AOR 2.2 [1.6 - 3.1], $p < 0.001$), lack of encountering

Table 2. Dichotomous correlates of perceived difficulties (a sense of nigate) regarding HIV/AIDS services among public health nurses (n = 1535).

		HIV/AIDS services		Odd ratio	p^a	AOR	p^b
		High perceived difficulties	Low perceived difficulties	(95% CI)		(95% CI)	
		Number (%)	Number (%)				
Demographic							
Age	<40 years old	396 (59.9%)	265 (40.1%)	1.6 (1.3 - 2.0)	<0.001	1.2 (0.8 - 1.6)	0.366
	≥40 years old	392 (48.4%)	418 (51.6%)	1		1	
Work experience as PHN[c]	<20 years	427 (58.9%)	298 (41.1%)	1.5 (1.2 - 1.8)	<0.001	1.3 (1.0 - 1.8)	0.089
	≥20 years	384 (49.0%)	399 (51.0%)	1		1	
Experience							
Offered consultations on sexual matters	No	90 (70.9%)	37 (29.1%)	2.2 (1.5 - 3.3)	<0.001	1.0 (0.6 - 1.6)	0.973
	Yes	689 (52.2%)	630 (47.8%)	1		1	
Attitude towards consultations on sexual matters	Negative (As duty/feel hesitant/do not want to)	719 (57.3%)	536 (42.7%)	2.6 (1.9 - 3.5)	<0.001	2.2 (1.6 - 3.1)	<0.001
	Positive	74 (34.1%)	143 (65.9%)	1		1	
Encounter homosexual people during practice	No/do not know	520 (68.3%)	241 (31.7%)	3.4 (2.7 - 4.1)	<0.001	1.6 (1.2 - 2.1)	0.002
	Yes	290 (38.9%)	455 (61.1%)	1		1	
Friends with homosexual people	No/do not know	731 (55.3%)	590 (44.7%)	1.7 (1.3 - 2.4)	0.001	1.2 (0.8 - 1.7)	0.452
	Yes	77 (41.8%)	107 (58.2%)	1		1	
Encounter people with HIV during practice	No/do not know	635 (62.7%)	377 (37.3%)	3.1 (2.5 - 3.9)	<0.001	1.8 (1.4 - 2.4)	<0.001
	Yes	174 (35.3%)	319 (64.7%)	1		1	
Knowledge							
Knowledge of sexual diversity	Low	584 (64.8%)	317 (35.2%)	3.1 (2.5 - 3.9)	<0.001	2.0 (1.5 - 2.5)	<0.001
	High	222 (37.1%)	377 (62.9%)	1		1	
Learned about sexuality in PHN education	No/do not remember	556 (63.3%)	322 (36.7%)	2.6 (2.1 - 3.2)	<0.001	1.4 (1.1 - 1.8)	0.016
	Yes	246 (39.7%)	374 (60.3%)	1		1	
Learned about HIV/AIDS in PHN education	No/do not know	307 (69.9%)	132 (30.1%)	2.8 (2.1 - 3.6)	<0.001	1.3 (0.9 - 1.9)	0.178
	Yes	500 (47.3%)	557 (52.7%)	1		1	
Values							
Permissiveness of sexual behavior diversity	Low	423 (59.7%)	285 (40.3%)	1.6 (1.3 - 2.0)	<0.001	1.5 (1.2 - 2.0)	<0.001
	High	383 (48.3%)	410 (51.7%)	1		1	

a. Chi-square test, b. Logistic regression, c. Public health nurse.

homosexual people during practice (AOR 1.6 [1.2 - 2.1], $p = 0.002$), and lack of encountering people with HIV during practice (AOR 1.8 [1.4 - 2.4], $p < 0.001$), were associated with greater odds of having high perceived difficulties regarding HIV/AIDS. However, the experiences of offering consultations on sexual matters or being friends with homosexual people were not significantly associated with perceived difficulties regarding HIV/AIDS services. Thus, Hypothesis 1 (public health nurses with less experience with people living with HIV/AIDS or sexual minorities will have high perceived difficulties regarding HIV/AIDS) was only partially supported.

Concerning knowledge, having low knowledge of sexual diversity was associated having high perceived difficulties regarding HIV/AIDS services (AOR 2.0 [1.5 - 2.5], $p < 0.001$). Thus, Hypothesis 2 (public health nurses with less knowledge on sexual diversity will have high perceived difficulties regarding HIV/AIDS services) was supported. With regard to educational experiences, not learning about sexual diversity in public health nursing education was associated with having high perceived difficulties regarding HIV/AIDS services (AOR 1.4 [1.1 - 1.8], $p = 0.016$). In contrast, not having learned about HIV/AIDS in public health nursing education was not significantly associated with the outcome variable.

Finally, low permissiveness of diversity of sexual behavior was found to be significantly associated with having high perceived difficulties regarding HIV/AIDS services (AOR 1.5 [1.2 - 2.0], $p < 0.001$). Thus, Hypothesis 3 (public health nurses with low permissive attitudes towards diversity of sexual behavior will have high perceived difficulties regarding HIV/AIDS services) was supported.

4. Discussion

4.1. Perceived Difficulties and Correlates

In this cross-sectional study, we assessed the perceived difficulties regarding HIV/AIDS services among public health nurses working for the local governments of the Kinki region of western Japan, and identified their correlating factors. As expected, more than half of the participants (52.8%) reported some or many perceived difficulties regarding HIV/AIDS services. This prevailing perception has likely hindered the execution of HIV/AIDS-related services, including counseling and testing, at the public health centers in this region. Therefore, it is necessary to determine the means of reducing these perceived difficulties so that public health nurses feel more confident and comfortable in providing HIV/AIDS-related services. The other findings of this study have much to contribute in this regard.

First, a complete lack of experience of encountering homosexual people and people with HIV during practice was associated with greater odds of having high perceived difficulties (AOR 1.6 and 1.8, respectively) compared to those who have had such experiences. Furthermore, although there is a study suggesting that being friends with sexual minorities would have a positive impact on nurses' attitudes towards such minorities, our findings suggest that this has no real im-

pact on perceived difficulties regarding HIV/AIDS services [20]. Thus, as a first step to facilitate provision of HIV/AIDS services among public health nurses, a future training and education session might incorporate opportunities for public health nurses who have encountered sexual minorities and HIV-positive people during practice to share their experiences with those who have not encountered these groups.

Interestingly, attitudes towards offering consultations on sexual matters, rather than actual experience, were significantly associated with having high perceived difficulties regarding HIV/AIDS services. As noted above, most participants (87.4%) had experience in offering consultations on sexual matters, which suggests that knowledge and techniques related to dealing with sexual matters and sexuality are fundamental for public health nurses. However, very few nurses (only 12.1%) had actually learned about sexual diversity in their formal training; this was reflected in the low number of correct answers for certain items regarding knowledge of sexual diversity. These findings suggest that the gap should be filled by including sexual matters in the public health nursing education curriculum.

With regard to knowledge, public health nurses with less knowledge on sexual diversity had greater odds of having high perceived difficulties regarding HIV/AIDS services (AOR 2.0) compared to those with high knowledge, as expected. Relatedly, those who did not have a chance to learn about sexuality in their public health nursing education had greater odds of having high perceived difficulties regarding HIV/AIDS services. Interestingly, however, learning about HIV/AIDS in their formal education was not significantly associated with perceived difficulties, which implies that the content in public health nursing education does not match nurses' needs for their practical work. The in-depth questions revealed that content on HIV/AIDS in their formal education was mostly limited to biomedical knowledge (84.6%), modes of transmission (91.5%), and ways of prevention (86.4%). For their future educational needs, we noted that nurses desired to listen to the voices and understand the lives of sexual minorities and people living with HIV/AIDS, suggesting that such information should be included in public health nursing curriculum. This would ensure that, by the time that nursing students become qualified public health nurses, they feel sufficiently confident to interact with sexual minorities and people with HIV/AIDS as their clients.

Finally, the multivariate analysis indicated that low permissiveness towards diversity of sexual behavior was associated with having high perceived difficulties. In the in-depth open-ended question on this topic, we also found that nurses reported having to continuously struggle to handle concerns of sex and HIV/AIDS without prejudice or bias; indeed several nurses reported "Sex was taboo when I was trained as a public health nurse" or "Sexuality was not as diverse as it is now, when I was young." However, participants said that in working with clients and obtaining knowledge through on-the-job training, they were able to broaden their perspective and change their own perceptions. Given that the clients of public health nurses are becoming increasingly diverse in terms of back-

ground—not only in terms of sexuality, but also in many other aspects of life—training to obtain cultural humility might be included in public health nurses' education. This would enable greater self-reflection before they begin interacting with clients and will help them reconcile their own values with those of their clients [21]. In this way, students might feel more comfortable in executing their health education, which is a required skill for public health nurses [22].

4.2. Implications for Public Health Nursing Education

To reduce the prevailing perceived difficulties regarding HIV/AIDS services among Japanese public health nurses, systematic efforts should be integrated into public health nursing education. Currently, there is an opportunity for implementation of such efforts, as nursing and public health nursing education in Japan are currently undergoing reform and growth, with the rapid proliferation of nursing schools at the undergraduate university level and an amendment to the Act on Public Health Nurses, Midwives, and Nurses in 2009.

It is important to ensure that opportunities to learn about sexuality are given in undergraduate nursing education, which precedes formal public health nursing education. According to Kayashima's report on teaching sexual health in nursing education in Japan, the importance of supporting the understanding of sexuality in nursing practice was recognized by many parties, but so far there has been no concerted effort to actually teach nurses practical skills for use in consultations on sexual matters [23]. Additionally, Mizuno reviewed the syllabi of 80 (out of the 140) schools of nursing at the undergraduate level to identify the status of sexuality education. Finding it largely wanting, she proposed that a course on sexual diversity and its related issues be provided to freshman nursing students [24]. In practice, it might be helpful to adapt a fully developed curriculum created in western countries, such as the Mims-Swenson sexual health model, into the Japanese context [13].

In public health nursing education, providing students with opportunities to listen to the real voices of sexual minorities or people with HIV/AIDS would likely help students better understand these clients. Students might be able to visualize the lives of these people even by reading their accounts or blogs on the Internet. As noted by Carabez, a course assignment to conduct structured interviews with nurses on care of sexual minorities might also help Japanese public health nursing students recognize these issues [25].

Currently working public health nurses also require basic knowledge of sexual diversity and a fuller understanding of the lives of sexual minorities and people with HIV/AIDS. On-the-job training courses may be organized for working public health nurses. This would likely help to reduce prevailing perceived difficulties regarding HIV/AIDS among public health nurses, and hence improve the quality of HIV counseling and testing services at public health centers.

4.3. Limitations

Since this study is cross-sectional, we cannot make inferences on the direction of

the causal relationships for any of the correlations observed. Another possible limitation is the lack of consideration of certain other covariates that might underlie the association found. Furthermore, regarding the items assessing participants' attitudes, we could not eliminate the possible influence of social desirability bias. Finally, this study explanatorily assessed perceived difficulties regarding HIV/AIDS services using a single question; the development and validation of a scale to assess this construct in more detail would be needed, especially in light of the global movement to develop standardized measures of HIV-related stigma and discrimination [26] [27]. By overcoming these limitations, future studies could develop and test the effectiveness of actual interventions that seek to reduce these perceived difficulties by increasing Japanese public health nurses' confidence in dealing with HIV/AIDS and sexual matters.

5. Conclusion

This cross-sectional study revealed that 52.8% of public health nurses in western Japan had perceived difficulties regarding HIV/AIDS services. Considering the factors correlated with these prevailing perceived difficulties in HIV/AIDS, public health nursing education in Japan should focus on sexual issues and HIV/AIDS in a more systematic way.

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Is It Workplace Stress a Trigger for Alcohol and Drug Abuse?

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Abstract

Those workers most vulnerable to pressure tend to suffer from scarce social and personal resources with which to respond adaptively to stress. In this case, the effects of psychoactive substances may exceed the stressed worker's positive expectations. Thus, the aim is to analyze the scientific evidence on the relationship between drug abuse and workplace stress, based on an integrative review of the literature. Data were collected in February 2016 from the databases of the Virtual Health Library and PubMed. The final sample of 16 articles was divided into two categories: alcohol and drugs abuse in professions with high degree of psychosocial hazards and risks, and alcohol and drugs abuse for workplace stress in other professions. A relationship between precarious conditions, the nature of the work and its influence on drug abuse could be seen. However, other variables may strengthen psychoactive drug use as a coping strategy for stress.

Keywords

Work, Psychological Stress, Workplace, Alcoholism, Substance Use Related Disorders, Psychological Adaptation

1. Introduction

The human being cannot avoid work. Everything achieved and constructed by humans from pre-history to the present day is the result of labor by diverse individuals. Thus, work can be viewed as one of the pillars of civilization which has been built.

Although work is the basis of the wealth of nations and the source of the individual's financial support, it has also been the source of mental and physical illness. This is due to the characteristics of society that imposes daily situations of

stress and anxiety on the individual. Anyone who works complains of increased demand and pressure in the workplace, where workers are constantly expected to produce more in less time [1].

Workers, then, see the environment as wearing them down, exhausting their physical and psychological resources and threatening their wellbeing. In this context, stress appears as the individual's reaction to these threats, impelling them to seek to adjust or respond to these conditions that provoke anxiety or fear. This response may be physical, mental or emotional and aims to stabilize internal biological processes and preserve self-esteem [2] [3].

However, a point may be reached at which the organism can no longer bear or support the stressful situation and attempts begin to decrease, manage, control or tolerate the harmful effects of stress. These are known as coping strategies [4] [5].

Coping mechanisms consist of cognitive and problems solving behavior that the individual uses to deal with stress. Coping may be adaptive, through physical activities or socializing with friends and family or non-adaptive, escape strategies, unhealthy behavior such as drug abuse. In general, non-adaptive coping is strongly linked to drug abuse [6] [7].

Studies [8] [9] have shown that there is a close relationship between stress and alcohol and drug abuse. The more stressful events followed by inefficient coping strategies, the greater the vulnerability to drug addiction and abuse. The more negative situations, the greater the risk of using alcohol or drugs as a coping strategy to improve one's mood or distract oneself from disagreeable sensations.

Those individuals most vulnerable to pressure tend to suffer from scarce social and personal resources with which to respond adaptively to stressful situations in the workplace. In these cases, the stressed worker begins to feel positive expectations regarding the effects of psychoactive substances, making them feel more relaxed after use, escaping from the negative emotions of stress. Alcohol possesses a double mechanism, on the one hand, it reduces anxiety and, on the other hand, it acts as a stressor, activating the hypothalamic-pituitary-adrenal axis [8] [10].

The question, then, is: What is the relationship between drug abuse and workplace stress? To assist in elucidating this issue, the following objective was outlined: to analyze the scientific evidence on the relationship between drug abuse and workplace stress.

2. Materials and Methods

This is an integrative review of the literature, a broad approach that enables diverse published studies on the topic in question to be integrated. This means that experimental and non-experimental studies can be included to give a complete understanding of the phenomenon in question. The results obtained can create a consistent and comprehensive view of the relevant concepts, theories or problems [11].

The following six steps for the integrative review were followed. The first was

to identify the topic and select the hypothesis or research question. Next, inclusion and exclusion criteria were defined for the studies/samples or searches in the literature. The third stage was defining the data to be extracted from the selected studies. The fourth evaluated the studies included. Next, the results were interpreted and, finally, at the sixth stage, the review/synthesis of knowledge was presented [11].

The following question was drawn up to guide the research: What is the relationship between drug abuse and coping strategies for workplace stress? Data were collected in February 2016 from the databases included in the Virtual Health Library (VHL) and PubMed through the link "search by DeCs/MeSh descriptors".

The descriptors used were "work", "psychological stress", "alcoholism" and "substance-related disorders" combined through the Boolean operator "AND". Inclusion criteria were: publications between 2010 and 2015, so as to analyze the most up to date publications available in the literature; studies dealing with the topic of stress in workers and drug abuse; workers being study participants; qualitative or quantitative methodological design; and published in Portuguese, English or Spanish. Those studies were excluded which were reviews or discussions; not published in the form of an article (theses or dissertations) and duplicated articles.

The combination of the descriptors "psychological stress", "work" and "alcoholism" produced 94 articles in VHL and 10 in PubMed, the combination of "psychological stress", "work" and "substance-related disorders" produced 115 articles in VHL and 12 in PubMed. **Figure 1** synthesizes the search process. The initial sample totaled 231 articles. Of the studies listed, 45 met the inclusion criteria. After applying the exclusion criteria and reading the articles in full, the *corpus* of this study was composed of 16 articles. Next, the pertinent data were selected for the review and grouped.

Classification of the articles was based on the scientific evidence currently available in the literature, including the levels of the evidence and grades of recommendation to obtain the best results. Level of evidence was classified by the type of study according to the Oxford Centre for Evidence-based Medicine [12]. In reading the articles for the corpus of this study, those with evidence levels up to three were considered.

At level 1, the evidence is from randomized, controlled clinical trials with narrow confidence intervals, or from systematic reviews or meta-analyses of all relevant randomized, controlled clinical trials, or from clinical directives based on systematic reviews of randomized, controlled clinical trials; level 2, evidence derived from historical cohort studies or with segments of compromised cases (at least one well designed randomized controlled clinical trial, but of lower quality) and ecological study; level 3, evidence obtained from well-designed, non-randomized clinical trials (case-control studies), systematic reviews of case control studies [12].

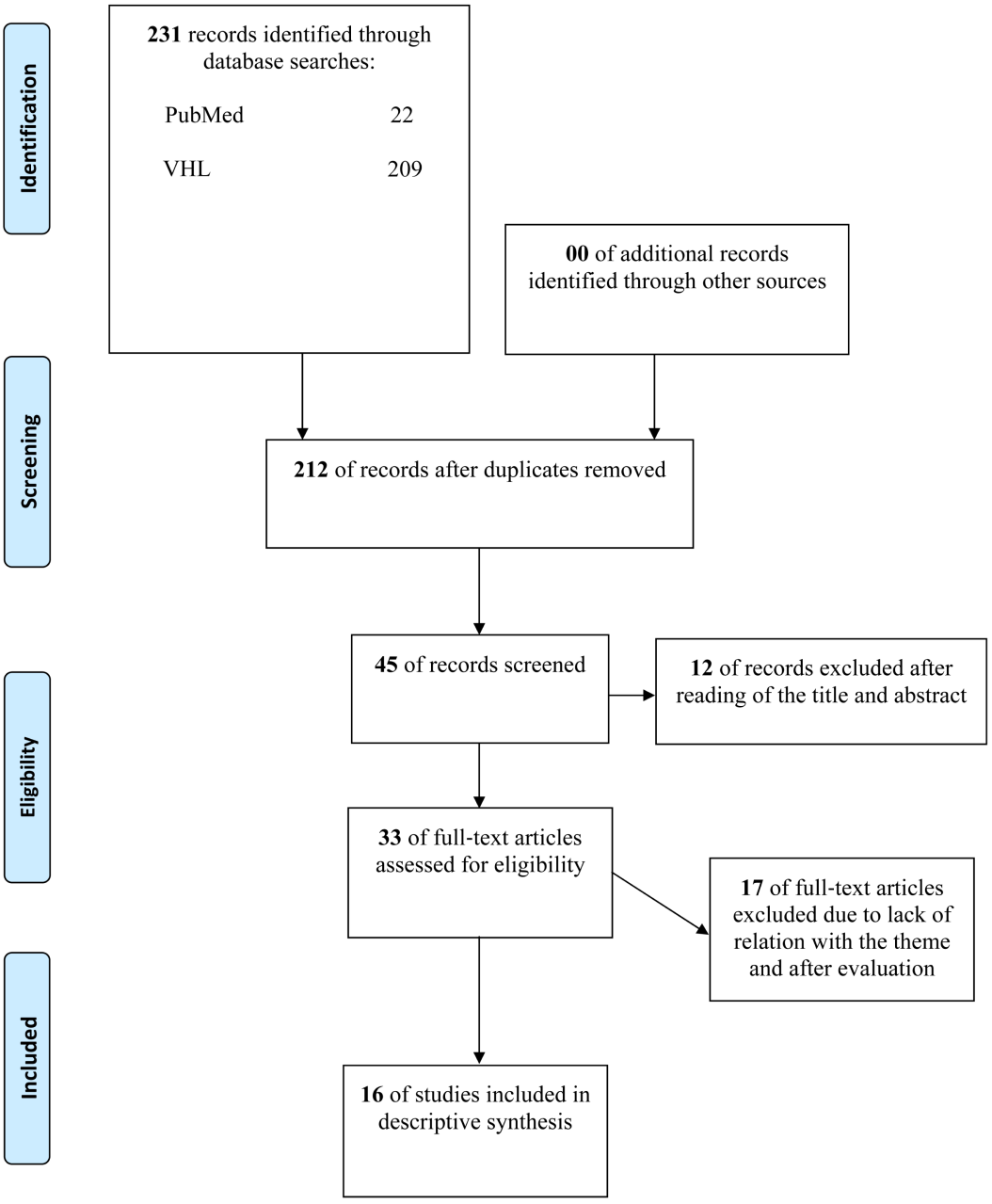

Figure 1. Flow chart of search procedures.

Among the articles making up the final sample, however, there were no randomized clinical trials. Thus, the strength of the evidence of 16 articles was classed as level 2, as the studies were observations of clinical developments or treatment results and two articles as level 3, as they were non-randomized. Thus, the recommendation grade was B, denoting a moderate grade of evidence, being studies that presented important evidence in the outcome.

In order to analyze and interpret the data, they were organized using a previously-prepared data form [13], containing data on the study such as year of publication, authors, type of study, location and population studied; when completed for each article from the sample, the data could be catalogued. Thus, it was easy to

get an overview of the articles and compare the studies. The articles were divided into two categories of analysis: alcohol and drugs abuse in professions with high degree of psychosocial hazards and risks (8) and alcohol and drugs abuse for workplace stress in other professions (8).

3. Results

The articles making up the corpus of this study were written in English, of which two were bilingual (English-Portuguese) and none of them were Spanish. The professionals studied in the 16 articles were separated into two categories. Table 1: professions with high degree of psychosocial hazards and risks and other professions.

Table 2 and Table 3 synthesize the general data on the selected articles. The majority (88%) were of quantitative design. As for origin, seven (41%) were conducted in the United States (USA) and the rest in a variety of other countries. Professionals who worked directly in caring for others were analyzed in eight (53%) of the articles.

3.1. Alcohol and Drugs Abuse in Professions with High Degree of Psychosocial Hazards and Risks

All the studies explored the job characteristics and workplace conditions. Both exposure to drugs and difficult working conditions can create psychological distress and cause secondary problems such as drug abuse [14].

Among the prison warders and the police officers studied, their own perception of difficult working conditions and stressful, traumatic day-to-day experiences constituted a risk factor for increased smoking and alcoholism [14] [15]. Such stressful situations can trigger illegal drug use due to constant contact with drugs and drug dealing [15].

Similar working conditions are also found among urban police officers in the USA [16]. In this category, alcohol consumption in the sample (747) studied was considerable; a third of the men and women studied reported consuming large quantities of alcohol on single occasions (bingeing) during the preceding month, a higher proportion than in the general population.

Table 1. (a) Categories of studies according to the professionals' categories.

Categories of studies	Professionals studied
Professions with high degree of psychosocial hazards and risks	Doctors
	Prison warders
	Police officers
	Bartenders
	Fire fighters
Other professions	Truck drivers
	Latino immigrant workers
	Journalists
	Construction workers
	Civil servants
	General workers

Table 2. Panorama of the articles by author, title, year of publication, type of study, country of origin and population of the study.

Authors	Title	Year	Objective	Type	Country	Population
Biron M.	Work-Related Risk Factors and Employee Substance Use: Insights from a Sample of Israeli Blue-Collar Workers	2011	To identify work-related risk factors and employee substance use	Quantitative	Israel	569 construction workers
Austin-Ketch T. L. *et al.*	Addictions and the Criminal Justice System, What Happens on the Other Side? Post-Traumatic Stress Symptoms and Cortisol Measures in a Police Cohort	2012	To evaluate physiologic and stress measures in a high-risk occupation where occupational exposure to difficult criminal situations can lead to physiologic and psychological health consequences	Quantitative	United States	100 police officers
Cheng W. J.	Alcohol Dependence, Consumption of Alcoholic Energy Drinks and Associated Work Characteristics in the Taiwan Working Population	2012	To examine the association between work and characteristics and the risk of alcohol dependence across different employment types and occupations	Quantitative	Taiwan, China	22,085 general workers
Unrath M.	Identification of Possible Risk Factors for Alcohol Use Disorders among General Practitioners in Rhineland-Palatinate, Germany	2012	To identify possible risk factors for alcohol use disorders among general practitioners (GP) working in the outpatient sector	Quantitative	Germany	2092 doctors
Oreskovich R. M. *et al.*	Prevalence of Alcohol Use Disorders among American Surgeons	2012	To determine the point prevalence of alcohol abuse and dependence among practicing surgeons	Quantitative	United States	7197 Surgeons
Tutenges S.	Drunken Environments: a Survey of Bartenders Working in Pubs, Bars and Nightclubs. International Journal of Environmental Research and Public Health	2013	To asses risk factors in the working environment of bartenders	Quantitative	Denmark	424 bartenders
Barros V. V. *et al.*	Mental Health Conditions, Individual and Job Characteristics and Sleep Disturbances among Firefighters	2013	To assess the associations between mental conditions, individual and job characteristics and sleep disturbance among firefighters	Quantitative	Brazil	303 fire fighters
Fjeldheim C. B. *et al.*	Trauma Exposure, Posttraumatic Stress Disorder and the Effect of Explanatory Variables in Paramedic Trainees	2014	To investigate the type, frequency, and severity of direct trauma exposure, posttraumatic stress symptoms and other psychopathology amongst paramedic trainees	Quantitative	South Africa	131 paramedics
Collel E. *et al.*	Work-Related Stress Factors Associated with Problem Drinking: A Study of the Spanish Working Population	2014	To examine the association between work-related stress and alcohol use in a representative sample of the Spanish working population	Quantitative	Spain	13,005 general work-ers
Gavin R. S.	Association between Depression, Stress, Anxiety and Alcohol Use among Civil Servants	2015	To identify depressive symptoms association with sociodemographic variables, exposure and dimensions of occupational stress	Quantitative	Brazil	1239 civil servants

Table 3. Panorama of the articles by author, title, year of publication, type of study, country of origin and population of the study.

Authors	Title	Year	Objective	Type	Country	Population
Bierie D. M.	The Impact of Prison Conditions on Staff Well-Being	2010	To examine the impact of prison conditions on staff well-being (substance use...)	Quantitative	United States	1738 prison warders
Shattell M. *et al.*	Occupational Stressors and the Mental Health of Truckers	2010	To report findings on the occupational stressors and the mental health of truckers	Quantitative/ Qualitative	United States	60 truck drivers
Negi J. N.	Identifying Psychosocial Stressors of Well-Being and Factors Related to Substance Use among Latino Day Laborers	2011	To identify psychosocial stressors of well-being and factors related to substance use among Latino Day laborers	Qualitative	United States	150 Latino immigrant workers
Ballenger J. F.	Patterns and Predictors of Alcohol Use in Male and Female Urban Police Officers	2011	To examine the drinking patterns of a large sample of urban police officer and to identify specific predictors of alcohol use	Quantitative	United States	747 police officers
Buchanan M.	Coping with Traumatic Stress in Journalism: A Critical Ethnographic Study	2011	To identify the coping strategies used to buffer the effects of being exposed to trauma and disaster events and work-related stress	Qualitative	Canada	31 journalists
Mezuk B.	Job Strain, Depressive Symptoms, and Drinking Behavior among Older Adults: Results from the Health and Retirement Study	2011	To examine the relationship between job strain and two indicators of mental health, depression and alcohol misuse, among currently employed older adults	Quantitative	United States	2902 working adults

It is noteworthy that in this study, the female police officers showed low levels of workplace stress, but high levels of alcohol consumption. This characteristic is attributed to the need to identify oneself with an organization culture for self-affirmation in a male-dominated environment [16].

Even given such results, it is thought that substance abuse among police officers is underreported, as this category perceive alcohol as part of a social event, commonplace and innocent, such as having some beers after work. This type of habit can develop into a coping strategy to deal with the day-to-day tragedies and stress of the profession [15].

Alcohol may also be an element present in the workplace itself, as is the case with bartenders, professionals who make and serve alcoholic drinks to diverse clients. They also live under constant stress because of the risks of verbal aggression and threats. Thus, this work environment presents a risk of developing disorders related to abuse of alcohol and other drugs. One study interviewed 489 bartenders in Denmark; 68.3% stated they had drunk alcohol while on shift, 40.15% reported a binge drinking episode during a least one shift within the last month, 17.57% has drunk 10 or more doses during the last month and 41% admitted using illegal drugs [17].

The violence at work these professionals experience has been associated with the high levels of stress found, although not with drug use. However, continuous

exposure to stressors that are out of our control, as in the case of bartenders, can, over time, negatively affect the ability to cope with stress [17].

The case of bartenders reinforces that the norms surrounding alcohol use and that of other drugs and their easy availability in the workplace are basic factors influencing the abuse if these substances [15].

Likewise, high levels of alcohol and greater vulnerability to developing alcohol-related disorders affect health care professionals; 24% of the 131 emergency services paramedics studied in South Africa abused alcohol, 23% of the 2092 doctors analyzed in Germany reported drinking alcohol every day and it was found that 18.9% had suffered from alcohol-related disorders, with females more affected compared to the population in general. In this case, it is believed that the female doctors are exposed to greater stressful factors than other women, to which are allied the challenges of bringing up their own children and the lack of free time [18] [19].

The female surgeons of the 7197 interviewed in the USA also showed greater vulnerability to alcohol abuse or addiction compared with their male colleagues. Another important factor found in this study was the close relationship between alcohol abuse and addiction and the existence of symptoms of depression and burnout syndrome, such as emotional exhaustion, de-personalization and insensitivity [20].

In this study, an association was found between resilience and daily consumption of alcohol which can be considered a coping strategy for at least some of the doctors interviewed [21].

Certain individuals do not possess coping mechanisms sufficient to face day-to-day stressful situations. Thus, they internalize conflicts and emotions, causing a state of agitation and psychological activation, culminating in sleep disturbance. This was the situation found in 51% of the 303 Brazilian firefighters' studies, with sleep disturbances associated with alcohol abuse and addiction associated with increases in suicidal thoughts [21]. Constant exposure to risk may lead professionals such as prison warders, police officers, fire fighters and doctors, among others, to develop post-traumatic stress.

3.2. Alcohol and Drugs Abuse for Workplace Stress in Other Professions

In general, professions are exposed to different types of pressure that can cause stress in susceptible individuals. Each person develops their own strategy for coping with the prolonged effects of stress. However, coping strategies with negative results may cause behavior and mental problems, such as a distraction to avoid thinking of the stressor, which can occur through alcohol or drug abuse, daydreams and insufficient sleep [22].

Professionals in diverse categories, therefore, may view alcohol or drugs as the most accessible and immediate strategy to deal with these demands. For example, truck drivers interviewed in the USA stated that the constant pressure to deliver cargo on time, irrespective of weather or traffic conditions led them to

resort to drug abuse to stand the pressure and keep active. The preferred drug in this category was crack as it helped deal with the constant loneliness and depression, keeping them alert so as to be able to remain on the road [23].

In contrast, the pressures of the world of work are dealt with better by older professionals, those in their 60s or 70s. Research conducted in the USA with 2902 workers aged over 60 found no association between work pressure and alcoholism. This discrepancy is believed to young workers [24].

In addition to constant pressures at work, flouting labor laws, discrimination, social isolation, instability, undervaluing the professionals and hazardous environments are also determinants of drug abuse, attempting to reduce the effects of these psychosocial stressors. Such situations are faces by truck drivers, Latino workers living illegally in the USA and working men in Taiwan [23] [25] [26] [27].

Of workers in Taiwan, China, those that present the highest prevalence of alcohol addiction (16.8%) were those doing manual work, other categories at risk included construction workers and miners (20.3%), chief executives and politicians (20%), laborers (15.8%), journalists and artists (15.4%) [25]. This prevalence in certain categories may, in some cases, be the result of organizational characteristics such as the culture and behavioral norms in the workplace, as well as easy access to alcohol.

Workers in Spain also showed propensities to drug abuse; of the 13,005 interviewees, 5% of the males and 2.3% of the females were classed as heavy drinkers and 19.5% of the men and 8% of the women reported bingeing. In the majority of cases, alcohol abuse was associated with work stress factors. It was observed that male heavy drinkers were exposed to hazardous work environments and a lack of social support. Bingeing, in turn, was related to men working in precarious situations [27].

To deal with post-traumatic stress experienced in the workplace routine, 31 Canadian journalists reported resorting to a variety of drugs to overcome the psychological stress. The substances of choice were alcohol, marihuana, hashish, cocaine, crack and heroin. The drugs were used to help "anesthetize" whatever situation might appear in their daily work. The main objective of substance abuse was to suppress or avoid feelings and memories of covering war, homicide or other traumatic events [28].

Among civil servants in Brazil, it was found that anxiety and self-reported problems from alcohol abuse were risk factors for depression. Alcohol use in depressive workers can be seen as a coping strategy [29].

In contrast, 91% of the 261 workers studies in Israel reported not having drunk alcohol in the month preceding the interview, even when experiencing stress at work. The group studied did not use alcohol or drugs to cope. Culturally, Israel has low per capita alcohol consumption, and a high prevalence of abstinence. It can thus be seen that the company norms and the cultural context also exert considerable influence on the coping strategies chosen to face workplace stress [30].

4. Discussion

Abuse of alcohol and drugs is more likely to be adopted as a coping strategy for stress when the norms and social context accept alcohol. It represents a serious problem for a significant percentage of the working population (5% - 20% of workers) especially in some sectors and occupations [31]. This can be easily observed in the interaction between controlling the quantity of alcohol consumed in high-risk jobs and the quantity of drugs consumed at social events.

To understand the degree of alcohol use in the workplace it is adopted the concept of standard drinks that means the alcoholic beverages in their containers, that is the same number of units of pure alcohol (approximately 12 g alcohol). A moderate user would be in an intake of 22 units or more of alcohol a week for men, and 14 or more units a week for women [32]. It is important to highlight that the International Labour Organization (ILO) stated that chronic substance abuse and even moderate use of alcohol and drugs can performance negative effects at the workplace [32].

The results of this study show the relationship between precarious conditions, the nature of the work and its influence on drug abuse, principally alcohol. However, work is not the only risk factor, there are other variables that may also increase alcohol and drug use as coping strategies adopted by workers. Thus, the reasons behind the alcohol and drug abuse triggered by workplace stress are multifactorial.

From the results of this study, it can be seen that cultural factors, such as social acceptance, or lack thereof, of alcohol; social issues, such as the need for female self-affirmation in organizations dominated by male culture; loss of cultural identity, the situation experienced by immigrants; lack of psychological support to deal with pressure and trauma experienced at work all influence the use of psychoactive substances as coping strategies.

In the global context of the impact of psychoactive substance use and abuse within the workplace, public health needs to develop a better understanding of the potential impact. To obtain this better understanding, it is recommended that studies are used that relate to the intervening variables, those that influence the final result, so as to explain how negative experiences of work can lead to psychoactive substance abuse. Moreover, the design of these intervening variables may explain with more consistency the relationship between negative work experiences and alcohol and other drug use [33].

It should be highlighted that the difficulty of evaluating the direct relationship between work stress and consuming psychoactive substances lies in the two-way mechanism of this association. On the one hand, the work may consume alcohol as a way of coping with workplace stress, on the other, alcohol tends to reduce efficiency at work and cause increased workplace stress [34]. Following this line of reasoning, a study involving 140,000 European workers revealed that those who consume large amounts of alcohol and those who abstain are more affected by workplace stress that moderate consumers [34].

Of the professionals studies in the articles included in this study, only the bartenders and the journalists reported using illegal drugs, the other only reported using alcohol. This may be because of organizational and cultural issues. This finding shows how psychoactive drug use may be underreported and not reliably reflect these workers' quality of life.

For the prevention of drug abuse at the workplace it is necessary to focus on the identification and rehabilitation of workers with severe alcohol and drug abuse problems. According to the ILO, one of the most challenging issues in combating drug and alcohol abuse in the workplace and in society lies in ignoring the fact that alcohol and drug use is an accepted part of many social and cultural sets. It is difficult to develop a distinction between social drinking of alcohol and the real dangers to health and safety of abusive consumption. It is also problematic in some wine and beer producing countries to discourage workers drinking [35]. For example, in Portugal, in a sample of 100 interviewed, 25% of workers in the construction and public works sector declared they had drunken alcohol during working hours and most of them stated that they drank it with a meal [36].

Workers who seek treatment and rehabilitation should not be discriminated and should enjoy normal job security and opportunities. Counseling, treatment and rehabilitation programs should be adapted to individual needs. Prevention is a positive approach because emphasize worker health, well-being and safety. Self-assessments can be an important tool to help educate individuals on their own level of substance consumption quantified on a daily or weekly basis [32]. Also, it is imperative to identify individuals' risks and implement protective factors, to promote peer support and to create a healthy workplace environment.

5. Final Considerations

From the synthesis of these studies, the relationship between drug abuses as the most used coping mechanism for workplace stress was confirmed. However, the scientific evidence found showed the need to evaluate intervening variables that influenced the use of psychoactive substances so as to minimize the harm of negative experiences at work.

It is still believed to be impossible to draw up a reliable profile of the types of drugs used to cope with workplace stress as, for the majority, illegal drugs may cause more damage to the professional's image. Moreover, the studies did not show a clear methodology for differentiating the nature of the stress identified in their sample, in other words, the measurement of workplace stress cannot be isolated from other sources of stress in the subjects' lives. However, the complexity of the relationship between workplace stress and psychoactive substance consumption as compensatory and codependent mechanisms is evident.

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Abbreviations

ILO: International Labour Organization

VHL: Virtual Health Library

USA: United States of America

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Factors Related to Affective Occupational Commitment among Japanese Nurses

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Abstract

We identified the factors related to affective occupational commitment among nurses in Japan by conducting a cross-sectional survey in 12 hospitals in the Tohoku and Kanto districts of Japan in 2013. Of the 4046 nurses in these hospitals, 1330 completed the self-report questionnaire (valid response rate: 32.9%). High job satisfaction, high professional autonomy, having a scholarship loan, and being married were strongly related to affective occupational commitment. Conversely, having a high effort-reward imbalance and fewer overtime work hours indicated a low level of such commitment. The findings suggest that professional autonomy and job satisfaction are key factors for developing affective occupational commitment. Programs that promote professional autonomy and make people feel more appreciated for their work should be created to improve such commitment, and it would be important to provide adequate organizational resources to increase job satisfaction and reduce effort-reward imbalance. The fact that longer working hours are related to affective occupational commitment suggests that excessive emotional commitment to one's occupation can lead to overtime work. Therefore, nurse managers should consider the staff's working situations more thoroughly.

Keywords

Affective Occupational Commitment, Psychosocial Work Environment, Nurses, Japan

1. Introduction

Occupational commitment is defined as "a psychological link between a person and his or her occupation that is based on an affective reaction to that occupation" [1]. Professionals tend to commit to their occupation rather than the or-

ganization to which they belong, and nursing professionals are no exception [1] [2]. Researchers have mainly examined occupational commitment among teachers, and have identified a number of related factors, including work stress [3], job satisfaction [4], and psychological well-being [5]. As for other occupations, occupational commitment is considered to have an important impact on creativity [6], knowledge-sharing among employees [7], and productive behavior [8]. These works have shown that occupational commitment affects not only occupational factors or employee's own well-being, but also organizational outcomes, such as worker retention and sustained productivity within the organization. As a result, interest in occupational commitment has been increasing in recent years.

In nursing research, occupational commitment has been of considerable interest in recent years. Studies among nurses have suggested that occupational commitment has a significant association with job satisfaction [9] [10], job performance [11], psychological well-being [12], and professional turnover [13] [14] [15]. Meyer *et al.* [16] proposed that occupational commitment was a three-component model comprising affective, continuance, and normative occupational commitment. Of these three components, affective occupational commitment has been determined to be the strongest predictor of occupational behavior.

Affective occupational commitment refers to the emotional commitment one has to an occupation [1] [16]. Affective occupational commitment has been mainly examined from the perspective of nurse retention. Several studies have shown that affective occupational commitment is a significant indicator of turnover intention and actual turnover among nurses, both inside and outside Japan [10] [17] [18] [19]. Satoh, Asakura, and Watanabe [20] showed that, of the three components of occupational commitment, affective commitment was the strongest influencing factor of intention to continue nursing. Hospitals are increasingly becoming committed to maintaining adequate staffing of nursing personnel [21] [22], and an effective way of improving nurse retention is to enhance their affective occupational commitment.

Although many researchers have explored the contribution of affective occupational commitment to turnover intention among nurses, rather little has been done to clarify the factors promoting affective occupational commitment [20]. While the determinants of organizational commitment have been discussed, there is still a relative paucity of research comprehensively exploring the determinants of occupational commitment, including the associated demographic factors. Indeed, only two meta-analyses have identified the influential factors of occupational commitment [1] [23], which included job satisfaction, professional autonomy, support from coworkers and supervisors, job involvement, job stress, and income. However, these meta-analyses did not focus strictly on affective occupational commitment and looked at occupations beyond just nurses.

Theoretically, affective occupational commitment is influenced by occupational value congruence, job characteristics, work environments, and individual differences [1] [23] [24] [25]. The aim of the current study was to determine the specific factors related to affective occupational commitment among nurses in Japan. This would provide suggestions about intervention programs for promoting

affective occupational commitment, which in turn could help in preventing nurse turnover and improving intention to stay in the profession.

2. Methods

2.1. Research Design and Participants

This study used a cross-sectional design and employed the data collected in a previous study by Satoh *et al.* [20]. Twelve hospitals in the Tohoku and Kanto districts of Japan, all of which had more than 300 beds and a 1:7 nurse-to-patient ratio, agreed to participate. Data were collected from September to October 2013 using a self-report questionnaire.

The sample size for this study was determined using an effect size of 0.2, statistical power level of 0.8, and alpha level of less than 0.05 [1] [16] [23]. The estimated number of participants was 1200 participants; thus, 4030 nurses were needed for the current study assuming a response rate of 30%.

Then, we distributed the questionnaire to the 4046 nurses working in the nursing departments of these twelve hospitals. Of these, 1531 nurses (response rate: 37.8%) returned the questionnaire by mail. We analyzed the data provided by 1330 nurses (valid response rate: 32.9%).

2.2. Measures

2.2.1. Affective Occupational Commitment

We used the Japanese version of the Occupational Commitment Scale [9], originally developed by Meyer *et al.* [16]. It comprises 6 items, which respondents rate on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The scores are summed, with higher scores indicating higher levels of commitment.

2.2.2. Effort-Reward Imbalance (ERI)

The Japanese short version of the Effort-Reward Imbalance Questionnaire (ERI-Q), originally developed by Siegrist and colleagues [26], was used to assess stressful conditions at work. The Japanese short version of the ERI-Q has high validity and reliability [27]. The model on which the ERI-Q is based was developed in the medical sociology field to clarify the effects of efforts and rewards at work [28]. Marmot *et al.* [28] reported that the ERI model is suitable for explaining stress in service occupations and professions, and health professionals in particular.

The Japanese version of the ERI-Q has three subscales measuring effort (6 items), reward (11 items), and over-commitment (6 items). Effort refers to job demands, responsibility, and workload, while reward refers to what workers can expect to gain through their labor, including money, esteem, and career opportunities. The items in these two subscales are answered in two steps. First, respondents indicate whether each item is a source of stress for them by choosing one of two options: *agree* or *disagree*. Those who answer *agree* are then asked to rate the degree of distress by selecting one of four options ranging from 1 (*not at all distressed*) to 4 (*very distressed*). The scores on each scale are then summed, with higher scores indicating that more effort is given and that workers are ex-

periencing distress (effort) or the greater the rewards that workers obtain.

Over-commitment is a personal factor referring to an individual's use of an exhausting work-related coping style [29] [30]. Respondents rate each item on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*), and the scores of all items are summed. A higher total score indicates a greater likelihood of experiencing over-commitment.

2.2.3. Professional Autonomy

This was assessed using 7items from the professional autonomy scale developed by Asakura *et al.* [31]; it has established validity and reliability. The scale evaluates nurses' perceived professional autonomy. The respondents rate the items on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), after which the scores are summed. Higher scores indicate greater professional autonomy.

2.2.4. Job Satisfaction

Job satisfaction was assessed using the general job satisfaction scale, a subscale of the Japanese version of the Job Satisfaction Scale [32], originally developed by McLean [33]. The scale comprises 4 items evaluating the degree of overall satisfaction with various working conditions. Respondents rate each item on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), after which the scores are summed. Higher total scores indicate greater job satisfaction.

2.2.5. Personal and Occupational Characteristics

We assessed the following demographic and occupational characteristics of respondents: gender, age, marital status, child status, living with persons requiring care, education, number of overtime hours per month, employed status, position, years of nursing experience, own income/household income, and scholarship system.

2.2.6. Organizational Characteristics

The number of beds at this hospital, number of nurses in staff at the hospital, and hospital location were assessed.

2.3. Statistical Analyses

Descriptive statistics (frequencies, means, and standard deviations) for participants' personal and occupational characteristics were calculated, and Cronbach's α values were calculated for the affective occupational commitment, job satisfaction, ERI, and professional autonomy measures. We used t-tests and one-way analyses of variance (ANOVAs) to compare the variable means. Pearson's correlation coefficients were calculated between affective occupational commitment and the other continuous variables. Furthermore, logistic regression analysis was performed to identify the individual factors associated with affective occupational commitment; in this analysis, affective occupational commitment was dichotomized into high and low using the median split. Personal and employment demographic variables, organizational characteristics, job satisfaction, ERI ratio, over-commitment and professional autonomy were used for independent va-

riables.

SPSS Statistics 22.0 for Mac [34] was used for the data analysis. Statistical significance was set at $p < 0.05$ (two-tailed).

2.4. Ethical Considerations

Approval for this study was obtained from the ethics committee of the authors' institution. We requested the cooperation of all of the hospitals' nursing service directors orally and in writing. Participants were informed of the voluntary nature of this study and assured of their right to refuse to participate or withdraw at any time, and of the confidentiality of the data. Participants agreed to take part in the study by completing and returning the questionnaire.

3. Results

3.1. Sample Characteristics

The sample characteristics are presented in Table 1. The majority of the sample was female (95.4%), worked at hospitals in the Tohoku district (62.9%), and worked at hospitals with 500 - 699 beds (71.0%). Furthermore, 37.3% worked at hospitals with more than 700 nursing staff. Respondents' mean age was 37.61 (SD = 10.29) and their mean years of clinical experience was 15.52 (SD = 10.28).

3.2. Affective Occupational Commitment and Personal and Occupational Characteristics

Of the personal and occupational characteristics, marital status ($p < 0.001$), child status ($p < 0.001$), position ($p < 0.001$), employment status ($p < 0.05$), hospital capacity ($0.01 < p < 0.05$), and area of hospital location ($p < 0.01$) were significantly related to affective occupational commitment. More specifically, married nurses, nurses who had children, nurses who worked in hospitals with more than 700 beds, and nurses who worked in the Kanto district had significantly higher affective occupational commitment scores (Table 2).

3.3. Correlations between Affective Occupational Commitment and Independent Variables

All continuous variables had significant correlations with affective occupational commitment. Positive correlations were found for age ($r = 0.189$, $p < 0.001$), years of nursing experience ($r = 0.203$, $p < 0.001$), job satisfaction ($r = 0.339$, $p < 0.001$), and professional autonomy ($r = 0.308$, $p < 0.001$), while negative correlations were found for share of household income ($r = -0.087$, $p < 0.01$), ERI ($r = -0.260$, $p < 0.001$), and over-commitment ($r = -0.160$, $p < 0.001$) (Table 3).

3.4. Logistic Regression of Affective Occupational Commitment

The results of the logistic regression analysis for affective occupational commitment are shown in Table 4. Married nurses (odds ratio [OR] 1.54, 95% confidence interval [CI] 1.04 - 2.28), nurses who had obtained a scholarship (OR 1.34, 95% CI 1.04 - 1.74), nurses who worked more than 20 hours of overtime work

Table 1. Sample characteristics.

		N	%[†]
Gender	Female	1269	95.4
	Male	60	4.5
Age	Mean ± SD	37.61 ± 10.29	
Years of nursing experience	Mean ± SD	15.52 ± 10.28	
Marital status	Married	700	52.6
	Single	629	47.3
Child status	Have a child	636	47.8
	Do not have a child	693	52.1
Living with persons requiring care	Yes	208	15.6
	No	1115	83.8
Share of household income	Mean ± SD	64.51 ± 2.80	
Education	Community college or vocational school	1108	83.3
	University graduate or higher	196	14.7
Employment status	Permanent	1263	95.0
	Temporary	66	5.0
Position	Managerial position	153	11.5
	Staff nurse	1168	87.8
Scholarship system	Used	604	45.4
	Not used	726	54.6
Hospital location	Kanto district	498	37.4
	Tohoku district	831	62.5
Number of overtime hours per month	<5	211	15.9
	5 - 20	688	51.7
	≥20	419	31.5
Number of beds at hospital	<500	226	17.0
	500 - 700	944	71.0
	≥700	159	12.0
Number of nursing staff members at hospital	<500	309	23.3
	500 - 700	524	39.4
	≥700	496	37.3

[†]Some percentages do not equal 100% due to missing data.

Table 2. Comparison of mean scores.

		Mean	SD	*p*
Gender				
	Female	21.22	3.89	
	Male	20.27	3.52	

Continued

Marital status				
	Married	21.78	3.77	***
	Single	20.49	3.88	
Child status				
	Have a child	21.81	3.77	***
	Do not have a child	20.58	3.87	
Living with persons requiring care				
	Yes	21.42	3.86	
	No	21.13	3.88	
Education				
	Community college or vocational school	21.24	3.86	
	University graduate or higher	20.81	3.98	
Employment status				
	Permanent	21.11	3.86	*
	Temporary	22.14	3.85	
Position				
	Managerial position	20.94	3.87	***
	Staff nurse	23.04	3.38	
Scholarship system				
	Used	21.27	4.09	
	Not used	21.09	3.68	
Hospital location				
	Kanto district	21.68	4.08	***
	Tohoku district	20.86	3.71	
Number of overtime hours per month				
	<5	21.30	3.58	
	5 - 20	21.06	3.80	
	≥20	21.29	4.13	
Number of beds at hospital				
	<500[a]	21.16	3.93	a-c*
	500 - 700[b]	21.00	3.85	b-c**
	≥700[c]	22.22	3.76	
Number of nursing staff members at hospital				
	<500	21.36	3.70	
	500 - 700	20.84	3.91	
	≥700	21.40	3.92	

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table 3. Correlation Coefficients between Variables

	Mean	SD	Range	Cronbach's alpha	Correlation	*p*
Affective occupational commitment	21.17	3.87	6 - 30	0.837	-	
Age	37.61	10.29	2 - 65	-	0.189	***
Years of nursing experience	15.52	10.28	0 - 48	-	0.203	***
Share of household income	64.51	2.80	0 - 10	-	−0.087	**
ERI (effort-reward imbalance)	0.97	0.39	0.20 - 3.95	-	−0.260	***
Over-commitment	15.48	3.36	6 - 24	0.799	−0.160	***
Professional autonomy	24.97	4.10	7 - 35	0.821	0.308	***
Job satisfaction	11.14	3.56	4 - 20	0.870	0.339	***

***$p < 0.001$, **$p < 0.01$.

Table 4. Logistic regression analysis.

	Odds ratio	95% CI		*p*
		Lower	Upper	
Gender (Male = ref.)	1.49	0.79	2.81	
Child status (Not Having child = ref.)	0.83	0.56	1.24	
Marital status (Single = ref.)	1.54	1.04	2.28	*
Living with persons requiring care (No = ref.)	1.25	0.87	1.79	
Share of household income	0.97	0.92	1.02	
Years of nursing experience	1.02	1.00	1.04	
Position (Managerial position = ref.)	1.33	0.84	2.08	
Employment status (Temporary = ref.)	0.81	0.42	1.56	
Number of overtime hours per month (<5 hours = ref.)				
5 - 20 hours	1.43	0.97	2.11	
≥20 hours	2.18	1.39	3.40	**
Scholarship loan (No = ref.)	1.34	1.04	1.74	*
Hospital location (Tohoku district = 0)	1.37	0.92	2.05	
Number of beds at hospital (≥700 = ref.)				
<500	0.97	0.56	1.69	
500 - 700	0.64	0.37	1.12	
Number of nursing staff members at hospital (≥700 = ref.)				
<500	0.89	0.59	1.34	
500 - 700	0.89	0.64	1.24	
Job satisfaction	1.15	1.11	1.20	***
Effort–reward imbalance	0.40	0.26	0.62	***
Professional autonomy	1.12	1.08	1.16	***
Over-commitment	0.98	0.93	1.02	

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

per week (≥20 h vs. <5 h; OR 2.18, 95% CI 1.39 - 3.40), nurses with higher job satisfaction (OR 1.15, 95% CI 1.11 - 1.20) and nurses with higher professional autonomy (OR 1.12, 95% CI 1.08 - 1.16) all had significantly greater odds of having high affective occupational commitment. Conversely, nurses who had a higher ERI score (OR 0.40, 95% CI 0.26 - 0.62) had significantly lower odds of having high affective occupational commitment.

4. Discussion

The aim of this study was to determine the factors related to affective occupational commitment among Japanese hospital nurses. The results of our study indicate that job satisfaction, professional autonomy, effort-reward imbalance, overtime work hours, receipt of a scholarship, and marital status might be key factors influencing affective occupational commitment.

Affective occupational commitment was found to be positively associated with job satisfaction. The relationship between affective occupational commitment and various work-related attitudes, especially job satisfaction, has been confirmed in numerous international studies. Meyer *et al.* [16], for instance, showed that affective occupational commitment had a positive correlation with job satisfaction when developing an occupational commitment scale among Canadian nurses. Job satisfaction has also been found to be an antecedent of affective occupational commitment in other previous studies [1] [35]. Affective occupational commitment is believed to improve through satisfying work experiences produced by involvement in the nursing profession [16]. Overall, our results agree with those reported by previous studies. However, it should be noted that there is conflicting evidence regarding the causal relationship between affective occupational commitment and job satisfaction; as such, causal links in both directions are possible. In other words, high job satisfaction among nurses might produce stronger affective occupational commitment; however, it is equally likely that higher affective occupational commitment leads to an improvement in job satisfaction. As these are both important factors for predicting nurses' intention to stay [35], we suggest further examinations of affective occupational commitment or job satisfaction to prevent nurse turnover.

Affective occupational commitment and professional autonomy are crucial factors influencing nurses' work attitudes and outcomes. Numerous studies on nurses have clarified the relationship between affective occupational commitment and work-relevant behavior [10] [16] [18] [19] as well as the relationship between professional autonomy and work-relevant behavior [36] [37]. The emotional connection to one's occupation (*i.e.*, affective occupational commitment) is intimately connected with a profession's work behavior [1] [16]. Furthermore, somebody with strong affective occupational commitment is likely to strongly identify with her/his occupation and the various beliefs and values associated with it [1]. Professional autonomy is regarded as a cognitive aspect related to those beliefs and values [31]. Thus, affective occupational commitment and professional autonomy are theoretically related. Our study adds further empirical

support for this relationship. This relationship was also found in a meta-analysis of occupational commitment studies [1], but that study did not specifically focus on the link between these two variables among nurses.

Compared to the previous two variables, effort–reward imbalance had a negative association with affective occupational commitment. This result accords with previous research shows that job stress has a negative association with affective occupational commitment [1]. Both physically and psychologically demanding jobs might decrease individuals' emotional attachment to the occupation itself, which in turn could increase intention to leave [15]. Nurse managers should thus assign jobs according to staff members' ability and skill and ensure adequate nurse staffing, when possible. Reducing effort–reward imbalance is thought to be difficult, however, given that nursing is a highly demanding profession. The degree to which nurses are rewarded for their efforts can improve the sense of meaning in and emotional attachment to nursing [38]. As such, it would be important for nurse managers to appreciate their nursing staff and provide adequate rewards, and for nurses to understand that they can obtain rewards that correspond with the amount of effort they put into the job. This can potentially reduce the negative effects derived from extrinsic effort.

In Lee *et al.*'s [1] meta-analysis of occupational commitment, extremely low correlations were reported between various demographic variables and affective occupational commitment. Similarly, a study of Japanese newly graduated nurses found no significant relationship among individual characteristics, employment attributes, and affective occupational commitment [17]. On the other hand, clinical experience, age, marital status, level of education, occupational position, and having flexible working hours were all found to be associated with greater occupational commitment [2] [10] [38] [39] [40] [41]. Our finding that nurses who are married have a higher level of affective occupational commitment was the exact opposite of Blau's [2] findings, who proposed that higher affective occupational commitment is associated with a greater likelihood of not being, married [2]. However, people's attitudes towards jobs have changed over the decade since Blau's study, and the number of women who continue to work after marriage has been increasing globally. This is perhaps why our results were inconsistent with Blau's. Additionally, the findings of the current study suggest that those who have strong affective occupational commitment have a greater intention to remain in nursing in that they are willing to juggle their work and family life after marriage—in other words, their high affective occupational commitment makes them less likely to leave their jobs after marriage.

We identified the use of scholarship loans as a factor related to affective occupational commitment. Previous studies have reported that aspiration to progress and be proactive in self-improvement can increase affective occupational commitment [2] [16]. Our study is indirectly congruent with that finding, in that nurses who pursue a scholarship loan are likely to possess such aspirations. Note that we did not find any significant differences in the means of affective occupational commitment by scholarship use status, but the logistic regression analysis

confirmed the latter as a strong predictor of the former. This suggests that confounding factors might have obscured the association between affective occupational commitment and scholarship use status.

Regarding overtime work hours, nurses who worked more than 20 hours of overtime work per week tended to demonstrate higher affective occupational commitment. No other study that examined this relationship found the same. Our findings suggest that nurses with high affective occupational commitment are more likely to become absorbed in their jobs, and thus will work longer hours. Excessive commitment to work is considered to facilitate longer working hours. However, because overwork can have an adverse effect on physical and psychological health [30] [42], nurse managers should manage work hours according to nursing staff's workload or work conditions. Furthermore, higher affective occupational commitment might be a stress reaction to effort–reward imbalance [26] [43]. Thus, nurse managers should pay attention to staff showing such tendencies.

Although few studies have reported on the association between affective occupational commitment and demographic variables, this study showed different findings from those conducted previously. It is important that the demographic characteristics related to affective occupational commitment are understood in order to devise efforts to improve such commitment. Further research is needed to explore the individual differences and other demographic variables related to affective occupational commitment.

5. Limitations

First, because respondents were all nurses working in the Tohoku and Kanto districts of Japan, and thus may not be representative of Japan, caution must be taken when generalizing the results. The low response rate might also have influenced the generalizability of the findings. Another survey using a national sample of Japanese nurses would be useful. Second, we could not establish causal relationships with certainty in this cross-sectional study; longitudinal studies would be needed to investigate causality in the future. Finally, to examine the topic more comprehensively, researchers should include other psychosocial environmental variables that might relate to affective occupational commitment.

6. Conclusion

This study revealed that professional autonomy and job satisfaction could improve affective occupational commitment. Antithetically, effort-reward imbalance is associated with lower affective occupational commitment among Japanese nurses. To improve affective occupational commitment, intervention programs targeting relevant personal resources (*i.e.*, skill, knowledge, and resilience) should be developed. Additionally, organizational resources, such as adequate staffing, easy access to support, and useful information must be provided to increase job satisfaction and reduce effort-reward imbalance. More than 20 hours of overtime work per week was also positively related to high affective occupa-

tional commitment. Nurses who work longer hours might have an excessive emotional commitment to their occupation. Therefore, nurse manager should take staff's working situations into consideration.

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