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Psychometric Evaluation of the Perceived Stress Scale in Early Postmenopausal Chinese Women*

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ABSTRACT

Objective: *The objective of this study was to examine the psychometric properties of the Perceived Stress Scale (PSS) in a population-based sample of early postmenopausal Chinese women in Hong Kong.* **Methods**: *509 postmenopausal women, 50 to 64 years, recruited from the community through random telephone dialing were interviewed. The interview included the PSS, the Center of the Epidemiological Study of Depression Scale (CES-D), the State Trait Anxiety Inventory (STAI), the menopausal symptom checklist, and questions on sociodemographic characteristics and health behaviors. Principle component analysis was used to determine the component structure of the PSS items. The reliability related to internal consistency was measured by Cronbach's alpha coefficient and test-retest by intra-class correlation coefficients. Construct validity was investigated with subgroup comparisons on the basis of sociodemographic characteristics, and through correlations with the CES-D, the STAI, menopausal symptoms, and health behaviors.* **Results**: *Principle component analysis of the PSS showed that the scale consisted of 2 factors, which explained 52% of variance. Internal consistency was adequate (Cronbach's α = 0.81) and the test-retest reliability after an interval of 2 weeks was 0.86. The PSS distinguished well, and in the expected manner, between subgroups on the basis of age, work status, and marital status, providing evidence of construct validity. The PSS was also correlated with CES-D, STAI, menopausal symptoms, and health behaviors; hence the construct validity was further supported.* **Conclusions**: *The PSS appears to be a psychometrically sound instrument for measuring psychological perceived stress for Chinese women in midlife.*

Keywords: *Perceived Stress Scale, Validity, Reliability, Postmenopausal Women, Chinese*

1. Introduction

Symptoms of psychological stress appear to be increased in midlife women [1] due to life-stage, hormonal, and metabolic changes [2,3]. A number of studies have provided evidence that psychological stress is associated with a broad array of health outcomes, including cardiovascular morbidity and mortality [4,5], and respiratory infection [6]. Recent studies have also demonstrated that perceived stress is associated with premature death [7] and adversely affects quality of life [8]. As midlife women confront many stressors, particularly during the period soon after menopausal, accurate measurement of psychological perceived stress is essential for better understanding of the susceptibility and treatment of psychological distress.

The Perceived Stress Scale (PSS) is one of the most widely used instruments for measuring psychological perceived stress. Studies have supported the validity and reliability of the PSS in a variety of samples [9-11]. The PSS has also been shown to relate to a number of physiological responses [12,13]. Nevertheless, the psychometric properties of the PSS have yet to be examined in early postmenopausal Chinese women. We addressed this need by examining the factor structure, reliability, and validity of the PSS in a population-based sample of early postmenopausal Chinese women in Hong Kong.

2. Methods

2.1 Subjects

The current study was conducted at baseline from 2002 to 2004 as part of a study of subclinical atherosclerosis in early postmenopausal Chinese women in Hong Kong. A detailed description of the sample for the study has been published elsewhere [14]. 518 women aged between 50 to

64 years, and within 10 years since menopause (defined as 12 months since the cessation of the last menses) were recruited through random telephone dialing based on the most recent residential telephone directory. At least 6 attempts at different times of the day and week were made for each number before it was considered a non-contact. If more than one postmenopausal woman within the household fell into the targeted age range of 50 to 64 years, the member with the most recent birthday was selected. Women with surgical menopause, cardiovascular disease and severe disease conditions such as cancer and renal failure were excluded. Eligible subjects were invited for a face-to-face interview, clinical assessments, and carotid ultrasound measurements. A response rate of 62.5% was obtained. Seven women who reported taking psychotropic medication within the last 3 months from the date of interview, one woman without psychotropic medication data, and another woman without PSS score were excluded, thus leaving 509 subjects for analysis. Furthermore, a random sub-sample of 25 women were re-interviewed over the telephone for a reliability test with an intervening 2-week interval. All women gave written, informed consent and the study was approved by the Ethics Committee of the Chinese University of Hong Kong.

2.2 Measures

Standardized interviews assessed sociodemographic characteristics, medical history, use of medications, psychological factors, menopausal symptoms, and health behaviors. In the analyses presented below, we focus on sociodemographic characteristics, psychological factors, menopausal symptoms, and health behaviors.

Sociodemographic characteristics

Several questions were administered to elicit information about the sociodemographic data including age, household income, education, work status and occupation, as well as marital status. Women actively looking for a job or temporarily not employed because of any reasons were classified as 'non-working'. Information was also gathered about the year since menopause.

Psychological factors

Perceived stress was assessed using the PSS which was developed by Cohen [15]. This scale is a self-report measure and the version having used had 10 items [9]. The PSS measures the degree to which individuals perceived their daily life as being stressful during the last month with a 5-point Likert scale (0 = never and 4 = very often). Total scores can range from 0 to 40. Higher scores on the PSS represent higher levels of perceived stress.

Depression symptoms were assessed using the Center of the Epidemiological Study of Depression Scale (CES-D) which was developed by Radloff [16] and was locally translated and validated by Cheung *et al.* [17]. The CES-D is a self-report measure consisting of 20 items, with response options for each item reflecting varying

degrees of depression symptoms. Respondents were told that the items constitute a list of ways they may have felt or behaved during the last week, and they indicated the frequency of occurrence of each symptom on a 4-point Likert scale (0 = rarely or none of the time: less than 1 day and 3 = most or all of the time: 5 to 7 days). Total scores can range from 0 to 60. Subjects with scores of 16 or more on the CES-D scale were considered 'mild depression'.

Anxiety was assessed using the State Trait Anxiety Inventory—Form Y (STAI) which was developed by Spielberger *et al.* [18]. This scale was translated into Chinese by Tsoi *et al.* [19] and has been successfully employed in measuring anxiety in the Chinese population [20-22]. The STAI comprises of two 20-item self-report scales for which subjects were asked to indicate the temporary condition of state anxiety and the more general and long-standing quality of trait anxiety on a 4-point Likert scale (1 = not at all and 4 = very much so). Because half of the items reflect the absence of anxiety, the scoring of these items were reversed and responses on all items summed to give a total score ranging from 20 to 80. Scores on the STAI have a direct interpretation: high scores on their respective scales mean more state or trait anxiety and low scores mean less.

Menopausal symptoms

Menopausal symptoms were assessed using the 20-item symptom checklist adapted from Avis *et al.* [23] and locally translated by Ho *et al.* [1]. A binary response was adopted and each woman was asked to respond 'yes' or 'no' to having had experienced any of the symptom in the past 2 weeks. The symptom checklists comprised of five symptom clusters, namely psychological, musculoskeletal and gastrointestinal, non-specific somatic complaints, respiratory, as well as vasomotor.

Health behaviors

Women were asked to rate their cigarette smoking habits on a scale of never smoked, once smoked but did not anymore, or currently smoke if they smoked 1 or more cigarette per day. Also they were asked about their alcohol intake habits on a scale of never drinkers, infrequent drinkers, or frequent drinkers (at least once per week). Women were also asked to give information about the usual level of participation in occupational, leisure-time physical activity, sport and exercise, and household activity over the previous 12 months with the modified and locally translated Baecke questionnaire [24,25]. Total hours of sleep per day were extracted from the translated Baecke questionnaire. In addition, women who reported that she had frequently engaged in a given sporting activity / exercise were defined as physically active, and those who infrequently / never engaged were physically inactive.

2.3 Data Analysis

Continuous variables were reported as mean and standard deviation. Factor structure was assessed using principle

component analysis with varimax rotation. The reliability related to internal consistency was measured by Cronbach's alpha coefficient (Cronbach's α) and test-retest by intra-class correlation coefficients (ICCs). Construct validity was performed through comparisons between PSS scores across various subgroups on the basis of sociodemographic characteristics using analyses of variance (ANOVAs) or t-tests, depending on the number of categories, through correlations with 2 psychological measures (CES-D and STAI) tapping similar constructs, and through correlations with a number of menopausal symptoms and health behaviors including total hours of sleep per day, smoking, alcohol intake and physical activity. A $P < 0.05$ was used to denote significant difference. All analyses were performed with SPSS version 15.0 (SPSS Inc., Chicago, IL, USA).

3. Results

Characteristics of study population

The mean age of the study population was 56 years and the majority was married (80.7%). About half had secondary or above level of education and 70.3% were housewives. 60.7% of the women reported four or more menopausal symptoms. The prevalence of smoking and frequent alcohol intake was rather low (less than 4%). Details of the characteristics of the study population have been described in a previous paper [14].

Factor structure

The principal component analysis revealed 2 factors that accounted for 52% of the variance in the items (**Table 1**). The first factor 'positive perception', accounting for 38% of the variance, was made up of 6 positively worded items. Factor loadings ranged from 0.535 to 0.771, and none of these items loaded onto the second factor. The second factor 'negative perception' accounted for an additional 15% of variance and was composed of 4 negatively worded items with factor loading ranging from 0.691 to 0.798.

Reliability

The reliability related to internal consistency (measured by Cronbach's α) was 0.81 for the whole PSS, 0.77 for the first factor, and 0.77 for the second factor. Test-retest reliability (measured by ICCs) after an interval of 2 weeks was 0.86.

Construct validity

Subgroup comparisons

The mean score of the PSS was 11.56, with standard deviation of 7.16 (Range 0-40) (**Table 2**). PSS scores decreased with age ($r = -0.173$, $P < 0.01$). Women within 5 years of menopause were also associated with higher PSS scores, but the magnitude of this association was attenuated after adjustment for age (data not shown). When scores were classified by level of household income, PSS scores declined as household income increased. Women with household incomes of HK \$ 10,000 or less reported higher PSS scores than did those earning \$ 10000 - \$ 49,999, \$ 50,000 - \$ 99,999, and more than \$ 100,000. However, none of the comparisons between group means were significant ($P = 0.536$). Women with education beyond tertiary education reported more perceived stress than did all those with less than a tertiary education, but the difference was not statistically significant ($P = 0.367$). Women who were housewives or who were retired had PSS scores significantly lower than did those in paid employment ($P < 0.01$). No significant differences between the PSS scores for those who were service sector / manual workers and those who were administrative professionals were found ($P = 0.424$). PSS was also related to marital status. T-test revealed that women who were married or living with a partner had lower PSS scores than did those who were never married, widowed, divorced, or separated ($P < 0.05$). After adjustment for age, the magnitude of this association remained nearly unchanged ($P < 0.05$) (data not shown).

Relationship between PSS scores and other psychological measures

Correlations between the PSS, the CES-D, and the STAI were calculated (**Table 3**). As expected, both the latter scales correlated positively with the PSS ($r = 0.690$, $P < 0.01$ and $r = 0.693$, $P < 0.01$, for CES-D and STAI, respectively). When STAI was split into its component scale, the PSS correlated well with both SAI and TAI ($P < 0.01$).

Table 1. Rotated factor loadings of PSS items

Item	Factor 1	Factor 2
1	0.771	0.154
2	0.535	0.223
3	0.698	0.161
6	0.621	0.172
9	0.686	0.010
10	0.678	0.214
4	0.220	0.712
5	0.293	0.691
7	0.007	0.764
8	0.197	0.798
Eigenvalue	3.774	1.462
Variance accounted for, %	37.737	14.623

Table 2. Mean PSS scores and standard deviations for sociodemographic categories

	N	PSS score, mean ± SD	P-value
Overall	509	11.54 ± 7.15	---
Age, years			
50 - 54	199	13.03 ± 7.78	0.000
55 - 59	225	11.44 ± 6.60	
60 - 64	85	8.45 ± 6.02	
Years since menopause, years			
< 5	261	12.15 ± 7.48	0.049
≥ 5	246	10.91 ± 6.77	
Household income			
< HK $ 10,000	129	12.09 ± 7.95	0.536
HK $ 10,000 - $ 49,999	157	11.96 ± 6.83	
HK $ 50,000 - $ 99,999	169	11.33 ± 6.59	
≥HK $ 100,000	45	10.56 ± 7.68	
Education			
Primary or below	226	11.15 ± 7.50	0.367
Secondary	236	11.74 ± 6.86	
Tertiary or above	47	12.66 ± 6.94	
Work status			
Housewife	356	10.74 ± 6.90	0.000
Employed	151	13.28 ± 7.22	
Non-working	2	28.00 ± 9.90	
Occupation			
Service sector / manual workers	128	13.07 ± 7.12	0.424
Administrative professionals	23	14.48 ± 7.77	
Marital status			
Single, widow, divorced or separated	98	12.95 ± 7.11	0.033
Married or lived together	411	11.23 ± 7.14	

PSS, perceived stress scale
P-values from ANOVAs or T-tests for comparisons of mean values

Relationship between PSS scores and menopausal symptoms

PSS scores were significantly related to the number of menopausal symptoms for all of the five symptom groups (**Table 4**). PSS scores were associated with more psychological symptoms (r = 0.406, P < 0.01) and, to a lesser extent, with more musculoskeletal and gastrointestinal (r = 0.219, P < 0.01), non-specific somatic complaints (r = 0.231, P < 0.01), respiratory (r = 0.180, P < 0.01), and vasomotor symptoms (r = 0.235, P < 0.01) as well. After adjustment for age, the magnitude of these associations remained nearly unchanged (data not

Table 3. Correlations between PSS scores and other psychological measures

Psychological measures	PSS score	
	Pearson correlation coefficient	P-value
CES-D	0.690	0.000
STAT	0.673	0.000
SAI	0.538	0.000
TAI	0.693	0.000

PSS, perceived stress scale, CES-D, Center of the Epidemiological Study of Depression Scale, STAI, State Trait Anxiety Inventory, SAI, State Anxiety Inventory, TAI, Trait Anxiety Inventory
P-values obtained from Pearson correlations

Table 4. Correlations between PSS scores and menopausal symptoms

Menopausal symptom groups	PSS score	
	Pearson correlation coefficient	P-value
Psychological[a]	0.406	0.000
Musculoskeletal and gastro-intestinal[b]	0.219	0.000
Non-specific somatic complains[c]	0.231	0.000
Respiratory[d]	0.180	0.000
Vasomotor[e]	0.235	0.000
All symptoms[f]	0.412	0.000

PSS, perceived stress scale
[a]Psychological: difficulty in concentration, nervous tension, rapid heartbeat, trouble sleeping, feeling blue.
[b]Musculoskeletal gastrointestinal: diarrhea and/or constipation, aches or joint stiffness, backaches, upset stomach.
[c]Non-specific somatic complaints: lack of energy, dizzy spells, headaches.
[d]Respiratory: persistent cough, sore throat, shortness of breath.
[e]Vasomotor: cold sweats, hot flushes, loss of appetite.
[f]All symptoms: all of the above, including two symptoms (urinary tract infection and feeling of pins and needles) not loaded into anyone of the symptom clusters.
P-values obtained from Pearson correlations

shown).

Relationship between PSS scores and health behaviors
Women who reported that they had 5 hours or less of sleep per day had PSS scores significantly higher than those who reported more than 5 hours of sleep per day (P < 0.01) (**Table 5**). PSS scores were also significantly higher amongst physically inactive women when compared with the physically active (P < 0.01). Analyses also showed decreased PSS scores were associated with in-

creased levels of physical activity by means of total index assessed by the modified Baecke questionnaire (data not shown). No relationships of the PSS scores with smoking or alcohol intake were revealed by the data.

4. Discussion

Overall, the PSS performed reasonably well in this sample of early postmenopausal Chinese women. The factor structure of the PSS was consistent with the structure found in the US population [9]. Items stating positive attitude were gathered in the 'positive perception' factor and items of negative attitude were in the 'negative perception' factor. Cronbach's α for each factor was high, indicating that all factors were internally consistent. The level of stability was sufficient. The PSS was stable over a period of around 2 weeks.

The PSS scores were able to distinguish between groups of women in an expected way on the basis of age, work status, and marital status, providing evidence of its construct validity. Women who were younger had generally higher PSS scores. The results are congruent with those of Cohen and Williamson [9], who reported an inverse association of PSS scores with age. Compared with housewives, women with paid employment and non-working women had higher PSS scores. Ho *et al.* [26] also demonstrated that women with paid employment and non-working women were more likely to report menopausal symptoms. Perhaps being employed in midlife was a source of stress resulting from perceived job uncertainty, interpersonal conflicts and financial difficulties. Thus, our data are consistent with traditional conceptions of groups who should be experiencing greater stress because of the demands of their living and working environments.

Women who were never married, widowed, divorced, or separated had generally higher PSS scores than those who were married or living with a partner. Cohen and Williamson [9] have also noted a significant difference between mean PSS scores of single or never married, divorced, or separated and married/living with a partner. The difference in perceived stress levels may be explained either by never married women having more difficulty in identity formation and acceptance of their role by society or married women whose children are nearly grown tend to experience more satisfaction and less stress at midlife.

The PSS was also found to correlate significantly with other psychological measures (CES-D and STAI) commonly used to measure similar psychological constructs, and thus the construct validity of the PSS was confirmed.

Adequate correlations between the PSS scores and the number of menopausal symptoms for all of the symptom groups including psychological, musculoskeletal and gastrointestinal, non-specific somatic complaints, respiratory, and vasomotor symptoms groups were observed.

Table 5. Mean PSS scores and standard deviations for health behavior categories

	N	PSS score, mean ± SD	P-value
Total hours of sleep per day, hours			
< 5	35	15.91 ± 7.83	0.001
5 – 6	109	12.03 ± 7.42	
6 – 7	171	11.28 ± 6.76	
7 – 8	136	10.29 ± 6.84	
> 8	58	11.84 ± 7.26	
Smoking			
Never smokers	492	11.51 ± 7.13	0.571
Former smokers	9	14.00 ± 9.29	
Current smokers	8	12.13 ± 6.58	
Alcohol intake			
Never drinkers	321	11.53 ± 7.12	0.946
Infrequent drinkers	170	11.56 ± 7.36	
Frequent drinkers	18	12.11 ± 6.34	
Physical activity			
Physically inactive	241	13.16 ± 7.38	0.000
Physically active	268	10.12 ± 6.64	

PSS, perceived stress scale
P-values from ANOVAs or T-tests for comparisons of mean values

Our results are consistent with that observed in another study [27] suggesting that perceived stress soon after menopause may also sensitize women to symptomatic responses. A possible explanation for this association is that the effect of stress on catecholamine and estrogen changes.

A significant inverse association between PSS scores and total hours of sleep per day was also revealed. Our result is consistent with findings of a previous study [28] that perceived stress was a significant predictor of subjective sleep disturbance in middle-aged Chinese women, but the study was limited by the cross-sectional design, which could not address causality of associations. Indeed, the relationship between psychological stress and sleep loss is bi-directional. Chronic sleep loss may increase the feelings of stress via the transient or enduring activation of the neuroendocrine stress systems [29].

Our results are also consistent with another epidemiological study in finding an inverse association between PSS scores and physical activity [30]. Plausible mechanisms could be that physical activity may enhance self-esteem, improve mood states, reduce state and trait anxiety, and resilience to stress [31]. Therefore, in this study, we had identified a number of menopausal symptoms and health behaviors which were associated with the PSS scores, hence the construct validity of the PSS was further supported.

This study has several limitations. Our findings were based on a cross-sectional study, the temporal or cause-effect relationship was unclear, and thus predictive validity could not be confirmed. Test-retest reliability was accessed in 2 different modes of data collection (face-to-face and telephone interviews), differential response bias could be introduced. However, the strength of the study lies in the population-based nature of the sample.

In conclusion, the results of this study suggest that the PSS is an instrument with adequate psychometric properties (consistent internal structure, high reliability, and high construct validity). Therefore, the PSS can be a very useful tool to detect psychological stress among early postmenopausal Chinese population. The PSS may also predict adverse health outcomes when it is used in longitudinal studies. More attention to a long-term temporal perspective is needed to delineate the predictive validity of the PSS for health outcomes such as cardiovascular events in women in midlife.

5. Acknowledgment

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Sensitivity and Specificity of the CDC Empirical Chronic Fatigue Syndrome Case Definition

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ABSTRACT

In an effort to bring more standardization to the chronic fatigue syndrome (CFS) Fukuda et al. case definition [1], the Centers for Disease Control and Prevention (CDC) has developed an empirical case definition [2] that specifies criteria and instruments to diagnose CFS. The present study investigated the sensitivity and specificity of this CFS empirical case definition with diagnosed individuals with CFS from a community based study that were compared to non-CFS cases. All participants completed questionnaires measuring disability (Medical Outcome Survey Short-Form-36) [3], fatigue (the Multidimensional Fatigue Inventory) [4], and symptoms (CDC Symptom Inventory) [5]. Findings of the present study indicated sensitivity and specificity problems with the CDC empirical CFS case definition.

***Keywords*:** *Chronic Fatigue Syndrome, Empirical Case Definition, Centers for Disease Control and Prevention, Fukuda Criteria*

1. Sensitivity and Specificity of the CDC Empirical Case Definition

The Centers for Disease Control and Prevention (CDC) has developed an empirical case definition for chronic fatigue syndrome (CFS) that involves assessment of symptoms, disability, and fatigue [2]. The CDC empirical CFS case definition assesses three specific areas to determine whether a person meets criteria for this illness including: 1) disability, using the Medical Outcomes Survey Short Form-36 (SF-36) [3], 2) fatigue, using the Multidimensional Fatigue Inventory (MFI) [4], and 3) symptoms, using the CDC Symptom Inventory (SI) [5]. The authors of this empirical case definition feel that the specification of instruments and cut-off points will result in a more reliable and valid approach for the assessment of CFS.

The disability criterion for the Reeves *et al.* empirical CFS case definition [2] would be met by scoring below the 25th percentile on any one of the following four SF-36 sub-scales [3]: Physical Functioning (less than or equal to 70), Role Physical (less than or equal to 50), Social Functioning (less than or equal to 75), or Role Emotional (less than or equal to 66.7). Because a person could meet the disability criterion for the empirical CFS case definition by only showing impairment in one or more of these four areas, a person could meet the disabil-

ity CFS criterion by only having an impairment in role emotional areas (e.g., problems with work or other daily activities as a result of emotional problems). Ware *et al.* [3] found that the mean for Role Emotional for a clinical depression group was 38.9, indicating that almost all those with clinical depression would meet the CFS disability criterion, as they would be within the lower 25th percentile on this sub-scale.

To meet the fatigue criterion, the Reeves et al. empirical case definition [2] requires a score on the MFI [4] of greater than or equal to 13 on the General Fatigue sub-scale, or greater than or equal to 10 on the Reduced Activity sub-scale. In one study of three groups with CFS [6], the mean MFI General Fatigue scores ranged from 18.3 to 18.8 and these scores are clearly higher than the Reeves *et al.* cutoff of 13. In addition, Reduced Activity items refer to issues that a person with depression might easily endorse. If a person indicated that the following two items were entirely true: "I get little done," and "I think I do very little in a day"; they would meet criterion for fatigue on this sub-scale.

The SI [5] assesses information about the presence, frequency, and intensity of fatigue related symptoms during the past one month. The frequency and severity scores were multiplied for each of the eight critical Fukuda *et al.* [1] symptoms and were then summed. To meet the Reeves *et al.* [2] symptom criterion, a person

needed to have four or more symptoms and a total score greater or equal to 25 on the SI. This overall level of symptoms seems relatively low for patients with classic CFS symptoms (the criterion would be met if an individual rated only 2 core symptoms as occurring all the time, and if one was of moderate and the other of severe severity). In addition, the 8 case definition symptoms for the empirical case definition were based on a time period comprising the last month compared to what is specified in the Fukuda *et al.* criteria, which states that: "There needs to be the concurrent occurrence of 4 or more of the following symptoms, and all must be persistent or recurrent during 6 or more months of the illness and not predate the fatigue."

Jason, Najer, Porter, and Reh [7] recently investigated this CFS empirical case definition with 27 participants with a diagnosis of CFS and 37 participants with a diagnosis of a Major Depressive Disorder (MDD). All participants completed questionnaires measuring disability (SF-36), fatigue (MFI), and symptoms (SI). Jason et al. found that 38% of those with a diagnosis of MDD were misclassified as having CFS using the new CDC empirical case definition. Jason, Evans, *et al.* [8] later used this same sample to examine issues of sensitivity and specificity for the three instruments along with their cut-off points. Sensitivity is the probability that the test correctly classifies a person with CFS as positive, whereas specificity is the probability that a test correctly classifies a person without CFS as negative. When Jason, Evans, *et al.* used a Receiver Operating Characteristic (ROC) curve analysis with the Reeves *et al.* criteria [2], they found the disability, fatigue and symptom criteria had serious specificity and/or sensitivity problems. They concluded that the Reeves *et al.* criteria would not be considered a good diagnostic method for selecting CFS cases among a sample of CFS and MDD cases.

Reeves, Gurbaxani, Lin, and Unger [9] critiqued the study by Jason *et al.* [7] by stating that the study should have relied on better methods to diagnose the sample, including a medical and psychiatric examination. Another criticism brought up by Reeves et al. was the focus on MDD, particularly as some persons with CFS also suffer from MDD. Some individuals with CFS do have MDD, but the key issue is that MDD can be confused with CFS, as it has some overlapping symptoms with CFS. For example, it is possible that some patients with MDD also have chronic fatigue and four CFS Fukuda *et al.* [1] symptoms that can occur with depression (e.g., unrefreshing sleep, joint pain, muscle pain, impairment in concentration). Yet, CFS and MDD are different disorders, and they can be differentiated by use of appropriate assessment instruments [10].

Great care needs to be exercised when determining which scales, with which cut off points, should indicate that CFS criteria has been reached for CFS samples. For example, Jason, Brown, *et al.* [11] examined published studies using the SF-36 [3] which contrasted CFS with controls. The largest differences emerged for the Role Physical, Social Functioning, and Vitality SF-36 subscales. Rather than arbitrarily selecting the lower 25% for four SF-36 sub-scales, as was recommended by the authors of the empirical CDC CFS case definition [2], Jason, Brown, *et al.* used Receiver Operating Characteristics (ROC) to determine sub-scales that best discriminate CFS from Controls in two well defined samples, one involving a community data base collected in the mid 1990s, and the other a tertiary data base collected in the mid 2000s. Vitality, Social Functioning, and Role Physical had the highest AUCs, with good sensitivity and specificity.

Because the Jason, Brown, *et al.* study [11] only had data on the SF-36, these investigators were not able to examine the Reeves *et al.* [2] recommendations on fatigue or symptom criteria. In addition, the Jason *et al.* [7] sample, which had all three Reeves *et al.* measures, had been criticized as not having formal medical and psychiatric examinations to select cases. The present study includes the disability, fatigue, and symptom measures as recommended by Reeves *et al.* in a carefully defined sample. In this study, we employed an ROC to determine the sensitivity and specificity of the Reeves *et al.* criteria in a well characterized community-based CFS sample. This study included formal medical and psychiatric tests to determine CFS status.

2. Method

The present project was carried out in two stages. In Stage 1, we attempted to re-contact the 213 adults who were medically and psychiatrically evaluated from a community-based sample from 1995-1997. These adults were previously evaluated in our original Wave 1 CFS epidemiology project [12]. Stage 2 of the study encompassed a structured psychiatric assessment, a complete physical examination and a structured medical history.

The original Wave 1 sample collected from 1995-1997 is a stratified random sample of several neighborhoods in Chicago specifically selected to contain individuals from different ethnic and socioeconomic profiles. As a whole, Chicago, Illinois is an ethnically and socioeconomically diverse city. We sampled in eight Chicago community locations, including low socioeconomic areas such as West Garfield Park, middle-socioeconomic areas such as Bridgeport and Armour Park, gentrifying areas such as the near West Side, and high socioeconomic areas such as the Loop and the near North Side. Racial data indicate that the sample consists of 20.0% African-Americans, 52.6% Caucasians, 18.7% Latinos, 0.5% Native Americans, 5.5% Asian Americans, 1.4% multiracial individuals, and 1.3% individuals of other races [12]. The telephone numbers comprising the stratified random sample

were obtained from Survey Sampling, Incorporated. This company generated random telephone numbers using valid Chicago exchanges, resulting in a sample of both listed and unlisted numbers (as well as business and non-working numbers). In the first stage of data collection in the original study, procedures developed by Kish [13] were used to select one adult from each household for subsequent screening for CFS-like illness. Birth dates for each adult were gathered and the person with the most recent birthday was selected to be interviewed using the Stage 1 CFS Screening Questionnaire. The final sample of respondents consisted of 18,675 households.

2.1 Stage 1

The *CFS Screening Questionnaire* consists of two parts and was administered to all participants that could be located for this follow-up study. It assessed participants' sociodemographic characteristics and fatigue characteristics to determine whether any changes have occurred since the first wave of data collection in the original study. Basic demographic data included age, ethnicity, socioeconomic status, work status, marital status, parental status (including number of children) and gender. Consistent with the procedures followed in the original CFS epidemiology study [12] the *CFS Screening Questionnaire* contains questions measuring more specific aspects of fatigue and health status. In addition, questions assessed the level of impairment that fatigue and illness cause to daily activities, as well as the frequency and duration of the fatigue. Respondents were also asked if they have ever been diagnosed with any other medical or psychiatric conditions associated with chronic fatigue and what current treatments they were receiving. A version of the screening scale used in the present study was evaluated by Jason *et al.* [14]. They recruited four groups of subjects (*i.e.*, those diagnosed with CFS, lupus, and multiple sclerosis, and a healthy control group). All subjects were interviewed with a screening instrument twice over a two-week period of time. The screening scale exhibited high discriminant validity and excellent test-retest and inter-rater reliability. Hawk *et al.* [10] revised this CFS Screening Questionnaire, and administered the questionnaire to three groups (those with CFS, MDD, and healthy controls). The revised instrument, which was used in the present study, evidences good test-retest reliability and has good sensitivity and specificity.

2.2 Stage 2

In Stage 2, the *Structured Clinical Interview for the DSM-IV* (SCID) [15] was administered to assess current psychiatric diagnoses as defined on Axis I of the Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition (DSM-IV) [16]. The SCID is a valid and reliable semi-structured interview guide that approxi-

mates a traditional psychiatric interview [17]. It has been successfully used to assess psychiatric disorders in samples of people with CFS [18].

Following the structured psychiatric interview, participants were provided a medical history interview and complete medical examination. Prior to the physical examination, the interviewer who accompanied participants and provided transportation to the medical exam administered the Medical Questionnaire at the physician's office to assess current and past medical history. The Medical Questionnaire is a modified version of The Chronic Fatigue Questionnaire, a structured instrument developed by Komaroff and Buchwald [19] that was used in a study by Komaroff *et al.* [20]. This comprehensive instrument assesses symptoms related to CFS and chronic fatigue, as well as other medical and psychiatric symptoms, in order to help rule out exclusionary conditions such as HIV/AIDS, active malignancies, iatrogenic conditions resulting from the side effects of medication, unresolved cases of hepatitis, and active substance use. In addition, the Medical Questionnaire measures fatigue severity, fatigue-related social role impairment, psychosocial stressors, job satisfaction, toxic exposures prior to CFS onset, chemical sensitivities, presence of CFS or chronic fatigue in other network members, and family medical history. Because sleep disturbances are often reported by individuals with CFS and chronic fatigue, the Sleep Disturbance Questionnaire, which has been validated experimentally in a sleep laboratory [21], has been incorporated into the medical questionnaire to help identify participants with sleep disorders.

Participants also filled out the Medical Outcome Survey Short-Form-36 (SF-36) [3]. This 36-item instrument is composed of multi-item scales that assess functional impairment in eight areas: limits in physical activities (physical functioning), limits in one's usual role activities due to physical health (role physical), limits in one's usual role activities due to emotional health (role emotional), bodily pain, general health perceptions (general health), energy and fatigue (vitality), social functioning, and general mental health. Scores in each area reflect ability to function and higher values indicate better functioning. Reliability and validity studies have demonstrated high reliability and validity in a wide variety of patient populations for this instrument [22]. According to Reeves *et al.* [2] significant reductions in occupational, educational, social, or recreational activities were defined as scores lower than the 25th percentile on Physical Functioning (less than or equal to 70), *or* Role Physical (less than or equal to 50), *or* Social Functioning (less than or equal to 75), *or* Role Emotional (less than or equal to 66.7). A person would meet the disability criterion for the empirical CFS case definition by showing impairment in one or more of these four areas.

Participants also completed the CDC Symptom Inven-

tory (SI) [5]. The SI assesses information about the presence, frequency, and intensity of 19 fatigue related symptoms during the past one month. For each of the eight Fukuda *et al.* [1] symptoms, participants were asked to report the frequency (1 = a little of the time, 2 = some of the time, 3 = most of the time, 4 = all of the time) and severity (the ratings were transformed to the following scale: 0 = symptom not reported, 1 = mild, 2.5 = moderate, 4 = severe)[1]. The frequency and severity scores were multiplied for each of the eight critical Fukuda *et al.* symptoms and were then summed. Individuals having four or more symptoms and scoring greater or equal to 25 would meet symptom criterion on this instrument according to the CDC empirical case definition.

Additionally, the participants completed the Multidimensional Fatigue Inventory (MFI) [4]. This instrument is a 20-item self-report instrument consisting of five scales: general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue. Each scale contains four items rated from 1 to 5 with the scale score of 1= completely true and the scale score of 5 = no, not true. Reeves *et al.* [2] employed the MFI to measure severe fatigue, and to do this, they used only two of the five subscales; General Fatigue and Reduced Activity. Using the CDC empirical case definition standards, severe fatigue was defined as greater than or equal to 13 on General Fatigue *or* greater than or equal to ten on Reduced Activity.

Following the medical history interview, the physician conducted a detailed medical examination. This examination was carried out in order to rule out exclusionary medical conditions and detect evidence of diffuse adenopathy, hepatosplenomegaly, synovitis, neuropathy, myopathy, cardiac or pulmonary dysfunction, or any other medical disorder. An 18-tender-point examination was used to test for Fibromyalgia [23]. Laboratory tests administered to all participants included a chemistry screen (glucose, calcium, electrolytes, uric acid, liver function tests, and renal function tests), complete blood count with differential and platelet count, T4 and TSH, erythrocyte sedimentation rate, arthritic profile (which includes rheumatoid factor and antinuclear antibody), hepatitis B surface antigen, CPK, HIV screen, and urinalysis. An intra-dermal, intermediate-strength PPD skin test was applied, and a posterior-anterior chest x-ray was completed, if it was not already obtained by the participant within eight months of entering the study. At the time of evaluation, the examining physician was blinded to participants' status with respect to initial classification based upon the Stage 1 screen. Participants were reimbursed $100.00 for the time and effort involved in participation. Participants also signed the Human Subjects

Consent Form (See Jason, Porter, Hunnell, Rademaker, & Richman [24] for more details).

At the end of Stage 2, a team of physicians was responsible for making final diagnoses. Two physicians independently rated each file according to the current U.S. definition of CFS. Files that did not meet CFS criteria were rated as either idiopathic chronic fatigue (ICF), exclusionary for CFS due to medically/psychiatrically explained chronic fatigue [1], or control (participants with no exclusionary illness and less than 6 months of fatigue). Those with ICF had at least six months duration of fatigue, but with insufficient symptoms or fatigue to meet the case definition of CFS. The exclusionary group had chronic fatigue for at least six months duration, but with active medical conditions that explain chronic fatigue (e.g., untreated hypothyroidism), previously diagnosed medical disorders whose resolution has not been documented beyond reasonable clinical doubt, and whose continued activity may explain the chronic fatiguing illness (e.g., unresolved cases of hepatitis C). The exclusionary group also included those with chronic fatigue for at least six months duration, but with psychiatric explanations of the fatigue (e.g., delusional disorders, schizophrenia, etc). Controls had no exclusionary illnesses and less than 6 months of fatigue. Reviewing physicians had access to all information gathered on each participant during each of the phases of the study. The review panel was also provided with all results from the physical exam. If a disagreement occurred during the physician review process regarding whether a participant should receive a diagnosis of CFS, ICF, exclusionary due to medically/psychiatrically explained chronic fatigue, or control, the participant's file was rated by a third physician reviewer, and the diagnosis was determined by majority rule. We used refinements of the Fukuda *et al.* criteria as recommended by an International Research group and the CDC [25].

2.3 Sample Characteristics

In Wave 1, 213 adults were medically and psychiatrically evaluated from the community-based sample. For the follow-up study, data was available on 24 individuals diagnosed with CFS and 84 who did not have CFS. Wave 1 differences were examined between those we were able to versus those we were not able to re-evaluate at Wave 2, and we did not find any significant sociodemographic differences for age, gender, race, marital status, number of children, or education (See Jason, Porter, *et al.*, [24] for more details).

2.4 Statistical Analysis

The statistical software package used for data analysis was PASW (formerly SPSS) for Windows, version 17.0. A Receiver Operating Characteristic (ROC) curve analysis [26] was used to evaluate the ability of the scales to

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[1]The scale we used had five choices, and we needed to convert the ratings to a four point scale in order to conform to Wagner *et al.*'s (2005) severity scaling system.

discriminate between patients with CFS in the community-based sample and those without this illness. The ROC curve graphically represents the probability of true positive results in diagnosis as a function of the probability of false positive results of this test. The area under the curve (AUC) is an indicator of the discriminatory ability of the scale: a straight line (area = 0.5) means that the scale is doing no better than chance in classifying CFS and non-CFS, while a perfect scale would have an ROC curve with an area of 1. The area under the ROC curve is a summary measure that essentially averages diagnostic accuracy across the spectrum of test values. The informative area under the ROC curve ranges from 0.5 to 1.0, and not from 0.0 to 1.0 as would the area under a probability distribution curve. An AUC of .99 means that 99% of the time a randomly selected individual from the CFS group will more adequately fulfill the fatigue criteria than a randomly selected individual from the control group. A test needs an AUC threshold of between 90-100% to have diagnostic meaning, and 95% or above to be considered a good diagnostic tool [27,28].

3. Results

3.1 ROC Analyses

Table 1 presents the ROC analyses for the CFS versus the non-CFS group. The MFI scales had AUCs that were

low. When using the cutoff scores proposed by Reeves *et al.* [2], using either the General Fatigue or Reduced Activity criteria, 95% of those with CFS were identified, indicating good sensitivity, but the specificity was only .27, indicating that few of those without the illness would have been correctly identified. The AUC for the SI instrument was also low, and the sensitivity data (.59) suggests that this symptom scale has significant problems in identifying true cases of CFS. Finally, AUC findings for the SF-36 indicate low AUCs, and using Reeves *et al.*'s cutoff scores, that the sensitivity is acceptable at .96; however, specificity is inadequate at .17. When using all three criteria for fatigue, symptoms and disability, the sensitivity was at an unacceptably low level of .65. The sensitivity and specificity outcomes for the Reeves *et al.* criteria suggest that these recommended scales and cutoff points would not be considered a good diagnostic tool for selecting CFS cases from the general population.

4. Discussion

The present study investigated the sensitivity and specificity of the empirical CFS case definition [2] with diagnosed individuals with CFS from a community based study that were compared with non-CFS cases. Findings of the present study indicated sensitivity and specificity problems with the CDC empirical CFS case definition. When comparing the overall Reeves *et al.* criteria, only

Table 1. AUC values, standard errors and confidence intervals for CFS vs. other*

Scale	AUC	Std. Error	95% C.I.		Cut-offs	Sensitivity	Specificity
			LB	UB			
MFI							
Gen. Fatigue	0.69	0.07	0.56	0.82	≥ 13	0.74	0.39
Red. Activity	0.64	0.07	0.51	0.78	≥ 10	0.74	0.50
Meets[a]	0.61	0.07	0.47	0.74		0.95	0.27
SI							
Total[b]	0.69	0.07	0.55	0.84	≥ 25	0.59	0.73
SF-36							
Phys. Func.	0.60	0.06	0.48	0.72	≤ 70	0.68	0.51
Role Phy.	0.66	0.06	0.54	0.77	≤ 50	0.82	0.51
Soc. Func.	0.62	0.07	0.48	0.76	≤ 75	0.74	0.35
Role Emo.	0.57	0.07	0.43	0.70	≤ 66.7	0.73	0.44
Meets[c]	0.56	0.07	0.44	0.69		0.96	0.17
Meets Criteria[d]	0.70	0.08	0.56	0.85		0.65	0.76

[a]Meets Reeves *et al.* (2005) fatigue criteria.
[b]Meets Reeves *et al.* (2005) core symptoms criteria.
[c]Meets Reeves *et al.* (2005) substantial reductions criteria.
[d]Meets Reeves *et al.* (2005) CFS criteria.
*Some of the participants did not complete all three questionnaires, and were thus excluded from the overall sensitivity and specificity figures.

about 65% of true CFS cases were identified. In other words, these criteria are not able to identify an acceptable high percentage of individuals who have this illness.

If samples of CFS are not identified with sensitivity and specificity, it will be difficult to compare samples from different studies, and the search for biological markers will be compromised. Using the Reeves *et al.* criteria [2], the estimated rates of CFS have increased to 2.54% [29], rates that are about ten times higher than prior CDC estimates [30] and prevalence estimates of other investigators [31]. It is at least possible that the increases in the United States are due to a broadening of the case definition and possible inclusion of cases with primary psychiatric conditions. Chronic fatigue occurs in about 4-5% of the population [32]. If about 5% of the population has 6 or more months of fatigue, and about half of this is due to clear medical or psychiatric reasons [31], then the critical question is how many of the remaining 2.5% have CFS. The empirical CFS case definition estimates that 2.54% do have this illness, so that research group would suggest that almost all of the remaining 2.5% would fall within the CFS category. However, Jason *et al.* [7] believe that within this 2.54% are mood disorders, which are one of the most prevalent psychiatric disorders (one-month prevalence rate of major depressive episode is 2.2%) [33]. As an example, one mood disorder is MDD, which can be confused with CFS, as it has some overlapping symptoms with CFS. It is possible that some patients with MDD also have chronic fatigue and four CFS Fukuda *et al.* [1] symptoms that can occur with depression (e.g., unrefreshing sleep, joint pain, muscle pain, impairment in concentration). Fatigue and these four minor symptoms are also defining criteria for CFS, so it is possible that some patients with a primary affective disorder could be misdiagnosed as having CFS. Yet, these are distinct illnesses, as several CFS symptoms are not commonly found in depression, including prolonged fatigue after physical exertion, night sweats, sore throat, and swollen lymph nodes. Illness onset with CFS often occurs over a few hours or days, whereas primary depression generally shows a more gradual onset. Biological findings also differentiate the two conditions [34]. Including the latter type of patients in the current CFS case definition could confound the interpretation of epidemiologic and treatment studies, and complicate efforts to identify biological markers for this illness.

It is important for screening tests to have high sensitivity and specificity, particularly for disorders with low prevalence rates such as CFS (about 4.2 in a thousand) [31]. As an example, in a city of 1,000,000, with a true CFS rate of 4.2 per thousand, there would be 4,200 CFS cases. According to Bayes' theorem [35] if a diagnostic test had a 95% rate of sensitivity, the screening test would correctly identify 3,990 of these cases. However, if the test had 95% specificity, there would be 49,790

individuals who did not have CFS but were identified as having it using the test. Clearly, being able to identify true negatives with precision is of high importance in the diagnostic process.

We provide two case studies that illustrate several of the problems with the Reeves *et al.* [2] criteria. For example, one person who we diagnosed with CFS did not meet the Reeves *et al.* empirical case definition due to not meeting the frequency/severity requirement for the Symptom Inventory (SI). Yet, this person indicated that she had experienced a 95% decrease in daily activities over the past 6 months and an 80% decrease in daily energy level over the last 6 months. The person also reported having experienced 6 months of fatigue and more than 4 core symptoms. On a different scale from the medical questionnaire, using a 100 point scale, with higher scores indicating more problems, the person had a score of 80 on impaired memory and 85 on un-refreshing sleep. Our physician panel clearly felt that this person met all CFS Fukuda *et al.* [1] criteria, but the person was not included as a CFS case using the Reeves *et al.* criteria. In contrast, another person who we classified as ICF met the Reeves *et al.* empirical case definition. This person only had a 30% reduction in daily activity in the last 6 months and a 30% reduction of daily energy levels in the last 6 months. Our physician panel did not diagnose this participant has having CFS, yet the person was counted as a CFS case using the Reeves *et al.* criteria.

There are several limitations in this study. First, the community-based study of participants was relatively small. Clearly, these results need to be replicated by other investigators with larger samples. However, when the Reeves *et al.* [2] disability criteria were evaluated on a tertiary care setting [11], the findings also pointed to sensitivity and specificity problems. Another study using psychiatric controls also found the empirical case definition to be problematic due to specificity issues [7].

In summary, the scientific enterprise depends on reliable and valid ways of classifying patients into diagnostic categories, and this critical research activity can enable investigators to better understand etiology, pathophysiology, and treatment approaches for CFS and other disorders [36]. When diagnostic categories lack reliability and accuracy, the quality of treatment and clinical research can be significantly compromised. If CFS is to be diagnosed reliably across health care professionals, it is imperative to provide specific thresholds and scoring rules for the symptomatic criteria.

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Scientific
Research

Beta Thalassemia Minor as a Risk Factor for Suicide and Violence: A Failure to Replicate

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ABSTRACT

The aim of present study was to evaluate the association of thalassemia minor with suicide, impulsivity and aggression. The study group consisted of 293 *suicidal subjects,* 300 *violent criminals and* 300 *control subjects. Thalassemia trait was slightly more common in criminals* (7.3%) *than in controls* (6.67%)*, this difference was not statistically significant* (*p* = 0.75)*. Similarly, carrier trait was observed more in suicidal subjects* (8.87%) *though this difference was not statistically significant* (*p* = 0.3)*. Despite a plausible biological hypothesis, our study results do not support that thalassemia minor could be a risk factor for suicidal, impulsivity and aggressive behaviors.*

1. Introduction

Beta-thalassemia is among the most common genetic disorders worldwide. The clinical spectrum of β-thalassemia ranges from the severe transfusion-dependent β-thalassemia major to the asymptomatic β-thalassemia carriers [1].

Showing geographical differences in prevalence, heterozygote β-thalassemia minor is frequent particularly in Mediterranean area and amongst people of Greek, Italian, Middle Eastern, Southeast Asian, Southern Chinese and African descent [2]. The significant clinical manifestations and complications commonly associated with β-thalassemia major are not seen in β-thalassemia minor. That is, most affected individuals are asymptomatic or characterized clinically by mild anemia with persistent microcytosis that usually goes unnoticed [1,3]. Considering the high prevalence of β-thalassemia minor in Iran (7-10 %), the National Thalassamia Program has been launched since 1997 for screening and genetic counseling in attempt to reduce the birth rate of β-thalassemia major [4-6].

Abnormal lipid profile has been repeatedly reported in all clinical phenotypes of β-thalassemia including thalassemia major, thalassemia intermedia and thalassemia minor [7-11]. Patients with β-thalassemia trait have been found to have lower plasma concentrations of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C), but unmodified plasma levels of high-density lipoprotein cholesterol (HDL-C) and triglycerides (TG) [12,13]. The most suggested underlying mechanism for hypocholesterolemia observed in heterozygous β-thalassemia is the higher erythroid bone marrow activity with the enhanced cholesterol requirement [14]. To date, the clinical implications of this associated hypocholestrolemia are still unknown.

Over the past years, many epidemical and clinical studies have shown the substantial evidences for low serum cholesterol concentrations in people with suicidal, aggressive and violent behaviors meaning that low cholesterol level is significantly related to physical aggression and violence towards self or others [15-23]. The severity of a suicide attempt as well as the degree of suicidal ideation was found to be inversely correlated with serum cholesterol levels. Low levels of cholesterol are associated with a more violent pattern of suicidal behavior [24,25]. There is also a report of low cholesterol levels in parasuicidal patients [24]. Impulsivity is closely associated with suicide and aggression or hostility [26].

The replication of these findings with different study designs across diverse populations has validated such associations. A reduced central serotonergic neurotransmission through decreased serotonergic (5HT) receptor function is a biochemical mechanism responsible for association between low cholesterol level and psychopathological processes involved in suicidal, aggressive

and violent behaviors [27-31].

Taking these separate associations together, one may expect that suicidal, aggressive and violent behaviors would be more observed in thalassemia minor, at a population level. Therefore, the attention is called to the psychosocial problems that this thought could emerge in a society where thalassemia trait is common. Without appropriate validation, over the years, this premise could bring the false impression of facing unstable relationships and interpersonal difficulties with β-thalassemia carriers and thus put them in considerable distress. To the best of our knowledge, no study exists that clinically challenges the correlation of β-thalassemia minor phenotype with suicide, aggression and violence. This study was conducted to test this hypothesis.

2. Method

2.1 Subjects

This cross-sectional, case-controlled study was conducted in Shiraz, south of Iran, from April 2007 to June 2008. The study sample included three separate groups of subjects: Group (A): subjects with attempted suicide (n = 293, mean age = 25.15 ± 10.94 y/o) who had been admitted to Nemazee University Hospital following a suicide attempt. Group (B): violent criminals were the prisoners sentenced to Adelabad jail (main jail of Fars province, southern of Iran) by court because of proven crimes linked to violence against life or health of others (n = 300, mean age = 33.29 ± 11.47 y/o). Violent crimes comprised of murder and/or attempted murder, infanticide, stabbing or wounding or other act endangering life, rape, sexual assault, child abuse, vandalism, arson, criminal damage to a dwelling or vehicle, burglary equipped by weapons, possession of and trafficking in drugs and/or firearms. None of the individuals were the subject of false arrest or self-defense. Only male subjects were investigated because we were not able to identify enough females with the same criteria of recruitment. Group (C): control subjects (n = 300, mean age = 28.15 ± 10.3 y/o) normal healthy volunteers and recruited from couples screened by Iranian National Thalassemia Screening Program as part of mandatory premarital blood tests [5-31]. A detailed medical history was taken from and a complete physical examination was performed on all subjects. Any subject with a history of or current definite physical diseases that could possibly influence the findings was excluded from the study. They were screened not to have personal and familial psychiatric histories as well. None used psychotropic medications or abused substances. Before recruitment, the purpose of the study was explained to each participant. Participants signed an informed consent form, which in case of group B was countersigned by a member of the prison staff. The study was preapproved by medical ethical committee of Shiraz

University of Medical Sciences.

2.2 Methods

Blood samples were taken from all studied subjects. The diagnosis of β-thalassemia trait was established based on basic hematological criteria: anisocytosis, poikilocytosis, hypochromia and microcytosis (mean corpuscular hemoglobin (MCH) < 27 pg, mean corpuscular volume (MCV) < 80 fL), and the quantity of HbA2 $\geq$ 3.5% and 2% < Hb F < 10%, performed by high performance liquid chromatography (HPLC)) [31]. Complete blood count was performed by Coulter counter machine, and hemoglobin electrophoresis by Citrate Agar. Suspected results were then confirmed by direct DNA sequencing using polymerase chain reaction (PCR)-based techniques. Subjects with normal hemoglobin, normal MCV, normal MCH, normal morphology, HbA2 < 3.5%, HbF < 2% and normal hemoglobin electrophoresis were regarded as non-β-thalassemia trait. To rule out iron deficiency anemia, individuals with HbA2 < 3.5% and anemia were treated with oral iron (one ferrous sulfate tablet equivalent with 50 mg elemental iron, three times daily) for 2 months. The tests were repeated after this period and a decision was reached using the same laboratory values as above. Alpha and beta-thalassemia trait was differentiated by fresh blood incubated with Leucin H3 method.

2.3 Statistical Analysis

The data were analyzed using SPSS software (version 13.0.0; SPSS, Chicago, IL, USA).

Pearson's χ^2-test and Fisher's exact probability test were used, when appropriate. Findings were deemed to be statistically significant at a p-value of less than < 0.05.

3. Results

The prevalence of thalassemia trait in all of three groups is shown in Table 1. Thalassemia trait was slightly more common in prisoners (22 (7.3%)) than in controls (20 (6.7%)), but this higher frequency was not statistically significant ($p = 0.75$). Similarly, carrier trait was observed more in suicidal subjects (26 (8.9%)), but this difference was not statistically significant ($p = 0.3$). More significantly, the prevalence of Thalassemia minor, in all three groups of studied subjects, was consistent with previous studies reporting the prevalence of β-thalassemia trait to be as 7-10% of Iranian population [5].

4. Discussion

Thalassemia is in one of the most prevalent genetic diseases and approximately 7-10% of Iranian population are carriers for this disease [4,5].

Previous studies have consistently shown a higher rate of aggression, violence and impulsivity as well as suicidal behaviors in individuals with low cholesterol level

Table 1. Prevalence of thalassemia-minor in patients with suicidal attempts and violence criminals

Patients	Healthy (n)(%)	Thalassemia trait (n)(%)	Total (n)(%)	p-Value
Patients with suicidal attempt (Group A)	267 (91.1%)	26 (8.9%)	293 (100%)	0.3*
Prisoners with violence crime (Group B)	278 (92.7%)	22 (7.3%)	300 (100%)	0.75*
Controls (Group C)	280 (93.3%)	20 (6.7%)	300 (100%)	

n = number, NS = Non-significant

[15-23], due to reduction of serotonergic activity in the brain [27-30]. Given that thalassemia patients (major, minor and intermedia) have lower cholesterol levels [7-13,32-36] one may assume that carrier state may represent a risk factor for these behaviors [37]. Considering the high prevalence of carrier individuals in our population, we were concerned about the emerging problem of the increase of emotional distress, unstable interpersonal relationships and marriage difficulties. These psychosocial concerns brought us to conduct the present study and assess the accuracy of this hypothesis for the first time in literature. We studied a large sample size and designed a reverse approach to evaluate the prevalence of thalassemia trait in individuals with suicidal attempts and in those with extreme aggressive behaviors as violent criminals.

Our findings failed to show significant correlation between being a thalassemia carrier and an increased rate of violence and suicide, that is to say thalassemia trait is unlikely to serve as a risk factor for future suicide and/or violence when considered in isolation. Although, a relation of low cholesterol to suicide and violence is confirmed to be causal, other factors could manipulate the behavioral impact of low cholesterol in thalassemia carriers. Suicide and violence are complex behaviors with multiple causes in nature and any single factor is likely to account for only a relatively small effect [38].

There were limitations in the present study. We used convenience samples consisting of accessible couples screened by National Thalassemia Screening Program, patients admitted to our university hospital and prisoners sentenced to local jail. Also, we only recruited male subjects with proven crimes linked to violence. Due to its selective nature, the sample may not entirely represent the general population. Nevertheless, the findings generated from this large sample may provide valuable information about the psychopathologies; suicide, aggression and violence, that were studied in thalassemia trait. We used a one-time blood sampling, potentially remote from the time of the violent crime. However, the measurement of HbA2 and HbF by HPLC is reproducible and precise. It is a reliable method for rapid screening in population surveys for beta thalassaemia. Moreover, the suspected results were confirmed by direct DNA sequencing techniques.

The importance of these findings is that the individuals with thalassemia trait would not be rejected by the rest of society due to fear of impulsive behaviors. The extent and significance of these findings should be evaluated through further epidemiological studies on greater samples with follow-up periods, after controlling for potential confounding variables.

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Scientific
Research

Analysis of Psychological Health and Life Qualities of Internet Addicts Using Structural Equation Model*

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ABSTRACT

Internet addiction disorder has become a serious social problem, and aroused great concern from the public and specialists. In this paper, the psychological states of internet addicts are measured by some famous mental scales, and their life qualities are investigated by some questionnaires. Structural Equations Model (SEM) is used to analyze the relationship between the psychological health and life qualities of internet addicts. Meanwhile, a definite linear algorithm of SEM is proposed which is useful for psychological analysis.

Keywords: *Psychological Health, Life Quality, Internet Addict, SEM Algorithm*

1. Introduction

Internet addiction disorder (IAD), or, more broadly, Internet overuse, problematic computer use or pathological computer use, is excessive computer use that interferes with daily life. IAD was originally proposed as a disorder in a satirical hoax by Ivan Goldberg in 1995 [1]. He took pathological gambling as diagnosed by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as his model for the description of IAD [2]. It is not however included in the current DSM as of 2009. IAD receives coverage in the press, and possible future classification as a psychological disorder continues to be debated and researched.

Goldberg converted Internet Addiction Disorder (IAD) into Pathological Computer Use (PCU). However, the basic contents of these two are the same. This paper used the concept of Internet Addiction.

Following Goldberg, people find their work could be in trouble because of Internet addiction, as well as social relationship, family relationship, finance, psychology and so on. Young (1996) discovered the emergence of a new clinical disorder by Internet addiction [3]. Kraut (1998) analyzed the Internet paradox: a social technology that reduces social involvement and psychological well-being

[4]. Shaw (2002) analyzes the relationship between Internet communication and depression, loneliness, self-esteem, and perceived social support [5].

As the research go deep, mathematical models are used to describe Internet addiction. Weiser (2001) builds a cognitive-behavior model of pathological Internet addiction (PIU). Zhang (2006) use Structural Equation Model (SEM) to analyze the relationship of motives, behaviors of Internet addiction and related social-psychological health. Wen (2008) builds appropriate standardized estimates for moderating effects in Structural Equation Models.

Indeed, SEM is very useful to investigate the personality characteristic and life satisfaction of adults who have Internet addiction, and reveal the relationships between them, and the potential factor of Internet addiction. It will provide basis to intervene the people with Internet addiction.

But there are some problems in calculation of SEM because SEM is a indefinite equation. In this paper we build a SEM for Internet addiction, meanwhile we offer a definite linear algorithm for SEM which is useful for any SEM.

2. The Index System of Psychological Health in Internet Addiction

The researches of Internet addiction vary from person to person. Different people choose different scales. This

paper takes Young [3] ten questionnaires to inquiry Internet addiction. There are many personality scales. Chinese Minnesota Multiphasic Personality Inventory (MMPI) which consists of ten indexes, including hypochondriasis, depression, hysteria, psychopathic deviate, masculinity feminity, paranoia, psychasthenia, schizophrenia, hypomania and social introversion, is took to test personality characteristic in this paper. Edward Dienner's Life Satisfaction Scale is also adopted to test life satisfaction, it comprises five questions.

The correlation between the above factors has been given a clear description in some articles. These three factors interact, and can be all affected by people's basic circs. We make an index system. People's basic circs, including sex, age, profession, education level, can be as independent variables; meanwhile, we choose three dependent variables which are Internet addiction, personality characteristic and life satisfaction. Independent variable and three dependent variables are latent variables. Each latent variable has certain kinds of explicit variables which are called manifest variables. The related dependent variables are showed in **Figure 1**.

3. Structural Equation Model

Structural Equation Model (SEM) is a fast-growing branch in the filed of applied statistics, widely used in psychology, sociology and other fields. This paper is the application of SEM to analyze social-psychological of Internet addiction.

There are two kinds of equations in SEM. One is the equations of the measurement model (outer model) between the latent variables and the manifest variables, we call Measurement Equations. The other is the equation of the structural model (inner model) among the latent variables, we call Structural Equations. In our model, there are 5 latent variables (ξ_1, ξ_2, $\eta_1 \sim \eta_3$) and 5 path relationships. The path coefficients from the exogenous latent variables ξ_i to the endogenous latent variables η_j are λ_{ji}, and the path coefficients among the endogenous latent variables η_{ij} are β_{ij}.
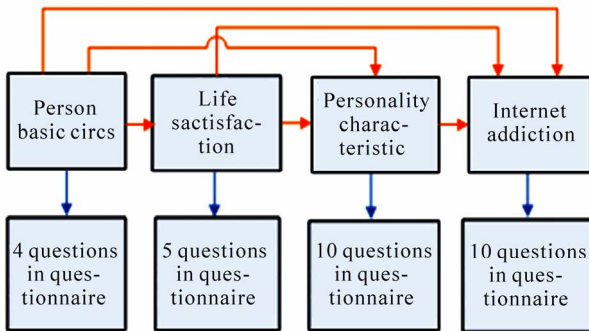
Figure 1. The basic index of dependent variables

Structural Equation Model can also be seen as the summary of secondary indicators. The latent variables ξ_1, ξ_2, $\eta_1 \sim \eta_3$ are the first-level index, they are virtual without direct observation values. Manifest variables are the second-level index, with practical observation values. The model in this paper, manifest variables can be acquired directly by questionnaire.

The Structural Equations are relationships among the latent variables. The Structural Equations can be expressed as follows

$$\begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 & 0 \\ \beta_{21} & 0 & 0 & 0 \\ \beta_{31} & \beta_{32} & 0 & 0 \\ 0 & \beta_{42} & \beta_{43} & 0 \end{pmatrix} \begin{pmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \end{pmatrix} + \begin{pmatrix} \gamma_1 \\ \gamma_2 \\ \gamma_3 \\ \gamma_4 \end{pmatrix} \xi_1 + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \end{pmatrix} \quad (1)$$

Under normal circumstances, the form of Structural Equation coefficients may be different from the Equation (1) except for the diagonal line with 0. We use vector and matrix to describe the Structural Equations. Let $\xi' = (\xi_1', \cdots, \xi_k')$, $\eta' = (\eta_1', \cdots, \eta_m')$. The coefficient matrix of η is denoted as a $m \times m$ matrix B, and the coefficient matrix of ξ is denoted as a $m \times k$ matrix Γ. The residual vector is $\varepsilon_\eta' = (\varepsilon_1', \cdots, \varepsilon_m')$. The Structural Equation (1) can be expressed as:

$$\eta = B\eta + \Gamma\xi + \varepsilon_\eta \quad (2)$$

The Measurement Equations are relationships between the latent variables and the manifest variables. Suppose there are k exogenous latent variables and m endogenous latent variables. The manifest variables corresponding to the exogenous latent variable ξ_t are denoted as x_{tj}, $t = 1, \cdots, k$; $j = 1, \cdots, K(t)$, where $K(t)$ is the number of manifest variables corresponding to the exogenous latent variable ξ_t. The manifest variables corresponding to the endogenous variable η_i are denoted as y_{ij}, $i = 1, \cdots, m$, $j = 1, \cdots, L(i)$, where $L(i)$ is the number of manifest variables corresponding to the exogenous latent variable η_i.

The Measurement Equations can be expressed as the relationship from the manifest variables to the latent variables:

$$\xi_t = \sum_{j=1}^{K(t)} \psi_{tj} x_{tj} + \varepsilon_{xt}, \quad t = 1, \cdots, k \quad (3)$$

$$\eta_i = \sum_{j=1}^{L(i)} \omega_{ij} y_{ij} + \varepsilon_{yi} , \quad i = 1, \cdots, m \qquad (4)$$

where ψ_{tj}, ω_{ij} are the path coefficients, and ε with subscript is a random error.

The Measurement Equations can also be expressed as the relationship from the latent variables to the manifest variables:

$$\begin{pmatrix} x_{t1} \\ \vdots \\ x_{tK(t)} \end{pmatrix} = \begin{pmatrix} \upsilon_{t1} \\ \vdots \\ \upsilon_{tK(t)} \end{pmatrix} \xi_t + \begin{pmatrix} \varepsilon_{xt1} \\ \vdots \\ \varepsilon_{xtK(t)} \end{pmatrix} , \quad t = 1, \cdots, k \qquad (5)$$

$$\begin{pmatrix} y_{i1} \\ \vdots \\ y_{iL(i)} \end{pmatrix} = \begin{pmatrix} \lambda_{i1} \\ \vdots \\ \lambda_{iL(i)} \end{pmatrix} \eta_i + \begin{pmatrix} \varepsilon_{yi1} \\ \vdots \\ \varepsilon_{yiL(i)} \end{pmatrix} , \quad i = 1, \cdots, m \qquad (6)$$

where $\upsilon_{tj}, \lambda_{ij}$ are the loading coefficients, and ε with subscript is still a random error.

Denoting manifest vectors as $x_t' = (x_{t1}', \cdots, x_{tK(t)}')$, $y_i' = (y_{i1}', \cdots, y_{iL(i)}')$, and denoting coefficients as $\psi_t' = (\psi_{t1}, \cdots, \psi_{tK(t)})$, $\omega_i' = (\omega_{i1}, \cdots, \omega_{iL(i)})$, then the Measurement Equation (3) can be expressed as:

$$\xi_t = \psi_t' x_t + \varepsilon_{xt}, t = 1, \cdots, k \qquad (7)$$

And (4) can be expressed as:

$$\eta_i = \omega_i' y_i + \varepsilon_{yi}, i = 1, \cdots, m \qquad (8)$$

Then the Equations (2,7,8) can be written as

$$SEM^+ \begin{cases} \eta = B\eta + \Gamma\xi + \varepsilon_\eta \\ \xi_t = \psi_t' x_t + \varepsilon_{xt}, t = 1, \cdots, k \\ \eta_i = \omega_i' y_i + \varepsilon_{yi}, i = 1, \cdots, m \end{cases} \qquad (9)$$

We call SEM^+ the Structural Equation Model with positive observation.

Letting $\upsilon_t' = (\upsilon_{t1}, \cdots, \upsilon_{tK(t)})$, $\lambda_i' = (\lambda_{i1}, \cdots, \lambda_{iL(i)})$, then the Measurement Equation (5) can be expressed as:

$$x_t = \upsilon_t \xi_t + \varepsilon_{xt}, \quad t = 1, \cdots, k \qquad (10)$$

And (6) can be expressed as:

$$y_i = \lambda_i \eta_i + \varepsilon_{yi}, \quad i = 1, \cdots, m \qquad (11)$$

We combine the Equations (2,10,11) as:

$$SEM^- \begin{cases} \eta = B\eta + \Gamma\xi + \varepsilon_\eta \\ x_t = \upsilon_t \xi_t + \varepsilon_{xt}, t = 1, \cdots, k \\ y_i = \lambda_i \eta_i + \varepsilon_{yi}, i = 1, \cdots, m \end{cases} \qquad (12)$$

And call SEM^- the Structural Equation Model with converse observation. The difference between SEM^+ and SEM^- is that the causalities between the latent variables and the manifest variables are converse.

4. LSE by the Modular Constraint of Structural Vector

If the observation equations of SEM are analyzed carefully, we can discover the way to use the least squares method between each structural variable and its corresponding observation variables, and obtain the least squares solution of structural variable by the modular constraint least square (MCLS) solution. The MCLS algorithm is as follows (the specific process can be seen in reference [10]).

Algorithm 1. The modular constraint least square solution of SEM

Step 1. In SEM^-, suppose that ξ_t, η_i all are unit vectors, and calculate the least square estimates of the loading coefficients between the latent variable and its manifest variables:

$$\hat{\upsilon}_{tj}^2 = x_{tj} x_{tj}', \quad j = 1, \cdots, K(t), \quad t = 1, \cdots, k \qquad (13)$$

$$\hat{\lambda}_{ij}^2 = y_{ij} y_{ij}', \quad j = 1, \cdots, L(i), \quad i = 1, \cdots, m \qquad (14)$$

Step 2. In SEM^-, calculate the least square estimates of latent variable by making use of $\hat{\upsilon}_{ij}, \hat{\lambda}_{ij}$:

$$\hat{\xi}_{ts} = \frac{\hat{\upsilon}_t' X_{ts}}{\hat{\upsilon}_t \hat{\upsilon}_t'}, \quad \hat{\eta}_{is} = \frac{\hat{\lambda}_i' Y_{is}}{\hat{\lambda}_i \hat{\lambda}_i'} \qquad (15)$$

where $s = 1, \cdots, N$, $t = 1, \cdots, k$, $i = 1, \cdots, m$, and X_{ts}, Y_{is} are the transverse vectors of the observation data matrix $X_{ts}' = (x_{t1s}, \cdots, x_{tK(t)s})$, $Y_{is}' = (x_{i1s}, \cdots, x_{iL(i)s})$.

Step 3. In SEM^+ (or (3,4)), make use of $\hat{\xi}_t, \hat{\eta}_i$ obtained in Step 2 to calculate regression coefficients ψ_{tj}, ω_{ij} according to a common linear regression method.

Step 4. In SEM^+ (or (2)), make use of $\hat{\xi}_t, \hat{\eta}_i$ obtained in Step 2 to calculate the estimates of coefficient matrices B, Γ.

Notice that (2) is a common linear regression equation system, we can use Two Step Least Square to calculate it.

5. Definite Linear Algorithm with Prescription Constraint

Obviously, the solutions of SEM^+ or SEM^- are not unique, and they may differ by a multiple. Therefore, in the Structural Equation (1) or (2), if each latent variable is multiplied by the same multiple, its coefficient solution is the same. Taking note of this, the solution of Structural Equations is irrelevant to the modular length of the latent variable. However, it is not reasonable to assume that the modular length of each latent variable is 1. On the other hand, if each modular length of the latent variable is not the same in the possibly existing optimal solution set, then MCLS is not good. Therefore, we need further consideration.

One reasonable way is to let each latent variable have an undetermined parameter of the modular length and combine the Structural Equation (1) or (2) to find the solution. The square sum of error of this solution includes $m+k$ modular length parameters. Changing these modular length parameters to minimize the square sum of error, we can obtain a reasonable modular length of the latent variable.

Another possible way is to find a more reasonable constraint to replace the modular constraint. After getting MCLS, we can change the modular length of the latent variable in Measurement Equations to make the path coefficient between latent variables and manifest variables satisfy the prescription condition. In Equations (3,4), the prescription conditions are:

$$\sum_{j=1}^{K(t)} \psi_{tj} = 1, \quad \psi_{tj} \geq 0, \quad t = 1, \cdots, k \qquad (16)$$

$$\sum_{j=1}^{L(i)} \omega_{ij} = 1, \quad \omega_{ij} \geq 0, \quad i = 1, \cdots, m \qquad (17)$$

To compute the prescription condition, we need to consider two cases.

If the corresponding path coefficients of MCLS are non-negative at the beginning, then it is simple. We just need to divide the two sides of the Equations (3, 4) by a constant. This constant should be the sum of the corresponding path coefficients in MCLS. For example, in the Equation (3), if $\sum_{j=1}^{K(t)} \psi_{tj} = c_t$, then the two sides o the Equation (4) are divided by the constant c_t, and $\sum_{j=1}^{K(t)} \psi_{tj} = 1$.

If the corresponding path coefficients of MCLS are negative at the beginning, we cannot copy the method of prescription regression proposed by Fang (1982) [11], because regression endogenous variables are not completely known. Now we know the direction of regression endogenous variables, but the modular length is undetermined. According to the theorem in [11], if the initial regression coefficients have negative ones,

whose prescription regression coefficient should be 0. So we can first make ordinary regression about MCLS, where the modular length of endogenous variables is 1. If there are some non-positive terms in the initial regression coefficients, we can get rid of these variables, and thus the corresponding regression coefficient is 0. Then the two sides of the Equations (3,4) can be divided by a constant that should be the sum of the corresponding path coefficients in MCLS, as discussed in the previous paragraph.

Of course we can improve the constraint of the prescription condition. If some regression coefficient is 0, its corresponding variable may be removed from the model, which is not a desired situation. To avoid this, we may change the prescription condition and let $\psi_{tj} \geq \delta$, $\omega_{ij} \geq \delta$, where $\delta > 0$ is decided by user according to practice problem. If some initial regression coefficients are less than δ, they all are changed as δ, and the corresponding exogenous variables with coefficient δ should be moved to the left side of the equation in regression process.

Summarizing the above discussion we can continue to improve the algorithm of MCLS.

Algorithm 2. Improvement on Step 3 of Algorithm 1.

Step $3'$. After getting the estimate of latent variables $\hat{\xi}_t, \hat{\eta}_i$ in Step 2, calculate the summarizing coefficients ψ_{tj}, ω_{ij} by prescription regression, and recalculate the estimates of ξ_t, η_i.

1) Make use of $\hat{\xi}_t, \hat{\eta}_i$ directly in Step 2 and calculate $\hat{\psi}_{tj}, \hat{\omega}_{ij}$ in SEM^+ by common regression.

2) For any t, if there are $\hat{\psi}_{tj} \geq \delta$, ($\delta \geq 0$) for all j, and $\sum_{j=1}^{K(t)} \psi_{tj} = c_t$, then divide both sides of Equation (3) by c_t. Similarly, for any i, if there are $\omega_{ij} \geq \delta$, ($\delta \geq 0$) for all j, and $\sum_{j=1}^{L(i)} \omega_{ij} = c_i$ then divide both sides of Equation (4) by c_i.

After checking all t, i, go to Step 4 in Algorithm 1.

3) For any t, i, if there is some j so that $\hat{\psi}_{tj} < \delta$, or $\omega_{ij} < \delta$, ($\delta \geq 0$), then let the corresponding term be fixed, i.e., $\hat{\psi}_{tj} = \delta$ or $\omega_{ij} = \delta$. After checking all j, go to Step 1 and Step 2 in algorithm 1.

Note that if some regression coefficient is fixed in common regression, the corresponding exogenous variables with its coefficient δ should be moved to the left side of the equation and combined with the endogenous variable to regression. After regression the corresponding exogenous variable with its coefficient δ should be moved to the right side of the equation.

This model and definite algorithm is helpful to researchers who study Internet addiction. More detailed proof of algorithm and data examples can be found in website http://public.whut.edu.cn/slx/English/.

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Community Violence as Psychosocial Stressor: The Case of Childhood Asthma in Boston

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ABSTRACT

Childhood asthma is a critical public health problem of urban centers in the United States and other industrialized nations. Population-based and laboratory research studies indicate that psychosocial stress differentially affects asthma expression. Witnessing or experiencing community violence is a psychosocial stressor that results in long-term biological changes that may in turn contribute to asthma morbidity. This is a review of the literature that examines the exposure to violence as a psychosocial stressor that is independently associated with asthma morbidity even after adjustment for income, housing, and other adverse life events. In addition to acting as a physiological trigger for the disease, community violence can also impact health behaviors and exposure to other unknown environmental risk factors. This connection leads the authors to suggest that reducing violence and the amelioration of its impact has implications beyond public health. The City of Boston in Massachusetts serves as the context to contextualize a series of recommendations that may ameliorate and/or prevent asthma incidence and prevalence. The reduction of poverty, unemployment, substandard housing, and high crime/violence rates can have significant health implications for children asthma and a decline on asthma hospitalization.

Keywords: *Psychosocial Stress, Violence, Asthma, Public Health*

1. Introduction

Our current understanding of what causes asthma continues to remain elusive [1]. There is, however, an increasing recognition of the relationship between psychosocial stress and asthma incidence and prevalence. We examine, first, this relationship, more specifically social violence, as a primary environmental exposure for asthma morbidity. And second, we discuss policy changes that may prevent and ameliorate asthma prevalence in urban settings including directions for future research. Childhood asthma is the subject of innumerous research studies. However, there are still many unknowns about its etiology and how environmental factors contribute to the onset and periodic episodes of this disease. Epidemiological research, meanwhile, demonstrates a disproportionate burden of disease amongst children of low socioeconomic position [2-8]. Furthermore, specific environmental exposures, such as violence, affect susceptible populations and contribute to asthmatic attacks [8-10]. This growing body of evidence, although still preliminary, provides an alternative explanation through which psychosocial stress as a result of exposure to violence, acts as a primary exposure to elicit asthma symptoms. Research into this phenomenon may help to explain the higher burden of disease amongst children living in disadvantaged neighborhoods and provide insight into interventions to combat this growing trend.

2. Epidemiology of Asthma

2.1 Burden of Asthma

Childhood asthma is prevalent in all major urban centers in the United States and other industrialized nations [1,11]. In 2003, 30 million or 10.4% of Americans had asthma. 20 million had had an asthma attack in the previous year. 9 million or 12.5% of children under the age of 18 in the U.S. had an asthma attack in the previous year. Current trends indicate that prevalence rates for current asthma increased more than double from 1980 to 2003. The most substantial increase occurred among children ages 0 to 4 years and ages 5 to 14 years. This increasing trend in rates was evident across race, sex, and age [12].

The medical services used to treat asthma result in over 10.8 million physician visits, over 478,000 hospitalizations, 2 million emergency room visits, and about 28 million missed school days annually [13]. Direct health care expenditures such as physician visits, medications and other interventions are estimated to be US$ 7.4 billion. About US$ 3.2 billion of those direct costs are spent on asthma care for children [14]. Indirect costs such as decreased worker productivity, days lost from work by adults who have asthma or care for children with asthma, and other losses are an estimated $ 5.3 billion [15].

In Massachusetts, the first pediatric asthma surveillance report released in 2004 found that has 9.2% of children in school diagnosed with asthma. District level prevalence varies from 2.7 to 16.2%, with prevalence as high as 30 % in some schools [16]. This implies asthma prevalence correlates with district level factors such as physical or social environment. The Prevalence of active asthma in the city of Boston was higher than the Massachusetts average: one in seven, or 14% of children attending school had active asthma the year 2004 with a disproportionate burden of disease amongst students living in disadvantaged neighborhoods. Children with asthma average three times as many absences and use significantly more health services than other children. An estimated US$ 77 million a year are spent for both direct and indirect costs associated with childhood asthma in Massachusetts [16].

2.2 Children in Disadvantaged Neighborhoods: A Vulnerable Population

Asthma prevalence and morbidity rates have drastically risen in the United States over the past two decades. Children living in disadvantaged neighborhoods have been found to be particularly vulnerable to higher asthma morbidity rates. Neighborhood disadvantage is characterized by the presence of a number of community-level stressors including poverty, underemployment, racial discrimination, environmental inequity, limited social capital, sub-standard housing, high crime and violence rates [9]. Racial and income disparities in asthma morbidity have been consistently reported with higher rates of asthma hospitalization and mortality in neighborhoods with low median incomes and a high prevalence of minority populations [17]. The health problems of these disadvantaged populations are not likely to be solved without understanding the potential role of such social determinants of health [18].

In the United States today, rates of asthma morbidity are highest among minority children, particularly those who reside in urban areas of low socioeconomic position. Income and poverty status has been found to be highly related to the number of asthma attacks a child reported in the last 12 months. 5.5% of children who were not poor reported having an asthma attack in the last 12-

months compared to 8.0% of poor children [19]. In Boston, childhood asthma morbidity rates are also highest in disadvantaged neighborhoods with a high percent of black and Latino residents and low socioeconomic status [20]. In contrast, neighborhoods with higher median income had much lower rates of hospitalization.

3. Psychosocial Stress: An Environmental Exposure

3.1 Psychosocial Stress and Asthma

Most research attributes differences in asthma morbidity to variation in socioeconomic position. Disparities in asthma outcomes, however, cannot be explained by socioeconomic factors alone. Geographic variation has been found in asthma morbidity among cities and neighborhoods of similar socioeconomic status [9]. Growing evidence from population-based and laboratory studies indicate exposure to psychosocial stress differentially affects asthma expression [21]. These findings suggest that exposure to psychosocial stress puts children at greater susceptibility to asthma morbidity by disturbing the regulation of the hypothalamic-pituitary-adrenal (HPA) system. In this framework, psychosocial stress can be conceptualized as an environmental exposure that can enter the body resulting in long-term biological changes that may contribute to asthma morbidity [22].

Research shows that psychosocial stress can also exacerbate asthma symptoms by making the lungs more susceptible to other environmental hazards. For instance, a lowered immune response caused by stress has been shown to increase rates of respiratory infections [23]. Stress can also influence behaviors which may lead to an increase in a child's exposure to potential risks such as indoor allergens and second-hand smoke, or by making children more vulnopin (**Figure 1**). Researchers are just beginning to tease out these intertwining pathways. The following section presents the current state of research and the known biological impact of psychosocial stress on asthma morbidity including violence.

3.2 The Biological Impact of Psychosocial Stress

The idea that emotions are important to asthma exacerbation is not new. References to this hypothesized connection in popular culture and the scientific literature are common. However, it is only in recent years that scientists have been able to identify and to rigorously test theories of how exogenous events are translated into physiological responses. In this case, how psychosocial stress can lead to an asthma attack. Current research is examining the ways that psychosocial stress acts as a social pollutant that can increase morbidity and exacerbate symptoms in children with asthma—a heuristic mode for this pathway is shown in **Figure 2**.
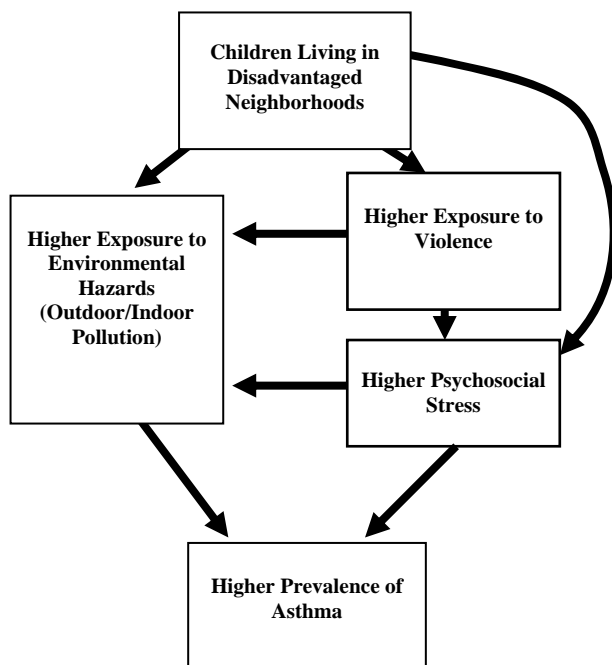
Figure 1. Proposed framework: pathways between psychosocial stress, neighborhood disadvantage and asthma

In humans, the primary source of physiological response to stress stems from activation of the HPA axis. This stimulation begins a cascading release of neurotransmitters, neuropeptides, and hormones that stimulate a sympathetic response to the perceived stressor. While this is generally a beneficial reaction that helps prepare the body to react to negative stimuli, research has shown that an over-activation of the HPA axis, through chronic stress or acute stressors, can have negative impacts on the body.

In the case of asthma, it is believed that the deleterious physical effects are mediated at least in part by the shared pathway of activation of the autonomic control of the airways in both asthma and stress responses. This overlap can be used to explain how the parasympathetic stress response might influence lung tone. Studies examining exposure to stressors have used vagal reactivity in response to stress as a measure of emotion induced airway constriction [24]. The mechanism suggested by this relationship is that the presence of an acute stress event will trigger a parasympathetic response including vagal activation and a corresponding rapid release of catecholamine leading to airway constriction. However, this is not the only way that stress has been implicated in exacerbating asthmatic symptoms [25].

The second physiological component of an asthma attack
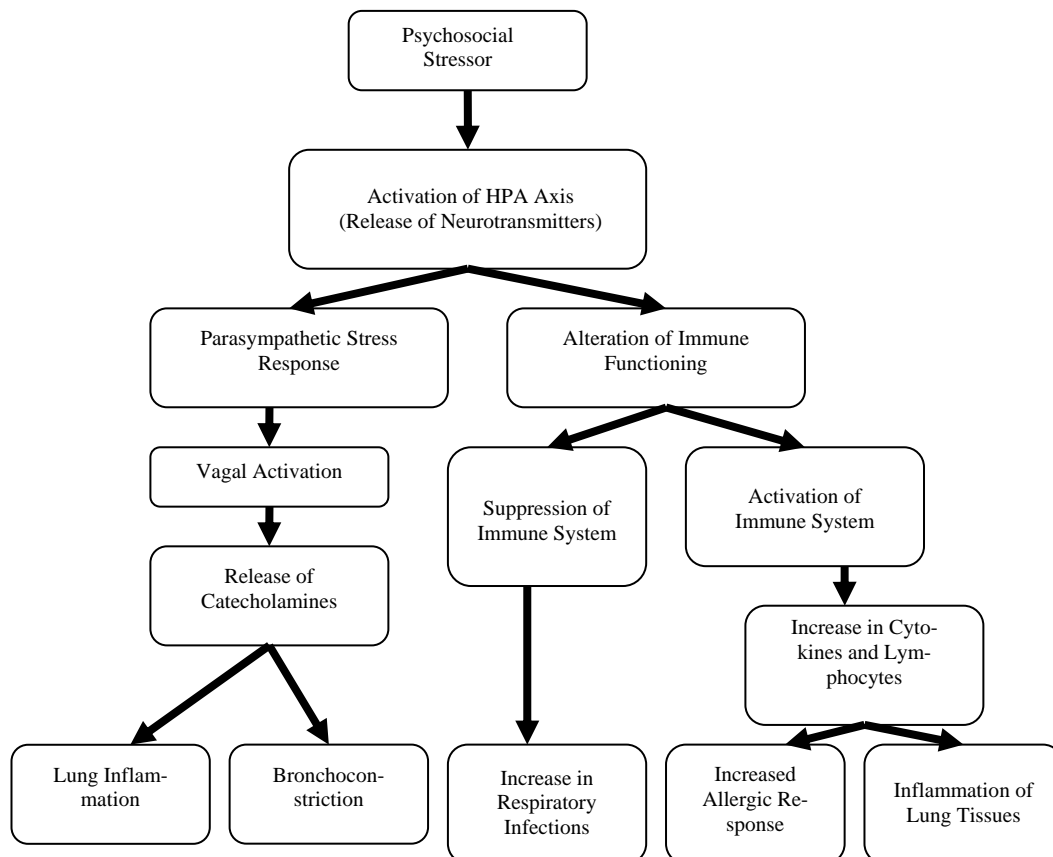
Figure 2. Hypothesized pathways: biological impact of psychosocial stress & asthma

is believed to be more closely associated with immune function. Stress induced alterations in immune response can be complex and may include both activation and suppression of the immune system. Some suggest that this alteration in lymphocyte creation may be an important component to the etiology of asthma in children raised in stressful environments [26]. These immune alterations are especially critical in the early development of a child's immune system when the Th2 polarization of their immune system and Th2 reactivity to allergens develops [27,28]. Although the direct role of stress on Th2 levels is still being investigated, there is evidence that parental report of life stress is associated with onset of wheezing in children less than one year of age [29].

3.3 Violence: A Primary Psychosocial Stressor

Children living in disadvantaged neighborhoods are at higher risk for asthma morbidity largely resulting from greater exposure to psychosocial stressors. We have characterized psychosocial stress as an environmental exposure that directly impacts the physiological expression of asthma. A clearer understanding of the most relevant sources of psychosocial stress that impact asthma morbidity is needed to adequately address interventions and policy initiatives improving psychosocial stress exposure in this vulnerable population. The literature to date has primarily focused on exposure to community violence as the principal psychosocial factor impacting asthma morbidity among children living in disadvantaged neighborhoods [9,26]. For the purposes of this paper we characterize community violence as direct exposure through victimization or through witnessing of violence. We primarily refer to violence that occurs outside the home rather than domestic violence, although we acknowledge exposure to domestic violence could have similar effects on asthma morbidity.

The psychosocial stressors associated with neighborhood disadvantage are numerous; however, the prevalence of chronic community violence is a specific and extreme stressor confronting the urban poor [26]. Likewise, the prevalence of high crime and violence is a critical component defining neighborhood disadvantage. As a result, exposure to violence has a direct impact on asthma morbidity rather than simply serving as a marker for low socioeconomic position. It has been independently associated with asthma morbidity even after adjustment for income, housing problems, and other adverse life events [30].

Certain populations face a greater deleterious effect of stress when facing daily life experiences that are unpredictable or uncontrollable [31]. This is critically important to asthma morbidity in disadvantaged neighborhoods given that living in a violent community has been associated with a chronic pervasive atmosphere of fear and the perceived threat of violence. Children and families ex-posed to community violence are more likely to view their world as being out of their control and to suffer more harmful effects from stress [26-30].

Community violence is pervasive. Studies have demonstrated that children living in urban disadvantaged neighborhoods are exposed to high rates of violence. More than 46% of children and adolescents in the U.S. reported being the direct victim of violence and over 60% reported having been exposed to community violence [32]. In an inner-city cohort in Chicago, Ilinois, 42% of children ages 7-13 had seen someone shot while 37% had seen someone stabbed [33]. In Boston, one study examined the prevalence of witnessing violence among children ages 1-5 from the pediatric primary care clinic at Boston City Hospital. The researchers found that 10% of children witnessed a knifing or shooting; 18% witnessed shoving, kicking, or punching; and 47% heard gunshots [34]. Similarly, in a national cohort sample from large U.S. cities, children had a 2 fold increased risk of asthma when exposed to interpersonal violence at home [3].

3.4 Impact of Exposure to Violence on Asthma

Violence affects asthma morbidity through many pathways. In addition to acting as a physiological trigger for the disease, community violence can also impact health behaviors and exposure to other unknown environmental risk factors [9]. For example, parents and caretakers who are worried about their children's safety may restrict outdoor activities leading to a greater exposure to indoor allergens. Given that the degree of housing disrepair has been associated with increased cockroach allergen levels (a known risk factor for increased asthma), children who live in disadvantaged neighborhoods and must stay indoors have higher rates of asthma morbidity [35]. Keeping children indoors may also restrict their ability to develop support networks. Additionally, it has been suggested that fear of crime fosters a distrust of others. Both of these factors can lead to social isolation and a diminishment of stress buffering factors such as social networks [26].

This exposure may also impact the adoption of coping behaviors by household members such as smoking, another known trigger for asthma. One study examining increased rates of smoking in African American households found that the strongest predictor of smoking was a report of high stress levels [36]. In a study of tobacco use among adolescents, smoking was strongly associated with adverse childhood experiences. This indicates nicotine may be adopted as a pharmacological coping device for the negative emotional, neurobiological, and social effects of adverse childhood experiences [37].

Finally, a violent environment may also impact compliance to asthma treatments and medical follow-up. Caregivers may fear making a trip to a pharmacy or me-

dical provider for treatment due to fear of personal safety in a violent neighborhood. Additionally, pharmacies may not stay open at night in high crime areas, limiting immediate or emergency access to medication. As mentioned previously it has been suggested that families who live in a violent environment are more likely to feel like their world is out of control. Helplessness has been linked to depression, which may limit the caretaker's ability to buffer the detrimental effects of community violence in the lives of their children [38]. Caretakers living in violent communities frequently express a sense of helplessness and frustration in their inability to protect their children.

4. Policy Recommendations

Prioritizing the reduction of psychosocial stressors, here described as community violence, in vulnerable neighborhoods introduces a beneficial externality: the reduction of asthma morbidity among children. This morbidity reduction, in turn, would bring other forms of economic, social, and health benefits that are directly and indirectly related to the disease under study. In Boston and other urban settings, attempts at controlling violence have always been accompanied by large community initiatives. In conjunction with reducing psychosocial stress through violence prevention and control measures, making health care accessible is a core component in reducing other forms of psychosocial stress. Enhancing quality health care accessibility for children with asthma and reduction of known indoor environmental exposures are indispensable in the long-term control of asthma.

Asthma morbidity is the result of a complex interplay of influences operating at several levels, including the individual, the family, and the community. Similarly, decisions regarding policies and programs that would reduce violence and the amelioration of its impact have implications beyond public health. Often policies that address violence prevention and control and health care access and quality operate in distinct legislative and regulatory worlds. To reformulate these policies into an integrated process, legislators should include psychosocial stressors like neighborhood violence in venues beyond the realm of law enforcement.

We recognize the complexity of preventing violence and asthma as well as the need for a variety of policies in the realm of environmental justice, human services, and law enforcement. However, none of these factors alone will suffice. For example, reinforcing police presence may not necessarily reduce the prevalence of psychosocial stress since police presence by itself may increase community stigma and fear. Our recommendations recognize the need for intersectorial policies to simultaneously address exposure to violence as well as prevention and treatment of asthma morbidity. There is strong evidence for violence acting as a significant psychosocial stressor however the exact mechanisms remain unclear introducing uncertainty in the risk analysis [39]. The precautionary principle [40] indicates that policy makers should develop the means to include considerations of the role that psychosocial stress plays on asthma morbidity within governmental and social policy as well as through recommendations to individuals [18]. We have categorized the recommendations under three areas: research and information, community participation, and public health initiatives.

4.1 Research & Information

Exposure to violence as a risk to the health of children has been the source of a growing number of research initiatives. These are promising activities but more research is needed to assess the specific exposure pathway and its connection with the known factors that determine health and health care disparities in asthma morbidity. At the present, we are only able to hypothesize that violence acts as a compounding or additive mechanism in making children more vulnerable to the impact of environmental pollutants (indoor and outdoor)—likely through its impact on the health seeking behavior of parents and children under treatment.

In addition to more methodologically sound research to identify the morbidity mechanisms; there is also a need for greater data of asthma morbidity amongst children as well as information on trends over time. To fill this need, the City of Boston should be a leader in efforts to establish a centralized state asthma data registry. This registry should include a system of surveillance by which psychosocial stressors assessment is routinely integrated into the treatment of children arriving with asthma crises to emergency rooms and local community health centers.

4.2 Community Participation

The City of Boston is experiencing resurgence in the number of homicides and other forms of social violence despite previous successful efforts at reducing its prevalence. There is a rich opportunity to link the renewed efforts at preventing and controlling violence with an awareness and identification of the psychosocial stressors directly linked to asthma morbidity that offers a significant opportunity to strengthen those efforts. These efforts may include: incorporating asthma morbidity prevention as another dimension in the Boston strategies to confront neighborhood violence, *i.e.*, Boston Strategic Multi-Agency Response Teams, Youth Center Initiatives, among others [41]; creating collaborative research and intervention initiatives with housing collaborative health initiatives to incorporate psychosocial stress as part of the surveillance and educational intervention activities engaging with community participants in the integration of evidence based knowledge into program efforts; incor-

porating the psychosocial stress agenda into the Asthma Planning Collaborative Initiative which has as a goal to develop a Massachusetts State Plan for Asthma.

4.3 Public Health Initiatives

Asthma is one of many chronic diseases in the United States in which disparities in treatment and access to care have been documented [42]. The City of Boston as part of its plans which include reducing health disparities [43] could provide further funding for: community based participatory research [44-46] with the goal of developing strategies to reduce violence in urban neighborhoods with high incidence of asthma morbidity; research projects that use a positive deviance model [47,48] to investigate how some families and community groups have been able to develop effective strategies and positively cope despite the witnessing of social violence in their neighborhoods; curricular initiatives to develop educational materials for others to learn from those community research experiences.

Second, in addition to these community research initiatives, the healthcare needs of patients need to be addressed. Social violence inhibits the ability of parents of ensuring the safety of their children and leading to emotionally unavailability due to fear and trauma [49]. These healthcare needs could be satisfied via the development of a comprehensive program to support and empower parents as the key factor in developing resilience and mediate the effects of children's exposure to violence; designing psychosocial and community interventions that help parents to reduce the psychological strain produced by a sense of lack of control and agency in their lives; fostering the development of community cohesion and trust to provide parents with a social support network that counteracts the deleterious effects of social violence; collaborating with child welfare institutions and collaborative family initiatives to assess and strengthen appropriate prevention and treatment of asthma morbidity among the children served by these programs; collecting information about asthma morbidity from programs that address the psychological needs of children that have identified as having witnessed or victimized by violence in their homes and/or neighborhoods.

Third, universal health care coverage is synergetic with recommendations directly addressing health care access and quality in the case childhood asthma. As part of these efforts, medical insurers would include as part of their plans asthma medical supplies and education specialists providing consistent education, expertise and support for patient to successfully identify and manage asthma; and, ameliorating the transportation and other health care access barriers. Examples of these efforts include a program like a roving clinic on wheels for asthmatic school children to provide a comprehensive asthma management strategy [50,51].

Policies that reduce poverty, unemployment, substandard housing, and high crime/violence rates may have significant health implications for children and ultimately have a direct impact on asthma hospitalization [2]. Similarly, policies that regulate outdoor and indoor air pollution would also affect asthma morbidity. In addition to direct impacts on community residents, crime and violence (or the lack thereof) can be used as indicators of collective well-being and social cohesion within a community. Furthermore, the conditions known to be associated with violence exposure are related to having experienced stress [52,53], and chronic violence exposure has been conceptualized as a pervasive environmental stressor imposed on already vulnerable populations [4,10] including asthma [5,8].

5. Conclusions

Asthma is a highly prevalent and increasing health challenge for urban neighborhoods across the nation and within Boston. Exposure to community violence creates high levels of psychosocial stress in neighborhoods, which are associated with a higher burden of childhood asthma. The theory of embodiment suggests that the body can often tell a story about the conditions of our lives [54,55]. We argue that asthma is the embodiment of the exposure to the environmental pollutant of violence in children's lives. There are many pathways through which this experience acts upon the body. Lack of social support, fear and stigma, greater exposure to indoor pollutants and allergens, as well as impacts on health behaviors are often part of living in environments where exposure to violence is high. However, it is violence itself that acts as a primary predictor of the psychosocial stress that is translated into biological changes in the respiratory and immune systems of children living in these neighborhoods. While there are uncertainties about the exact mechanisms behind this relationship, the precautionary principle should guide our actions towards making policies to protect the health of children now.

Based on the evidence and the burden of disease, we analyzed potential interventions that include: continued research and data gathering; increasing community participation in measures to combat violence and revitalize neighborhoods; and initiation of public health programs to address both violence prevention and decreasing barriers to asthma care and treatment. True change in asthma morbidity can only occur when the full context in which children live their lives is considered, and this must include a realization of the important role that psychosocial stress and violence play in this disease.

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Scientific
Research

Aggression on the Road as a Function of Stress, Coping Strategies and Driver Style

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ABSTRACT

According to Lazarus and Folkman's [1] *transactional cognitive model, people differ in their sensitivity and vulnerability to stressful events. Using questionnaire and observational techniques, the model was tested as a possible explanation for aggressive driving behavior. Responses from 226 drivers who were also observed driving their cars provided evidence for a link between stress and aggressive driving as well as between problem-solving strategy as a coping device in stressful situations and hostile behaviors. In addition, analysis showed that, in general, the more years of driving experience a driver has, the more likely he/she is to respond with instrumental rather than hostile aggression. Besides support for the theoretical model, some of the practical applications as they related to highway safety and the prevention of traffic accidents were presented.*

Keywords: *Driving Stress, Aggressive Driving, Problem-Solving Strategy, Hostile Strategy, Instrumental Stratgey*

1. Introduction

Road accidents and traffic offences resulting from aggressive driving have been a subject of interest to many researchers over the years with several studies attesting to an increase in negative outcomes. Examples range from irritability, anger, violent reactions [2,3] and even drivers shooting at each other during an argument such as who saw the specific parking space first [4]. A common explanation for these negative behaviors uses the frustration-aggression model whereby a driver who has been blocked from getting to his/her destination expresses frustration which may lead to some overt expression such as harming/hurting another driver. Yet, in many situations where aggression is manifested, the so-called cause of the frustration is not readily apparent. The present study applies an alternative approach, Lazarus and Folkman's [1] transactional cognitive model, for explaining drivers' actual reactions on the road.

According to the usual formulation, where frustration is followed by an aggressive act [5,6] no real distinction is made among the different types of aggression. However, Feshbach's [7] conceptualization which distinguished between hostile and instrumental acts [8] seems quite appropriate for the driving situation. Although both types of aggression are seen as an attempt to harm another person, the aim of instrumental aggression is to gain something such as money, social status or territory,

whereas hostile aggression is mainly aimed at causing hurt or pain. In his study on aggressive driving behavior, Shinar [9] defined instrumental aggression as actions taken by the driver that will aid his/her progress in driving, or help in removing or overtaking an obstacle on the road. while hostile aggression on the road serves no purpose other than harming another.

According to Shinar [10], the differentiation is not unambiguous and many expressions of anger on the road can be defined as either instrumental or hostile or both. Although overlap is expected between the concepts, this distinction can explain why there were fewer aggressive behaviors such as driving through a red light or honking at a driver blocking progress when the light is green (which is sometimes considered hostile) among older drivers as well as the greater number of such behaviors reported among men than women [9].

While hostile aggression gives drivers a feeling of satisfaction about the present difficulties in which they find themselves, it doesn't really solve the problem at hand. At best, these actions help channel drivers' anger while producing harm to the frustrating party. Overall, the frustration-aggression model, accounts for the result of the drivers' behavior but not for the process that leads the driver from his/her feelings of frustration to the specific behavioral reaction.

1.1 Road Rage and Aggressive Driving

Recently, a new term, road rage, has been introduced into the discussion on aggressive driving. Although many people view these terms as similar, in fact, it is likely that the terms have specific connotations [9]. The American National Safety Council has tried to differentiate between them by defining aggressive driving as "movement or activity using a vehicle that endangers or will endanger people or property," which is a traffic violation [11] whereas road rage is not necessarily a traffic offence and is seen as "an attack initiated by the driver of the car or a passenger, on a driver of another car or its passenger, using a car or other dangerous vehicle, this anger being the result of an incident or event on the road during driving" [11]. Examples are tailgating, deliberately blocking progress, honking, and even verbally or physically attacking a driver [9]. The present study applies the distinction between aggressive acts for explaining these behaviors.

1.2 Commuting Stress

Many investigators agree that driving is a complex activity, often accompanied by stress [12]. The relevant stimuli and responses associated with the commuting process are a relatively new concern for stress researchers and incorporate various environmental, personal, and situational sources [13]. Among the effects that have been investigated here are physiological [14], psychological [14] or organizational outcomes [15]. The commuting stress model postulated by Koslowsky *et al.* [13] comprises several stages relating to stress-causing factors such as distance and time, how subjective stress is conceived, and how the potential negative outcomes relate to each other. A popular type of research issue has been to identify moderators of the stress-strain relationship. For example, there is evidence that there are different levels of stress associated with mode of travel. Findings by Koslowsky and Krausz [16] showed that stress symptoms were greater among nurses who drove their cars to work, compared to those who commuted by public transport.

1.3 Driving Behavior Styles

In studying drivers' stress, Gulian, Matthews, Glendon, Davis & Debney [17] argued that drivers' stress-related behavior depends on the driver's appraisal of the situation, in that driving skills depend on the individual's ability to cope with stress. They identified five distinct and independent categories of driving under stress and assessed them by using the Driving Behavior Inventory (DBI). Among the styles relevant here are "dislike of driving" and "aggression." Questions on "dislike of driving" deal with anxiety, dissatisfaction and lack of confidence, especially under difficult driving conditions. These mainly relate to emotional stress symptoms such

as tension, and depressed mood states as a result of driving [18]. Questions on aggressive driving style deal with feelings of anger, frustration, lack of patience and a negative perception of other drivers who are sometimes seen as hostile and threatening. "Aggression" questions deal with annoyance while driving, lack of patience and aggressive actions, especially when progress is blocked by other drivers [19]. Research dealing with the association between driving styles and cognitive measures of coping found that drivers' stress measures and resulting behavior can be characterized by the following: drivers who scored high on "dislike of driving" tended to cope with stress while driving by using emotional coping strategies (for instance self-criticism) which increased feelings of apprehension about traffic. Drivers who scored high on "aggression" used direct confrontation strategies [19] which included tailgating and frequent overtaking [18].

In addition, drivers who scored high on "aggression" reported that they made more mistakes while driving and committed more traffic violations such as speeding [20]. "Dislike of driving" and "aggression" were found to be linked to processes such as cognitive assessments of circumstances involving stress and ways of coping with them [20], including emotional reactions and reactions to stress.

1.4 Coping with Stress

People differ in their sensitivity and reactions to stressful situations [21]. When drivers are stressed, their aggressive behavior may be easier to understand using Lazarus and Folkman's [1] cognitive model which describes coping styles in stressful situations. The model suggested by these researchers has been one of the most influential formulations in explaining both theory and empirical findings on coping strategies in stressful situations [22-25]. Cognitive evaluation starts with the individual appraising the dangers of the situation. Next, the individual analyzes ways to cope with the situation [1] so as to regulate emotions which may lead to modifying the specific stress-strain link.

An individual who experiences a stressful situation can react in one of two ways: emotion-focused coping defined as decreasing emotional stress including strategies such as abstention, blaming others, keeping distance, selective attention, and finding something valuable in negative events. On the other hand, problem-focused coping includes problem-solving strategies and dealing effectively with stress stimuli. Examples include focusing on the overall problem, attempting to define the problem, suggesting alternative solutions, considering the alternatives, choosing one of them, and taking action.

An overlooked but interesting area is the link between styles of coping with stress, and attitudes towards driving and related emotions [12]. Differences in coping styles

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among drivers are reflected in different attitudes towards driving [17,18,26]. Generally, in these studies, data were collected from questionnaires completed by participants but aggressive reactions of drivers were not tested in real time, *i.e.*, on the road. In addition, the instruments for comparing coping styles while driving were limited to developing measures and scales to test examine stress and copings, without examining the process of driving while under stress.

Based on the studies in the area using stress, driving style, and coping processes, the following specific hypotheses concerning aggression on the road were formulated:

Hypothesis 1: Drivers who use a problem solving approach to stress will experience less perceived stress. No relationship between emotional coping style and perceived stress is expected.

Hypothesis 2: Perceived stress, coping style, individually and as an interaction term, predict who is likely to be aggressive on the road.

Hypothesis 3: Drivers who use instrumental aggression will manifest more stress and use more of a problem-oriented style of coping than those who use hostile aggression while driving.

Hypothesis 4: There will be a link between perceived stress and driving style such that perceived stress of aggressive style drivers will be greater than the perceived stress of dislike driving style drivers.

2. Method

2.1 Sample

Participants included 226 drivers (67% women) affiliated with a university in central Israel. Mean age for the group was 29.0 (SD = 6.73), ranging from 19-74 with an average number of years of education, 14.8 (SD = 2.92), ranging from 8-30 years. About 49% were students, 43% salaried employees, 4% self-employed, 3% unemployed and less than 1% were soldiers or pensioners.

The average number of years driving was 10.27 (SD = 8.73), ranging from 1-59 years with about 89% saying they drove their cars almost every day The average number of kilometers driven in the middle of the week was 186.91 (SD = 220.72) and the range was between 1-2000 kilometers. Nearly 49% of the participants had been involved in road accidents. Of those involved in accidents, 75% were young drivers (30 or below). Among those who had committed a traffic violation, about 31% had at least one or more tickets for speeding.

During the period of observation, 31% of the drivers displayed one aggressive behavior including 7% who sounded a "short honk"; 1% a "long honk"; 3% "two consecutive honks"; 9% who had "cut in" on other drivers; and 12% who tailgaited.

2.2 Instruments

The State-Trait Anxiety Inventory. The Speilberger [27] State-Trait Anxiety Inventory, as translated into Hebrew by Teichman and Mellik [28], was used here. Participants are asked to rank the strength of their present feelings on a scale from 1-*not at all* to 4-*very much*. For the present analysis, the relevant items were those that focused on an emotional description related to stress attributes that a person feels "at a given moment", such as serenity, safety, anger etc. A person's anxiety level is determined by combining the individual responses with a higher score indicating a higher state of anxiety.

A Checklist for Coping Styles. The questionnaire was translated into Hebrew [29] from the original article by Folkman and Lazarus [22] *The Ways of Coping Checklist*. The questionnaire includes 43 items describing various strategies people use in order to cope with stressful situations. The participant is asked to what degree he/she uses each strategy when facing stressful situations. A four factor solution for coping styles, similar to Lazarus and Folkman, was obtained: coping focused on the problem (12 items), coping focused on emotion (12 items), searching for social support (8 items), and denial (5 items). Cronbach's alpha reliability on each of the 4 factors was found to be higher than 0.74. Four factor scores were compiled with a high score indicating that this particular strategy was used often.

Driving Behavior Inventory (DBI). The items in the DBI [17] were translated into Hebrew. The first part of the original questionnaire related to biographical questions such as driving experience and driving habits. The second part consisting of 37 general stress statements related to being on the road and reactions pertaining to the driving experience. Gulian *et al.* [12] found that these statements reflected five dimensions of stress while driving, expressing the participant's beliefs and reactions. Example of items and the relevant dimension include the following: "I overtake other cars whenever I get the chance."(Expression of aggression);"I am aware of difficulties on the road" (expression of alertness);"I am irritated when I overtake another car"(expression of irritation when overtaking); "I feel satisfaction when overtaking another car" (expression of tension when overtaking); "Driving usually makes me frustrated" (expression of aversion to driving-dislike driving style); "I am usually patient when facing heavy traffic" (Expression of general driver stress).

On the original DBI questionnaire, participants had to mark gradations on a scale (100 mm long) showing to what degree they agreed with the above expressions. Matthews *et al.* [30] recoded the items and used the following scale: 1) "doesn't describe how I feel"; 2) "describes me to a certain extent"; 3) "describes me well"; 4. "describes me very well". In the present study, this

scheme was used. A score was calculated for each participant on each dimension.

The questionnaire used the *back-translation procedure* discussed by Brislin [31]. Thus, an individual fluent in both languages translated the items from English into Hebrew, and then another translator fluent in both languages translated the items back into English. The two translations were quite compatible and only in a few cases was there a need to adjust a word or phrase.

Aggression Style. Based on the distinction in the literature between hostile and instrumental aggression [7,32], two additional measures were compiled, the first focusing on aggressive instrumental driving, which included the following behaviors: a short honk or pushing in front of the next driver; and a second measure for aggressive hostile driving, which included the following behaviors: a long honk, two continuous honks and tailgating. An individual was assigned either a value of 1 (hostile aggression), 2 (instrumental aggression) or 3 (no aggression).

2.3 Procedure

Before beginning the study, we met the parking lot manager and explained to him the aims of the study and the method to be used for gathering the data. We decided which days driving behavior would be observed in the parking lot and the cashiers at the entrance would distribute a questionnaire to each participant as he/she entered the lot after paying the entrance fee. Every driver was offered the questionnaire in an envelope and if anyone asked any questions, they would be told the following: "Read the explanation provided". The cashiers were also told not to force drivers to accept an envelope and to show respect for anyone who refused to participate in the study.

Gathering Data The questionnaires were distributed over four days. The envelopes contained two versions of the questionnaire: a long one with questions relating to perception of stress, coping styles and driving styles. The shorter version included questions relating to how stress is perceived. The cashiers handed out the two different questionnaires randomly.

The drivers were asked to put the completed envelopes in a box next to the cashier. The questionnaires were handed out to 800 drivers, of which, 237 questionnaires were returned, a 30% response rate; 11 questionnaires were disqualified because there was no record of those drivers being observed. The cashiers reported that 20 drivers refused to accept envelopes. Of those who accepted the envelopes, 79 (35%) filled in the questionnaires on the spot and handed them back to the observer or cashier at the parking lot. The rest of the questionnaires 158 (65%) were handed in and put in the box next to the cashier or left at the psychology department.

Gathering Information from Observation The ob-

servations were done at times when the traffic was heavy at the entrance to the parking lot and the person observing did so from the entrance to the lot without being seen by the drivers. The observer wrote down the three middle digits of the license plate (there was a double recording for 37 cars so the information from the observation was correlated with the questionnaires by age and gender variables); the approximate status of the cars (old or new); whether the driver was alone or with passengers; the driver's gender; the driver's approximate age (seemed to be above 30 or less than 30), and the aggressive driving behavior used such as a short honk, a long honk, two continuous honks, tailgating, light flashing, overtaking and cutting in front of someone. As previous observations had indicated that the main entrance was busier than other areas of the parking lot, the observer was stationed there. When the driver bought a parking ticket, he/she received an envelope containing the questionnaire. The envelope also contained particulars about the researchers. The drivers were asked to complete the questionnaire no later than a half hour after entering the lot and to leave it either with the cashier or at the psychology department. As an incentive, all those who filled in the questionnaire would be able to participate in a lottery where six drivers could win free parking for one semester.

3. Results

3.1 Measures

As shown in **Table 1**, the reliability measures were satisfactory for all scales. In addition, drivers were also divided into an aggressive group, a participant who manifested any kind of aggressive driving (without differentiating between hostile or instrumental driving) and those who didn't.

The analyses below follow the order of the study hypotheses. *Hypothesis* 1 tested the association between drivers' stress and stress-coping styles. A significant correlation was found between the problem-oriented style of coping and levels of perceived stress, $r = -.26$,

Table 1. Means, standard deviations, and reliabilities for scales

Measures	M	SD	Cronbach's α
Stress	1.68	.54	.92
Problem-oriented coping	3.01	.45	.76
Emotion-oriented coping	2.25	.57	.81
Driving style (DBI):			
Aggressive style	1.90	.59	.75
Dislike of driving style	2.46	.44	.55

Note. For stress & coping strategies $n = 225$-226
     For driving style (DBI): $n = 68$-69

$p < .01$. This correlation was negative indicating that the higher the participants' score in problem-oriented coping was, the less stress they felt. The correlation between emotional coping and perceived stress was not found to be significant.

In order to compare aggressive drivers to non-aggressive ones for the three measures mentioned above, a multivariate analysis of variance (MANOVA) was used. A significant difference was found between the two groups of drivers Wilks' Λ = .915 (F (3,222) = 6.92; p < .001; eta²-.08). The findings for the means and standard deviations are reported in **Table 2**. The only significant difference between the two groups of drivers was in their stress perceptions with drivers who displayed aggressive behavior showing greater stress perceptions than those who didn't (M = 1.89, SD = .56 and M = 1.58, SD = .51, respectively).

In *Hypothesis* 2 we argued that perceived stress, the various styles of coping and their interaction contributed to explaining the variance in aggressive driving. A *logistic regression analysis* was conducted, suitable for situations in which the dependent variable was dichotomous. The logistic regression analysis was done in four stages. The first stage included personal traits (gender and age) and those pertaining to driving (driving experience, involvement in road accidents). In the second stage, the level of perceived stress of the drivers was included, in the third stage, the two measures of coping with stress

Table 2. Means (SD's) for stress and coping strategies comparisons by aggressive behavior

	Aggressive behavior					
	Yes		No			
Measures	M	SD	M	SD	F(1,224)	eta²
Stress	1.89	.56	1.58	.51	16.44***	.06
Problem-oriented Coping	3.02	.35	3.01	.48	.07	--
Emotion-oriented Coping	2.18	.56	2.28	.57	1.45	--

*** p < .001
Note. n = 225-226; Yes = was aggressive; No = wasn't aggressive

were used, problem coping style and emotion coping style. Finally in the fourth and last stage, interaction among measures was used.

As can be seen in **Table 3**, the first two stages explained 16% of the aggressive driving variance. Of the variables in stage 1, only gender was significant. In the second stage, stress explained an additional 5% to the variance, F = 13.90, p < .01. In **Table 4**, the means for the different measures are analyzed by aggression type. Those drivers who were defined as aggressive (presented aggressive behavior while driving) perceived more stress. As the interaction term was not significant, the hypothesis was only partially confirmed.

Table 3. A logistic regression analysis for aggressive/non-aggressive drivers

	Measures	B	S.E.	Wald	Exp(B)	R²
First Step	Involvement in driving accidents	.371	.297	1.565	1.087	.11**
	experience in driving	.018	.049	.139	.805	
	Age	.001	.040	.001	1.132	
	Gender	1.430	.321	19.821***	1.142	
Second Step	Involvement in driving accidents	.371	.306	1.476	1.450	.16***
	experience in driving	−.003	.054	.003	.997	
	Age	.017	.045	.141	1.017	
	Gender	1.480	.337	19.332***	4.393	
	Stress	−1.102	.300	13.456***	.332	
Third Step	Involvement in driving accidents	.356	.307	1.345	1.428	.17
	experience in driving	.010	.054	.032	1.010	
	Age	.008	.045	.031	1.008	
	Gender	1.511	.345	19.222***	4.530	
	Stress	−1.222	.316	14.987***	.295	
	Problem-oriented Coping	−.481	.373	1.660	.618	
	Emotion-oriented Coping	.227	.291	.612	1.255	

** p < .01, *** p < .001
Note. 1. n = 225-226

PSYCH

Table 4. Means (SD's) for stress and coping strategies by types of aggressive behavior

| | Aggressive behavior | | | | | |
| | Hostile Aggression | | Instrumental Aggression | | | |
Measures	M	SD	M	SD	F(1,66)	eta²
Stress	2.03	.52	1.71	.57	5.90*	.08
Problem-oriented Coping	2.81	.21	3.31	.27	63.97***	.49
Emotion-oriented Coping	2.21	.51	2.15	.63	.16	--

** $p < .01$, *** $p < .001$
Note. $n = 69$

In *Hypothesis* 3, we compared drivers who displayed instrumental aggression to those who displayed hostile aggression. For the three measures mentioned before, a multivariate analysis of variance (MANOVA) was conducted and a significant difference was found between the group of drivers who displayed instrumental aggression and the group of drivers who displayed hostile aggression. Wilks' $\Lambda = .493$ (F (3.64) = 21.94; p < .001. eta² = .50). The means and standard deviation of the three measures of the two groups and the results of the variance analyses were done separately for each of the measures as can be seen in **Table 4**.

As we can see from the table, drivers who displayed instrumental aggression felt more stress than those who manifested hostile aggression. In addition, the problem-oriented coping style was greater among those drivers who manifested instrumental aggression than those rivers who displayed hostile aggression. A *logistic regression analysis* (see **Table 5**) was conducted in order to see to what degree the perception of stress and coping style variables contributed to variance in aggressive styles of driving. The analysis included three stages. In the first stage, gender, age, driving experience and involvement in road accidents was entered. In the second stage, the variable expressing the degree of stress the drivers experienced during the study was introduced. In the third stage, the two measures of coping with stress (problem-oriented coping style and emotional coping style) were introduced.

In the first stage, 8% of the variance in differences in styles of aggression manifested by drivers was explained with the only significant beta contribution coming from driving experience. An ANOVA here showed that there were significantly more drivers who manifested instrumental aggression (M = 11.26, SD = 9.01) than those who manifested hostile aggression (M = 7.89, SD = 6.57), F (1.65) = 101.11; p < .001; eta² = .60).

Table 5. A logistic regression analysis for aggressive behavior (hostile, instrumental)

	Measures	B	S.E.	Wald	Exp(B)	R²
First Step	Involvement in driving accidents	.083	.356	.055	1.087	.08*
	experience in driving	−.217	.118	3.387*	.805	
	Age	.124	.087	2.014	1.132	
	Gender	.132	.535	.061	1.142	
Second Step	Involvement in driving accidents	.069	.369	.035	1.072	.13*
	experience in driving	−.175	.117	2.237	.839	
	Age	.091	.086	1.107	1.095	
	Gender	.076	.548	.019	1.078	
	Stress	.946	.521	3.293*	2.576	
Third Step	Involvement in driving accidents	.224	.589	.144	1.251	.57***
	experience in driving	−.100	.184	.294	.905	
	Age	−.059	.137	.182	.943	
	Gender	1.391	1.103	1.591	4.019	
	Stress	.171	.785	.047	1.186	
	Problem-oriented Coping	−13.788	4.101	11.306***	.000	
	Emotion-oriented Coping	−1.532	1.004	2.328	.216	

* $p < .05$, *** $p < .001$
Note. 1. $n = 69$

PSYCH

In the second stage, level of stress added an additional 5% to explained variance. Interestingly, an ANOVA (see **Table 6**) indicated that the drivers who manifested hostile aggression manifested significantly greater levels of stress than those drivers who manifested instrumental aggression.

In the third stage, where coping styles were included, an additional 44% of variance was explained, all of which can be attributed to the problem-oriented coping style (B = −13.788, $p < .001$) a careful examination of this relationship (**Table 6**) shows us that drivers who scored high in this coping style were inclined to be instrumentally aggressive. In stage 4, no additional significant variance was explained. In total, 57% ($p < .001$) of variance was explained by the logistic regression.

For *Hypothesis* 4, we examined whether there would be differences in drivers' stress depending on driving style such that drivers displaying an aggressive style would feel more stress than those drivers who dislike driving. A Pearson's correlation analysis showed that there was a significant correlation between aggressive driving style and feeling of stress, r = .38; $p < .01$. The more aggressive the drivers were, the more stress they felt. No significant correlation was found between dislike of driving and perceived stress ($p > .05$).

4. Discussion

The findings supported the contention that drivers who displayed aggressive driving behavior showed higher levels of stress than drivers who didn't display aggressive behavior while driving. Although no link was observed between stress coping style and aggression, there was some evidence that drivers who display a high problem-oriented coping style tended to display more instrumental aggression than hostile aggression. Moreover, drivers whose driving style was characterized as the dislike group were inclined to react emotionally when coping with stress.

Using Folkman and Lazarus' *Cognitive Model* which describes coping with stress as an ongoing process of evaluation, we were able to explain to some extent the process that takes place when drivers express aggression or anger while driving especially when facing stressful situations. Overall, stress experienced by drivers as well

as their coping styles influences is associated with their behavior on the road. This strengthened our basic assumption that the frustration-aggression model used up to now by various researchers [9,33] to explain aggressive behavior of drivers on the roads, does not offer a sufficient or consistent explanation of drivers' aggressive reactions. It does not fully explain the process from the moment the driver experiences frustration to the actual behavioral reaction.

Among the new insights into driving behavior revealed by the data was the importance of stress perceptions and coping styles.

4.1 Stress and Coping with Stress

Drivers who displayed aggressive behavior had higher levels of stress than drivers who didn't display aggressive behavior. These findings were consistent with earlier literature that aggressive behavior was correlated with reports of the driving experience as a stressful event [2,3]. Our support here of this contention is also consistent with findings that drivers suffering from elevated levels of stress tended to perceive other drivers as a source of this emotion and causing them to react more aggressively towards the other driver, a form of road rage [12,17]. Nevertheless, no direct link was found between coping style, stress and driver aggression. Aggressive and non-aggressive drivers were not distinguished by their coping style indicating that driving usually involves stress and that stress is a common factor that exists for all drivers [17,20]. As already reported in the literature, clear stressor stimuli such as type and length of journey [34] or lack of control in many driving situations [13] is a common feature of most commuting experiences. It is safe to say that as soon as the level of stress is elevated to a certain point, drivers are prone to act aggressively, regardless of cause or individual style of coping with stress.

Researchers attempting to identify the circumstances under which drivers choose to use violence against other drivers in order to solve problems on the road may want to consider the stress variable as a probable main or contributing cause. Our claim here is that drivers experiencing elevated levels of stress tended to blame other drivers and one way of dealing with the stress was to behave aggressively, if not violently, towards them. In the study, although drivers entering the parking lot were all exposed to the same conditions, aggressive tendencies were reported mainly among those who perceived stress.

Those drivers who score high on the problem-oriented coping style tend to solve problems through instrumental aggression, which is not meant to harm people and can even be considered as a "healthy" way of coping with stress while driving. This assumption is supported by the regression analysis which showed that the coping with stress variable had less effect on aggressive behavior.

Table 6. Means (SD's) for aggressive behavior comparisons by driving style (Aggressive, Dislike of Driving)

	Aggressive behavior					
	Yes		No			
Measures	*M*	*SD*	*M*	*SD*	F(1,224)	eta²
Aggressive style	2.18	.68	1.74	.49	9.15**	.12
Dislike of driving style	2.34	.44	2.53	.43	2.97	--

Note. Yes = was aggressive; No = wasn't aggressive
    *n = 68; ** p < .01*

Therefore, the problem-oriented coping style served as a sort of moderating variable between perceived stress while driving and aggression. Moreover, the negative correlation between the task-oriented coping style and perceived stress appears to indicate that drivers with this kind of coping style are not inclined or tempted to react violently, but rather choose behavior that mitigates their feeling of stress.

The assumptions underlying the examination of driver style and its relationship to coping with stress and expressions of aggression while driving were partially upheld. The question is whether there is a link between the driving styles categorized as "aggressive driving" and "dislike of driving" and styles of coping [1] and aggressive response. In correlation analyses, a connection was found between aggressive driving style and perceived stress. The higher the drivers scored on the aggressive driving style measure, the greater the feeling of stress. In our observations, we noted that the more aggressive drivers were indeed those with an aggressive driving style score. These findings are also compatible with another finding, namely, drivers who reacted aggressively, as compared to the non-aggressive ones, reported experiencing higher perceived levels of stress. It should be noted that in spite of the obvious connection between aggressive driving style and high levels of stress, resulting in aggressive driving, there are no field or empirical studies that have dealt with these associations. In parallel, we found that those drivers who are averse to driving cope with stress emotionally. This finding is a replication of previous reports where drivers with high levels of driving aversion preferred emotional reaction to stress rather than behavioral reactions. These drivers reported feeling worried about driving and handling the traffic but coped with the stress of driving by using emotional coping strategies, such as self-blame or self-criticism [20]. Because they are inclined to blame themselves, it would seem they prefer an internalized cognitive-emotional reaction and reject an overt negative behavior that may not be considered as effective.

4.2 Theoretical Contribution

In addition to using the cognitive model of coping with stress [1] to explain the influence of stress on drivers' reaction, this study has provided a specific, theoretical contribution in defining aggressive behavior while driving. The research literature lacks a clear definition of road anger or aggressive driving and it is difficult to distinguish between various aggressive expressions while driving. Since a consistent and comprehensive definition of aggressive driving is missing [35], lack of order and an inability to test hypotheses characterize the field.

By dividing aggression into two types or categories, it is possible to portray drivers using measures of stress and coping styles. The first type includes aggressive behavior that acts as a practical and deliberate solution to a problem on the road, whether by avoiding the situation or by hurting others. The second type includes hostile behaviors for the purpose of getting rid of anger or fury which are not connected to the problem. A partial answer to the query whether road rage is a useful [36] or redundant [35] phrase was provided here. It would appear that hostile behaviors described in the present study include some of the actions that typify "road rage." Such hostile behavior is purposely meant to hurt other drivers and is different qualitatively from instrumental behaviors.

We think that this study makes an important contribution in clarifying both the process and outcome of the driving experience. By providing definitions and appropriate categorizations, it is now possible to begin "talking the same language." It is worthwhile exploring other avenues doing research in the future on drivers' tendencies to behave aggressively and to recognize them as such. In spite of the connection between the drivers' evaluation and the aggression they express, it is still not clear whether the drivers' tendency towards aggressive driving influences the choice they make to express aggression (instrumental or hostile) while driving. If it does, how is it expressed (the level of aggression, frequency, etc)?

4.3 Some Applications

The above findings may also have some important implications for road safety and prevention of road accidents, particularly concerning aggressive behaviors as providing a possible underlying basis for explaining why certain drivers tend to be involved in traffic violations or road accidents. In another vein, results here can be applied in the compilation of training programs on road safety focusing on the human factor and the psychology of driving rather than on the traditional areas of training and prevention of road accidents: teaching road skills; regulations, infrastructures etc. It is not sufficient to focus on legislation or obeying the laws. The findings presented here may indicate a pressing need to focus on psychological aspects of the driving experience and ways for channeling the perceived stress into less negative consequences. Ineffective, hostile solutions can be compared to more effective instrumental ones with the goal of modifying behaviors that can lead to road accidents.

4.4 Limitations and Future Research

In spite of the study outcomes, generalizing the results to other populations is limited for a number of reasons. The drivers were observed as they entered the parking lot. This is a situation which doesn't necessarily represent drivers' behavior while driving or in other situations. This situation limited the possible range of aggressive behaviors. For example, observations taken during the day did not enable observations such as "light flashing"

or "high beaming". It is not surprising that certain behaviors such as overtaking were not feasible and were not observed. In addition, every "participant" in the study was only observed once (as he/she drove into the parking lot). Inferences here are limited because one observation may not be representative of his/her driving behavior.

An improvement of the methodology in the future could be to measure the exact waiting time of each driver at the entrance to the parking lot, in order to be sure that all the participants felt the same amount of frustration and stress. In other words, we suggest measuring the waiting time of each driver from the time he/she reaches the parking lot to the time he/she goes past the entrance. This measure could be used to assess the level of stress caused by the circumstances and it would be able to differentiate the drivers' behaviors more successfully. Presumably the last driver in line would be more frustrated than the driver at the head of the line because the latter would have to wait less time.

In addition, because it is known that aggressive driving is influenced by stressful situations, and by various situational factors which increase stress levels, such factors might increase or lessen stress while driving, and this should continue to be examined. One possibility would be not to settle for a general measure of stress but rather to carry out a number of measures of the stress variable, and to differentiate between stress factors related to the driver's personality and situational factors. It is reasonable to assume that a driver who lives far away from the university, and has to travel, will be under more stress than someone who doesn't have to travel far.

A comment about the observational technique is in order. Even though one person carried out the observations, and thus observer reliability/consistency was relatively high, it is possible that the person who observed the lot did not notice various behaviors inside or outside the cars, such as "hand gestures", or "swearing." Therefore, exact observation techniques should be used, such as taking a picture of the drivers or having a number of people observing the lot.

In conclusion, though we succeeded in showing that the coping with stress model examined in the study is an effective tool for better understanding driving and coping styles, it is not clear to what degree the chosen situation was a source of stress for the study participants, and whether their feelings of stress were caused by other factors not related to the observed situation. Other personal, as well as situational, variables need to be considered in the future so as to provide a more realistic picture of the process leading to aggressive behavior.

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Scientific
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Intervention with Muslim Filipino Families: The Implications of Spirituality for Psychology

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ABSTRACT

Political repercussions following destructive events of September 11, 2001 *have the potential to dampen enthusiasm for the incorporation of spirituality by psychologists who see Muslim Filipino families. Among various Muslim Filipino populations, spirituality is fundamental. Psychologists who are conscientious would be remiss to exclude such a critical aspect of life when it is essential. The implications of spirituality for psychology intervention with Muslim Filipino families include the need to acknowledge and, when appropriate, apply values, belief systems, and other culture specific criteria. To do otherwise will bias intervention with Muslim Filipino families, rendering psychology less potent in its ability to accommodate such families.*

Keywords: *Islam, Spirituality, Filipinos, Muslims*

1. Introduction

Following the interest generated by September 11, 2001, also known as 9/11, it has become apparent that spirituality is critical to intervention with Muslim Filipino families [1]. Documentation and anecdotal accounts of Muslim Filipino spirituality offer considerable evidence to substantiate that claim. Following terrorist destruction in New York City and Washington D.C., political pundits of every type have found solace in renewed appreciation for patriotism and calls to military action. Amid such fervor, psychology intervention will require a more comprehensive approach to Muslim Filipino families. Such an approach is compulsory if psychology is to remain viable and loyal to its code of ethics [2]. Furthermore, despite the events in New York and Washington, including commercial aircraft being used as missiles to assault non-military targets, psychology is not unaffected. In the aftermath of these violent events is a concern for psychologists' ability to conduct ethical and effective intervention with an increasing Muslim Filipino population. Failure on the part of psychologists will also exacerbate political repercussions and reflect negatively on the profession.

Political repercussions resulting from the events of 9/11 can potentially dampen enthusiasm for the incorporation of spirituality into psychology. Such dampening effects will disserve intervention with Muslim Filipino families who may find themselves subjected to the aus-

pices of Christian and/or non-Muslim service providers. Without exception, the incorporation of spirituality is a necessity of intervention for well-meaning psychologists who may lack either the knowledge or motivation to apply it [3]. Thus, within society—despite rhetoric to the contrary—spirituality for Muslim Filipino families is a prerequisite to therapeutic services. Although professional literature acknowledges spirituality among the list of resources, amidst the prioritization of more traditional social issues it has been all but trivialized [4]. A greater focus on the significance of spirituality would enable psychologists to intervene on behalf of Muslim Filipino families efficiently and without incident. Instead, psychology has relied too heavily upon non-spiritual techniques or polite circumvention in reference to terrorism. As a result, rather than asking how they might incorporate spirituality with Muslim Filipino families, psychologists pose nebulous questions such as: "What are the deficits of Muslim Filipino families?" or "In what ways can Muslim Filipino families adjust to the Christian traditions as the Filipino cultural ideal?"

Conscientious psychologists would be remiss to exclude a critical aspect of life from intervention when it is essential. Spirituality may enhance the therapeutic potential of family values, family belief systems, and family traditions that are otherwise inaccessible by non-sectarian, non-spiritual methods. Furthermore, spirituality for Muslim Filipino families may contain coping mechanisms

that enable them to confront and overcome the many challenges of daily life. In an effort to educate and contribute to the effectiveness of psychology with Muslim Filipino families, this paper has three objectives: 1) to provide a beginning introduction to history of the Muslim Filipino population; 2) to provide a brief definitive account of spirituality; and 3) to detail the implications of spirituality for intervention with Muslim Filipino families.

2. History of the Muslim Filipino Population

Muslim Filipinos represent approximately 5% of the Philippine population [5]. As such they are the most significant minority in the nation. Racially they are of predominantly Asian descent and cannot be differentiated from the mainstream population aside from their religious traditions. In the 1970s aftermath of political turmoil the Muslim Filipino population known as Moro increasingly identified with the Muslim communities around the world including Malaysia, Indonesia, Libya, and the various Middle Eastern countries. Tensions between Muslim Filipinos and the Christian mainstream have been tenacious based upon economic neglect and societal prejudice against them.

Muslim Filipinos for the most part reside in the southern and western area of the Philippines consisting of Mindanao, Palawan, and the Sulu Archipelago. Within these Muslim Filipino communities exists ten subgroups which are distinguishable by language. Three such groups comprise the majority of Moros. They include the Maguindanaos who reside in North Cotabato, Sultan Kudarat, and Maguindanao provinces. The Maranaos are of the two Lanao provinces while the Tausugs are for the most part from Jolo Island. Lesser numbers are the Samals and Bajaus who reside on the Sulu Archipelago; the Yakans of Zamboanga del Sur Province; the Ilanons and Sangirs of Southern Mindanao Region; the Melabugnans of southern Palawan; and the Jama Mapuns of the smaller Cagayan Islands.

Historically unlike Muslims in other areas Muslim Filipinos have been less allied with one another preferring instead to emphasize their separate identities which has facilitated years of subgroup conflict. Not only do Muslim Filipinos differ by language etc. but additionally by political structures and Islamic traditions. The Tausugs for example were the first Muslim Filipinos who have criticized the Yakan and Bajau peoples for not being true Muslims. Such criticisms were eventually subjugated by a shared historical experience relative to culture, social traditions, and legal practices.

The ultimate authority figure in the Muslim Filipino community is the sultan. The sultan by tradition is considered both a secular and a religious figure whose power was validated by the Koran. Perhaps more important to daily operation of the community was the datu. Their power was measured not by their material wealth but by the size of their religious community. Tasks associated with their authority included the provision of assistance during emergencies and resolving disputes. Thus, by tradition the datu was critical to the overall functioning of the Moro community. The power of the datu might account for numerous wives and the ability to enslave others defeated in war or for debts owed. What's more if insulted a datu might demand the death of a perpetrator or the life of another as compensation for the death of one of his followers.

By the 1980s the datu remained the source of power in the Muslim Filipino community. On occasion they continue to administer the sharia known as the sacred Islamic law. While the expansion of their followers by raiding other villages is no longer possible they accomplished the same feat economically by providing assistance, employment, and protection needed by less able neighbors. Similarly in order for government programs to function properly required datu support in Muslim communities. While the datu today is unlikely to have more than one wife he is still permitted to do so if warranted by wealth. Thus the Muslim Filipino community remains hierarchical and dedicated to family particularly in rural areas.

Policies adopted post 1946 when the Philippines became independent of the U.S. are not irrelevant to tensions among Filipino subgroups. The Philippines remains a Christian nation. Under U.S. management, there existed the Bureau for Non-Christian Tribes which was abolished. The Bureau for Non-Christian Tribes dealt with minorities and promoted movement of Filipinos from heavily populated areas such as Central Luzon to relocate to the more "open" areas of Mindanao. Subsequently hundreds of thousands of Ilongos, Ilocanos, and Tagalogs began relocating to North Cotabato and South Cotabato and Lanao del Norte and Lanao del Sur provinces by the 1950s. Their relocation created resentments on the part of Moro people who were Muslims. Much of the tensions were verbalized as land disputes but not irrelevant to Christian versus Islam. To restore order Philippine army troops were sent into the area. The troops were for the most part Christians which Muslim Filipinos felt that they were unfairly at their mercy. Martial law was declared in 1972 at which time Muslim Mindano was in chaos.

Eventually the Philippine government recognized a need for structure to manage Muslim existence within a predominantly Christian country. It created the Commission for National Integration in 1957. It was later substituted by the Office of Muslim Affairs and Cultural Communities. The optimistic sought a country made up of Christians and Muslims who would be totally assimilated into the dominant Filipino culture. Their only differences would be religious preference and the refusal of Muslims to consume pork. This proposal was not acceptable to Muslims or Christians despite that the gov-

ernment was willing to make concessions for religious customs. For example Muslims were exempted from Christian Philippine laws which denied polygamy. All attempts seemed destined to fail. In 1990 the government cooperated in the Autonomous Region in Muslim Mindanao. This allowed Muslims in the area to assume control over specific areas of government absent national security and foreign affairs.

By the 1990s there were social dynamics which impacted the ability of Muslim leaders to oppose assimilation. Economic factors contributed to increased migration of residents from the region which introduced new roles and educational opportunities for women. These resulting interactions between Christians and Muslims led to more opportunities for assimilation and eventually intermarriage [5]. Despite the fact, Muslim Filipinos remain distinct by religious and cultural traditions which will require any psychologist be knowledgeable of their spirituality subsequent to intervention.

3. Spirituality

Among the various Muslim Filipino populations, spirituality is fundamental. Any attempts on the part of psychologists to define the concept of "spirituality" will be fraught with formidable challenges. However, an appropriate genesis is contained in the root words for "spirit." In Latin the term, *spiritus* conveys breath, courage, vigor, or life. According to Philip Sheldrake [6], spiritus was an effort to translate a Greek noun *pneuma* into English and which appeared in the Pauline letters of the Holy Bible. Similar to its Hebrew counterpart, *ruach*, pneuma means "wind," "breath," "life," and "spirit" [7,8]. The fact that "spirit" is so intimately associated with life is reflected in a definition of the Tenth Edition of Webster's Collegiate Dictionary [9]: "an animating or vital principle held to give life to physical organisms" (p. 1134). While the term "spirit" implies physical vitality in "breath," it is in fact essential to much more than respiration. According to Rudolph Otto [10], "spirit" also pertains to "the holy." In such a context, "spirituality" refers to the human search for purpose and meaning in life. Much to the dismay of some, the aforementioned concept of "spirituality" does not necessarily pertain to the existence of a Supreme Being or a higher source of power.

Numerous scholars have attempted to define spirituality in an effort to simplify its myriad complexity of meanings. Among those are Joseph M. Cervantes and Oscar Ramirez [11], who suggests that spirituality includes the pursuit of universal accord and completeness. Paul Tillich [12] maintains that spirituality pertains to humanity's utmost concerns relative to the meaning-giving aspect of culture. Father Leo Booth [13], in a more tangible explanation, refers to spirituality as an "inner attitude that emphasizes energy, creative choice, and a powerful force for living" [13]. Similarly, Elkins, Hed-

strom, Hughes, Leaf, and Saunders [14] suggest that spirituality included an admiration for the holiness of life and a harmonious regard for the material, an attitude of altruism toward one's fellow man, hope for a better world, and the acknowledgement that life has a tragic dimension. Furthermore, according to Chandler, Holden, and Kolander [15], spirituality includes "any experience of transcendence of one's former frame of reference that results in greater knowledge and love." Subsequently, Hinterkopf [16] refers to spirituality as something felt in one's body. Such a feeling then precipitates comprehension of new meanings in life which enhances growth. Finally, Holifield [17] contends that spirituality is "less a method than an attitude, a posture of one's very being that allows seeing not different things but everything differently" [17]. However spirituality is defined, intervention with Muslim Filipino families necessitates that psychologists be informed of the implications for intervention.

4. Implications of Spirituality for Intervention

The implications of spirituality for psychology intervention include the need for practitioners to acknowledge and, when appropriate, to apply values, belief systems, and other culturally specific criteria. This will provide the psychologist with alternatives to bring about desired changes or coping-mechanisms. It is not compulsory that psychologists endorse client belief systems or other aspects of spirituality, but they should acknowledge such systems as critical to the client's frame of reference.

Especially among Muslim Filipino families where Islam is the spiritual tradition, reverence for the patriarch, as well as concern for the family's status, provides a strong sense of solidarity and loyalty [18]. Hence, psychologists must know that individual family members are not free to live independently, but are required to consider family in each of their life decisions as prescribed by the Koran. The Koran, being the direct instruction from God, means that family members are expected to fulfill rules of behavior, family roles such as husband, wife, child, and so forth without the opportunity for personal input or preference. An individual's ability to adhere to spiritual directives reflects not so much upon him or her personally but upon the family and its kinship network. In the Islamic patriarchal tradition, males are more valued than females, which may cause conflict in Christian Filipino settings. However, unless influenced by such traditional Filipino norms, anxiety levels from this secondary status may not increase for women of Muslim Filipino families.

The importance of spirituality among Muslim Filipino families is evident in the extreme reluctance of individuals to yield to conversion [18]. Twentieth-century Christian missionaries are well aware of this reluctance. The number of Muslim Filipino believers who have converted from Islam to Christianity is very small. For the individ-

ual Muslim Filipino, family is not irrelevant to that small number, as the family role in the existence of the community is crucial. Accordingly, Muslim Filipino families who migrate to the U.S. or elsewhere often send for their "old country" relatives. Once abroad, there are few who do not have blood ties. Those who do are obvious by their difficulty in finding jobs or otherwise sustaining themselves. Frustrated, such Filipinos, without family, frequently return to the Philippines where normal family ties are a way of life. This significance of family is evident by the fact that whole Muslim Filipino communities may contain a small number of patrilineages [18]. Consequently, there is considerable overlap between family and spirituality within the Muslim Filipino community. However, while family is an important social structure, spirituality as it pertains to Islam, guides life and the family belief system. Psychologists who do not acknowledge this will be at a severe disadvantage in their attempts to intervene on behalf of Muslim Filipino clientele. Those who understand this structure will consider the values extended from spirituality when working with Muslim Filipino families. Values that are recognized by the Koran include: Hospitality and generosity in giving and spending; Respect for elders and parents; Wealth and male children; Subordination of women to men; Modesty; Intensive religiosity; Equality of all human beings; and Health and strength [18].

Psychologists who serve Muslim Filipino families should cultivate working relationships with Islamic clergy which is as critical as understanding spirituality. These relationships will prove useful in the clarification of Muslim Filipino norms, the facilitation of referrals, and the effective application of intervention strategies. Such relationships are mutually beneficial to the extent that both community and psychologists are enabled by the information that is exchanged. While some Muslim Filipino families may prefer assistance from Islamic personnel, others may be uncomfortable or self-conscious about expressing family concerns to Islamic members of a tight-knit community. Under such circumstances, the availability of psychologists might prove invaluable. What is more, the availability of psychologists will be particularly helpful if in fact the spiritual system (Islam) is the focus of the client's dysfunction. The professional psychologist will allow the client to explore spiritual alternatives within the context of a spiritually neutral clinical environment.

5. Conclusions

From the perspective of the psychologist, there are several reasons why they might consider the incorporation of spirituality with Muslim Filipino families. First, the effects of spirituality are well known and are likely to enable intervention with such families [19]. Secondly, the term "spirituality," for psychologists, conjures up images

of legal conflicts with the potential to charge emotions; when associated with stereotypes the term encourages knee-jerk condemnation of an entire religious group, their social structure, lifestyle, and other aspects of their being [20]. The outcome may impair the ability of such groups to sustain them in the human social environment unless more rational factions prevail. Thirdly, spirituality must be viewed separate and apart from the legal process. To do otherwise will bias intervention with Muslim Filipino families, thus rendering psychology less potent in its ability to accommodate said families.

Beyond legal conflicts, the most efficient means of enabling intervention with Muslim Filipino families is for psychologists to become more educated about Islam as pertains to Muslim Filipino spirituality. Education pertaining to spirituality and Islam together will enable intervention [21]. Psychologists who are so enabled will be in a better position to learn and assist Muslim Filipino families in sustaining themselves. Furthermore, psychologists who help reinforce respect for Muslim Filipino populations build the self-esteem of younger family members, which will assist the group's ability to survive as a whole. Equally important is the impact, on Filipino society at-large, of being informed of spirituality. One approach to being informed is to create tolerant environments by the building of bridges to Muslim Filipino communities, bridges beyond what is professionally necessary. The focus should be on cultural traditions, rather than on terrorist acts associated with any one of its member(s). Community action groups and youth projects, which familiarize the otherwise unfamiliar, have the potential to validate psychology as a helpful profession among Muslim Filipino families who might not otherwise seek intervention services [22].

Due to the potential for harm and legal repercussions brought by spirituality, it is critical that psychologists exercise caution when incorporating spirituality into their work. From a traditional Christian Filipino perspective, some aspects of Islam and other manifestations of spirituality might appear abnormal and indeed dysfunctional. For example, among certain Christian sects is the phenomenon of "speaking in tongues," where church-goers slip into a trance-like state and begin to verbalize in an unfamiliar language [23]. In the not too distant past, such persons may have been diagnosed as psychotic and received prescriptions for psychotropic medication. In fact, among these Christian sects, speaking in tongues is not regarded as psychotic or abnormal. Indeed, it is perceived by them as a gift from God. Thus, for legal as well as practice reasons, psychologists must resist the inclination to label spiritual phenomena simply because it is unfamiliar and/or not Christian in origin. Furthermore, psychologists who serve Muslim Filipino families must also be cognizant of their own belief systems and what that conveys to the client [23]. The psychologist's position on

spirituality is not irrelevant to setting the tone of the practice environment [23]. From those who endorse spirituality to those who reject it, there will be an impact in a myriad of ways.

Lastly, the ability of Christian Filipino psychologists to accurately perceive, conceptualize, and interact with Muslim Filipino families is a necessity in a rapidly changing and complex world. In order to enhance harmony and reduce the threats of terrorism, psychologists and other concerned citizens must acknowledge that all groups have assets, capacities, and strengths that should be reinforced despite the heinous acts committed by a relative few [24]. Since many of these assets such as cultural technologies are derived from cultural legacies, psychologists must increase their knowledge base considerably. Otherwise, their lack of education could contribute to the extinction of an irreplaceable Filipino component of mankind, which might prove antidotal to violence and terrorism worldwide. Furthermore, at a time of increased contacts between the world's various populations, psychologists are confronted by issues and perspectives that did not require intellectual consideration in the past [25]. They are thus challenged to develop creative strategies less confined to bias. Additionally, journal editors, book publishers and other affiliates of the "fact" manufacture industry must be actively receptive to the consideration of alternative views. That consideration must remain consistent and viable without interruption from unpredictable events to sustain the integrity and prestige of the psychology profession.

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Scientific
Research

The Impact of Emotional Intelligence on Nursing: An Overview

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ABSTRACT

In this paper we focus on the role that Emotional Intelligence has on nursing. We pay attention to both students and professionals and the role emotional intelligence has on emotional self-concept and burnout. Our studies with nursing students yield positive relations between the Clarity and Emotional Repair components of Perceived Emotional Intelligence and all scales of the self-concept scale. On the other hand, nursing professionals that have clear feelings about their emotions and situations that occur, and are capable of dealing with those emotions, have lower levels of stress in their work. Also, those nurses who show a high ability to curtail their negative emotional states and prolong positive emotional states show higher levels of overall health than those individuals who have trouble regulating their emotions. Our results imply that the emotional and cognitive dimensions have to be taken into account in future training programs for nursing professionals and students

Keywords: *Emotional Intelligence, Emotional Self-Concept, Burnout, Occupational stressors, Health, Nursing*

1. Introduction

The role of emotions in the formation of nursing professionals has been scarcely studied. However, our results show that emotions play an important role in a profession that requires not only technical expertise but also psychologically oriented care, knowledge about the self and emotions in nursing would be crucial to further development and growth of the profession. Thus, in this paper we focus both on students that are preparing themselves to be future nursing professionals and nursing professionals that face everyday a stressful context where they work.

2. Nursing Students and the Role of Emotional Intelligence in the Formation of Future Professionals

Self-concept is closely associated with the acceptance of one-self, and that its welfare or its opposite constitutes two poles in which the self is always present. For a profession that requires not only technical expertise but also psychologically oriented care, knowledge about the self in nursing would be crucial to further development and growth of the profession [1].

Mayer and Salovey propose the Emotional Intelligence (EI) concept [2]. This is a scientific approach that has

received a great deal of empirical support and has a very well grounded theoretical basis [3]. Emotional intelligence includes a set of skills related to the emotional processing of information. Specifically, emotional intelligence is defined as the ability to perceive, glean information from, and manage one's own and others' emotions [2,4]. Emotional intelligence comprises four dimensions: 1) Emotional awareness to perceive emotions adequately, implies the perception of one's own and other's emotions along with the ability to express and correctly assess our feelings and needs; 2) Ability of emotions to facilitate thinking, that is, emotions allow us to address the important information, facilitating accurate partnerships with other sensations, decision-making as well as the change of perspective; 3) Ability to understand emotions and their meaning: refers to the ability to analyze the different emotions, to understand the relationships between them and the different situations that stem from, in addition to the understanding of complex emotions and emotional transition from one state to another; 4) Regulation of emotions to promote emotional intellectual growth: is the dexterity to regulate the emotions of one-self and other's in the right way (neither minimizing nor extending), also refers to the skills to be open to positive emotional states and negative emotional states, and they are the only way to understand and im-

prove thinking.

These four skills are linked, so that an appropriate emotional regulation needs an adequate emotional comprehension and an adequate emotional comprehension requires an appropriate emotional perception. But the opposite is not always true. There are subjects with high capacity of emotional awareness but lack of emotional understanding and emotional regulation.

Why could emotional intelligence be an important factor in nursing? Studies have shown that an emotional intelligent nurse is an individual who can work in harmony with his/her thoughts and feelings [5]. The importance of the development of empathy (as an aspect of emotional competence) appears as a central factor in many nursing theories [6,7]. Some studies have shown that emotional intelligence allows nurses to develop therapeutically relationships to meet patients and their families and to better manage stress [8,9]. Also, studies using TMMS have contributed to evidence of the relationship between its components (Attention, Clarity and Repair) in several areas of research in the field of nursing. Clarity and Emotional Repair have been shown as protectors against stress, burnout and of improved job satisfaction and health among nurses [10-12]. Furthermore, Emotional repair has been shown as an emotional predictor of social support and mental health in nursing students [13], and nurses with high clarity and emotional repair show less anxiety when faced with death [14].

Studies that have related self-concept and/or self-esteem with emotional intelligence, using TMMS among university students, have found that PEI was associated with actual higher levels of happiness, higher levels of previous happiness, higher levels of positive affect, higher scores in life satisfaction and high self-esteem [15]. Likewise, individuals who show high levels of Clarity and Emotional regulation show high levels of self-esteem, an important index of mental health [16]. A study carried out by Fernández-Berrocal, Alcaide, Extremera & Pizarro [17] among secondary-school students found that emotional regulation was positively related to emotional self-esteem and negatively related to anxiety and depression.

The self is a body of knowledge that people have about their own characteristics. The sense of continuity and location of oneself seem to be universal in all cultures [18]. The self has been described as an attitude that the subject has about him/herself; this implies that we have to take into account other elements that allow us to understand terms associated with the self. The attitude tends to be composed of three components: cognitive, emotional and behavioural. The cognitive component refers to the mental representation of the object; the cognitive component therefore would be the self. The affective or evaluative component relates to the emotional response associated with the cognitive component, and therefore would be self-esteem (the overall assessment that a per-

son makes about him/herself). The behavioural component or intention to act has to do with what we think and feel we would like to do with the object; in this case we refer to self-behaviour.

From a psychosocial approach of nursing and mental health, self-concept, self-esteem and personal identity are essential elements of self-knowledge, a basic requirement in any profession that is relationally based and that also emphasizes the importance of self-care as a requirement for care [19]. Those nurses with a healthy self-concept influence patient care in a positive direction, and those nurses with a poor self-concept affect patient care negatively [20]. Several studies carried out in the field of nursing have suggested that the self has a critical impact on other important variables such as job satisfaction, stress, burnout and attribution [21-23].

Furthermore, Arthur and Randle's [24] study, which analyzes studies on the self from 1992 to 2006, found that the self-concept of nursing students was influenced by the way in which they were handled by professional nurses in various clinical areas. This hierarchy of having power over someone or something became an integral part of their self. Quantitative data found by Roid and Fitts [25] using the Tennessee Scale of Self-concept corroborate qualitative findings showing a deterioration in self-nursing students.

Other studies have related nursing students' self-concept behaviour to tobacco consumption and messages about the consumption of tobacco, showing that individuals with high self-concept who smoke tend to respond in a defensive way to anti-tobacco messages [26]. Moreover, Horneffer [27] found that the dimensions of self-concept correlated with health behaviours and responses to promote health information.

From these results it may be deduced that the ability to manage one's own emotions and recognize other people's is especially useful in the practice of nursing. Therefore, our studies show that clarity and emotional repair are positively related to self-concept, although attention to emotions is negatively related to self-concept. That is, our results indicate that the management of one's own emotions, as well as the ability to regulate the emotional state, appear to be essential features in the formation of self-image and are important for these future health professionals. Both dimensions are closely related. Also, we compared the results with regard to the PEI construct and the development of self-concept (high vs. low), and observed that there are differences between various dimensions. Specifically, the "high self-concept" group, that is, people who have a higher degree of knowledge about themselves, about their own capabilities, opportunities, resources and limitations are those who have a greater ability to regulate their own emotions and those of others. So, they may also show a greater degree of empathy with others, and this characteristic must be a priority in the

field of nursing. Moreover, our results show that the group labelled as "low self-concept" are those who give a greater emphasis to internal and emotional states, which may sometimes be a disadvantage for effective development of nursing work. In sum, it would be advisable to include specific components of Emotional Intelligence in the training curriculum of these future professional nurses, in order to train in the near future competent professionals in the use and management of emotional states [28].

Increasingly, our students of nursing and physiotherapy reach higher education with a serious deficiency in the skills required during the academic year, the uptake and implementation of clinical practice, and their incorporation into the world of work. Moreover, the adaptation of degree programs to make them suitable for the framework of the European Higher Education Area means rethinking these degrees from a dual perspective. On the one hand, the EHEA will soon require our students to develop a set of core competencies in order to be competitive in the labor market. In addition, teachers are inevitably required to adapt their programs and contents to the introduction of these skills both in the curriculum of the students and in the proposal and performance of training programs that promote the development of such skills. In some universities, as for example the University of Málaga (Spain), students are trained in competencies such as Emotional Intelligence. Previous studies have performed training programs of social skills with nursing students [29], but there are no studies about training other competencies with these students. Thus, it is essential to create materials totally adapted to the needs of these students, especially in their clinical training. Our research team is deeply involved in creating these materials dealing with the skills of emotional intelligence in order to enhance attention to emotions, clarity and emotional repair, to promote social and emotional support of male and female future nurses, and to provide training in communication with non-experts in the field and interpersonal skills in general.

3. Nursing Professionals and the Impact of Emotional Intelligence on Burnout

Research into stress at work has found that individuals who have direct contact with patients, clients, users or students, develop over a longer or shorter period of time the so-called *Burnout Syndrome*. This syndrome refers to the fact that a professional may be overwhelmed by the situation they are suffering (in family, social or working context) and that their capacity for adaptation has been exceeded.

The concept of Burnout was firstly mentioned by Herbert Freudenberger [30] to describe the physical and mental state that he observed among young volunteers working in a detox clinic. A year later many of them felt exhausted, were easily irritated, had developed a cynical attitude towards their patients and tended to avoid them. Afterwards, Maslach used the term in psychological science in 1977 at a convention of the APA [31]. Since then the term has been used to describe the burnout experienced by workers in human services (education, health, and public administration). At the present time it is possibly one of the most used concepts in hospitals, schools and businesses.

Maslach and Jackson conceptualize burnout as a tridimensional syndrome that is developed in professionals whose work targets are people [32]. They add three characteristic dimensions: 1) Emotional Exhaustion; 2) Depersonalization and 3) Personal Accomplishment. *Emotional Exhaustion* (EE) is characterized by the progressive tiredness, fatigue or loss of energy that may be evident in physical, mental or combined aspects. It implies an exhaustion of energy, the experience of being emotionally exhausted due to daily and continued contact with individuals whose work deal with (patients, students). *Depersonalization* refers to the development of feelings, attitudes, and negative responses (both distant and cold) to other people, especially to the beneficiaries of their work. This depersonalization is followed by an increase in irritability and a decline in motivation. Workers view the patients in a dehumanized way, due to affective hardening, blaming them for their problems (e.g. the patient deserves the illness, the student the failure, the prisoner his conviction…). *Lack of Personal Accomplishment* (PA) is manifested by negative answers to him/her-self and to work. There is a tendency for professionals to be negatively assessed and this negativity affects especially their performance at work and the relationship with the people they serve.

While the burnout syndrome arises as a response to chronic stress at work, it is noteworthy that it is a result of an ongoing process in which coping strategies, often used by the subject, fail. Coping strategies serve as mediating variables between the perceived stress and its consequences, and when they fail, the problem continues. This syndrome can have very negative results for both the individual who suffers it and for the organization in which they perform a professional role. For the individual it may affect their physical and/or mental health, resulting in psychosomatic disorders (e.g., cardio disorders, headaches, gastritis, ulcers, insomnia, dizziness or even states of anxiety, depression, and alcoholism). However, although all these stressors are general for all nurses, some people are affected more than others, showing major consequences of this stress. An individual skill that would help to better understand why certain subjects are more susceptible to the negative consequences of stress than others is Emotional Intelligence.

Work-related stress leads to a situation of dissatisfaction that could be one of the causes of demotivation experi-

enced by health professionals, especially nurses. Nursing is, by nature, a profession subject to high degrees of stress, partly due to the specific nature of tasks and those under their care. If we add the lack of autonomy of these professionals in their work, the lack of clarity of some tasks, the high pressure that they face and the lack of support from superiors, these professionals are a "perfect target" for the burnout syndrome in their work. Authors such as Cherniss or Stevens and O'Neil suggest that nursing professionals have no realistic expectations about the service they work for and the incongruity between their expectations and reality influences the stress they experience [33,34]. Also, Maslach and Jackson indicate that healthcare professionals are asked to engage intensively with people who usually are in a problematic situation in which they show feelings such as frustration, fear and despair. In these cases, the resulting tension can have an effect of emotional exhaustion and the emotional response is not itself a variable of burnout, but the definition of the phenomenon [32].

Several studies [35-37] found that nursing professionals are the group most prone to stress in their work, with the negative consequences that this entails for their health. Among the main causes of stress among nurses are contact with suffering and death, conflicts with peers, lack of preparedness to deal with the emotional needs of patients and their families, uncertainty about the effectiveness of treatment, tiredness and fatigue, fear of incurring negligence or inability, and night work.

In Florida, Stechmiller and Yarandi carried out research at nine hospitals on stress, job satisfaction and burnout among nurses in charge of more critical care [38]. They found that the responsibility of the profession, dealing with other people at work, problems of health, satisfaction with the amount of work, job security, psychological resistance and job satisfaction had a significant effect on emotional exhaustion, which is a component of burnout. The study by Parker and Kulik found that the levels of employment support and job stress were significant factors in predicting burnout [39]. The highest levels of exhaustion were in close relationship with a poor appraisal of the work done by the same person or the supervisor, with a greater number of working days lost due to sick leave and with a greater number of absences for mental health reasons. Along the same lines, the study by Collins examined the relationship between job stress, resistant personality and burnout in nurses at hospital [40]. The results they found were that to promote resistance through training programs for nurses could be useful in dealing with stress and could reduce the burnout that occurs in the environment of health services [41]. A study carried out by Avalos Gimenez and Molina using the Maslach Burnout Inventory found that between 27% and 39% of the nurses had scores indicative of burnout in one of the three subscales. Likewise, their results indi-

cated a greater deterioration among the nurses who worked in in-patient and general services, and lower in surgical nurses. The study by Albaladejo, Villanueva Ortega, Anastasio, Calle and Dominguez [42] with 622 nurses found that the majority of participants had symptoms of burnout, and that the most affected were young people with only a few years of service, working in emergency departments or in oncology. The study conducted by Augusto-Landa, López-Zafra, Berrios-Martos and Aguilar-Luzón [43] using *The Nursing Stress Scale* with a sample of nurses showed that the largest occupational stressors among nurses were workload, death and suffering, followed by insufficient training, uncertainty regarding treatment, problems with hierarchy and lack of support. Other incidents that in other professions can be more stressful but that in nursing were minor stressors, were problems between the nursing staff, the concern to move temporarily to other services owing to lack of staff and not knowing well how to operate and manage specialized machine.

The effects of stress in nursing practice lead to absenteeism [44], somatic diseases [45], coronary artery disease, and alcoholism [9]. With regard to the working timetable, it is important to note that the constant changes of time in this work have an influence on biological rhythms, disrupting the sleep-wake cycle and pace, and affecting the social relationships of the subject [46]. We also must take into account the importance of socio-demographic and labor variables. Some studies [47] have stressed the relationship between demographic variables and work with the appearance of responses to different stressors.

Among the demographic variables, some studies [48-50] found that single people or people without family responsibilities were more prone to the appearance of burnout syndrome than people who were married or in a stable relationship. In terms of labor variables, the assignment of unit or service, and the possibility of the worker to choose and to be comfortable in that unit have been considered one of the most important indicators of job satisfaction [51].

We now have a large body of research related to work environments that have analyzed the role of emotional intelligence related to welfare, health and stress management. Ciarrochi, Deane and Anderson found that emotional intelligence had a moderating role in the relationship stress-psychological health [52], such that subjects with high Emotional Intelligence are better predisposed to cope with environmental demands than subjects with a low score in this variable.

Emotions play a decisive role and the ability to reason about them, and to perceive and understand them may allow us to develop emotional regulation processes that would help to moderate the negative effects of stress and lead to better health [53]. Moreover, as the syndrome of
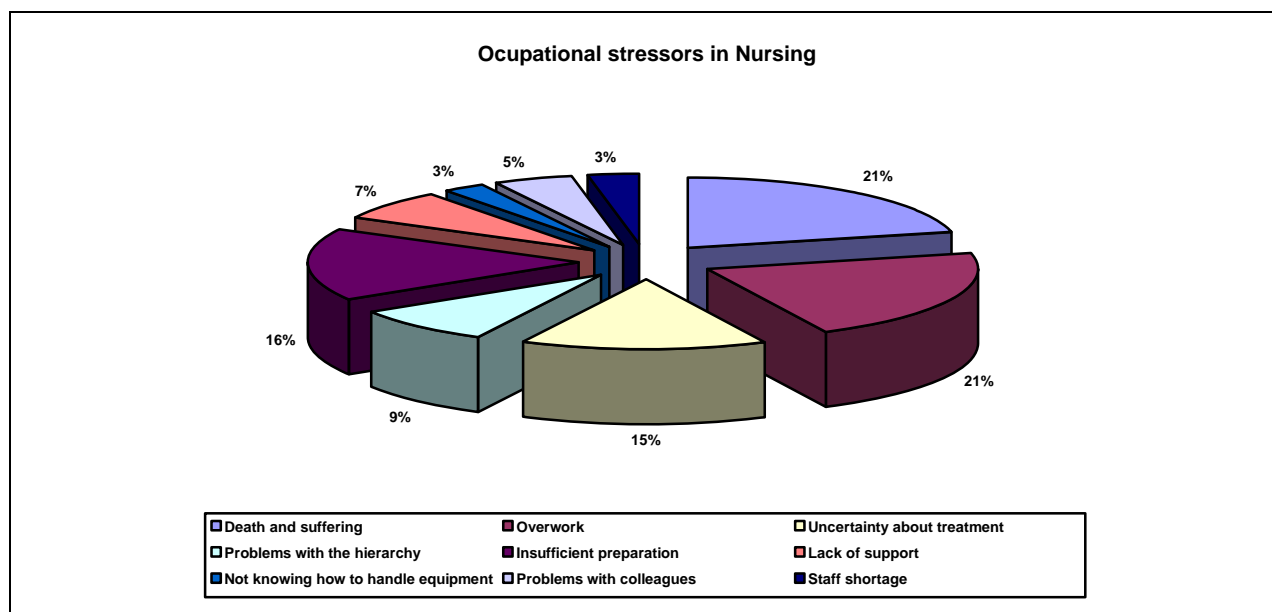
Source: Adapted from Augusto-Landa, López-Zafra, Berrios-Martos & Aguilar-Luzón (2008)

Figure 1. Percentage of occupational stressors in a nursing sample

burnout stems from social interaction between those who offer their services and those who receive them, the proper management of the emotions arising from such interactions is a key factor in explaining why some individuals are more resistant to appearance of the syndrome than others. This approach has led to the fact that, in the prevention and treatment of burnout, acquires special relevance the concept of emotional intelligence as predictor of quality that can predict success in setbacks that may arise in such professions. From this, we can deduce that a nurse is an emotionally intelligent person who can work in harmony with their thoughts and feelings [5]. The importance of the development of empathy (as an aspect of emotional competence) appears as a central factor in many nursing theories [6,7]. A recent study performed by Aguilar-Luzón and Augusto Landa investigated the relationship of the PEI and personality traits as predictors of empathy in nursing students, and found that emotional attention and repair were predictors of involvement empathy (one dimension of the IRI) [54]. Specifically, high scores in emotional repair predict the tendency of individuals to experience feelings of compassion and concern for others, that is, the meta-cognition of their emotions would act as a basis in the understanding of the emotions of others. Thus, it is possible for people with a good understanding of their emotions to extrapolate this ability to the interpersonal field. In this sense, people who give excessive attention to their emotions would perform the same process when it comes to addressing the feelings of others. This would explain the positive relationships between their own and others' emotional attention.

Other studies have shown that emotional intelligence allows nurses to develop therapeutic relationships to deal with patients and their families and to better manage stress [8,55]. The results of the studies presented lead us to believe that emotional intelligence is positively associated with health and negatively with stress. Thus, Limonero, Tomás-Sábato, Fernández-Castro and Gómez-Benito analyzed the relationship between the stress suffered by nursing professionals and the TMMS [56]. Their results showed that stress correlated negatively with Clarity and Emotional repair. That is, nursing professionals that are clear about the emotions they are feeling and the situations that provoke them, are able to regulate these emotions and have lower levels of stress in their work. Along the same lines, the study carried out by Augusto-Landa, Berrios-Martos, López-Zafra and Aguilar-Luzón analyzed the predictive ability of PEI and positive and negative affects to explain levels of burnout and mental health in nurses [10]. Thus, attention to emotions accounted for part of the variance of the components of burnout (emotional exhaustion and depersonalization), while low attention and high clarity and emotional regulation of emotions accounted for part of the variance of a component of the burnout called personal fulfillment. In fact, the subjects with low attention and high emotional clarity and emotional regulation reported greater personal fulfillment. With regard to mental health, the scales of positive and negative affect (Bradburn's scale of positive and negative affect) accounted for part of the variance in mental health. This can be explained by the positive association of positive affect with social contacts and extraversion, whereas negative affect is associated with interpersonal problems,

anxiety and neuroticism. Regarding the components of PEI, we found that an adequate attention to feelings, high clarity and emotional regulation are predictors of good mental health. A more thorough examination of the hierarchical regression analysis conducted on the criterion variable revealed that PEI influenced burnout in different ways. Firstly, a direct influence was found in the percentage of variance accounted for by each dimension (emotional exhaustion: 9%; depersonalization: 10% personal fulfillment: 41%), but there was also an indirect influence through the scale of affect, as the analysis showed that PEI factors influence the tendency to suppress negative affect and enhance positive affect, and in turn this trend accounts for part of the variance of the dimensions of burnout. We also note that the probability of burnout is lower in subjects who score high in emotional clarity or comprehension and emotional repair.

Along the same lines, but with nursing students, the study performed by Montes-Berges and Augusto-Landa analyzed the role of PEI in relation to social support, coping strategies and mental health [13]. The results showed that clarity and emotional regulation were outlined as predictors of social support of the subjects, and emotional regulation also appeared as the only predictor of mental health. These studies are consistent with the findings of Tsaousis and Nikolaou who found that high levels of emotional intelligence were good predictors of physical and psychological health [57].

Similarly, the study carried out by Augusto-Landa et al. analyzed the role that PEI has on occupational stress (measured by the Nursing Stress Scale) and health (measured by the SF-36 questionnaire) in nursing professionals [43]. Their results showed that those nursing professionals with high clarity and emotional regulation reported lower levels of stress, but those with high emotional attention reported higher levels of stress. Emotional regulation is shown as an important variable in the dimensions of health measures through the health questionnaire SF-36. Individuals with high emotional regulation showed better levels of health in its various dimensions than those subjects with low emotional regulation.

Similar results have been found in nursing students by Augusto-Landa and Montes-Berges [58], showing that emotional regulation appeared as the main predictor of the variance in different dimensions of the health questionnaire SF-36 (Vitality, Mental Health, Social Functioning and General Health) and somatic symptoms. Data from the above-mentioned studies suggest that emotional intelligence could be a personal ability of nursing staff that leads to a better perception of subjective well-being, self-efficacy and self-evaluation at work and helps to maintain high levels of dedication to work. Thus, a recent study by Augusto-Landa & Montes-Berges analyzed the role of PEI on the quality of life and dimensions of psy-

chological well-being in a sample of 85 nurses [59]. Analysis of variance results showed that emotional regulation (high vs. low) had an effect on life satisfaction and psychological well-being, confirming the importance of this factor in quality of life and the dimensions of psychological well-being. These data allow us to extend and corroborate those found in this type of samples.

4. Conclusions

In summary, we show the role that emotional intelligence has as a modulator variable of stress and as an important variable in nurses' health. We have analyzed the differential role played by the three components (Attention, Clarity and regulation) of PEI. In general, the characteristic pattern is that people with higher levels of psychological adaptation and lower levels of stress and burnout are those characterized by moderate to low scores in emotional attention and high scores in the other two dimensions of TMMS (emotional Clarity and Repair). It is important to summarize the importance of the dimensions of TMMS and their role in individual well-being as well as its influence on the different criteria that we have discussed throughout the chapter. Emotional attention is a dimension whose ends are usually characterized by emotional imbalance. Individuals who usually pay attention to emotions are characterized by monitoring at all times the progress of their moods in an effort to try to understand, which is not always productive to the subject, especially when this high level of attention is not accompanied by the discrimination of the causes, reasons and consequences. The real danger for these people is that they could develop an emotional spiral that leads to a ruminative process outside their control, rather than alleviating their mood, and this would perpetuate a negative state of mood.

This hypothesis endorses the findings that show that high emotional attention is associated with high levels of stress, lower job satisfaction and low self-concept in nursing professionals [10,42]. In terms of the clarity factor, the evidence shows that individuals who easily identify their specific emotions during stressful situations spend less time dealing with their emotional reactions. In addition, they invest fewer cognitive resources, which allow them to evaluate alternatives for action, to keep their thoughts on other tasks or to perform more adaptive coping strategies. In fact, high scores in emotional clarity were associated with different dimensions of overall health and greater adaptation to stressful situations at work [10,43], greater life satisfaction [59] and positive coping strategies [13].

Finally, emotional regulation emerges as the main predictor of health in nursing professionals, so that those who are able to regulate their emotional states (interrupt negative emotional states and prolong positive ones) show higher levels of health. Catanzaro and Mearns de-

monstrated the importance of expectations in capacity to regulate emotional and protective factors in our mental health and wellbeing [60].

The findings provided by research involve a range of evidence about cognitive and emotional factors related to the occurrence of burnout and emotional imbalance that must be taken into account in future training programs aimed at the prevention and monitoring of work stress both in students and nurses.

For all these reasons, we think that the training of emotional intelligence in professionals, not only in nursing professionals but also in nursing students, is necessary to prevent occupational stress and its impact on health. In current Higher education, which emphasizes a high profile development of interpersonal skills, training in the dimension of emotional intelligence is essential.

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Scientific
Research

Dark Leadership, Charisma and Trust

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ABSTRACT

Trust, charisma and bad leadership are central concepts in the managerial psychology. The aim of this paper is try to put forth shortly some ideas to research these phenomena, and connections between them, empirically. Charismatic leaders have the power and the ability to manipulate and misguide people. To prevent this misbehaving, it is important to promote processes of transformative ethical leadership. Thus, commitment, value-congruence, and communality are in the play a key positions. Charismatic leaders could be weak persons with destructive narcissist power. Good management and leadership are also central factors influencing these processes. Destructive and narcissistic leaders are, on the other hand, negative dark forces causing damage and harm in organizations. So, it is an important task to research these elements. The nature of the paper is exploratory. A conceptual analysis is conducted in order to set up a conceptual framework for empirical studies. The next phase of the research will be to gather relevant empirical material: interviews, company documents and participatory observation experiences.

Keywords: *Charisma, Leadership, Management, Ethics, Psychology*

1. Introduction

We have seen that people live in a more and more complicated, post-modern and globalized world. This tendency of modernization and post modernization still presents growing challenges for leaders in organizations. The dilemma of narcissism is one of the most acute problems in leadership behaviour in the Western world. Why do bad and destructive leaders with or without charisma exist? How is this evilness produced and reproduced in organizational behaviour? The culture of trust is said to be the most important factor behind wellness and wellbeing in organizations. Commitment is an inevitable part of this culture. Good management and leadership are also central factors influencing these processes. Destructive and narcissistic leaders are, on the other hand, negative dark forces causing damage and harm in organizations. So, it is an important task to research these elements.

The nature of the paper is exploratory. A conceptual analysis is conducted in order to set up a conceptual framework for empirical studies.

The next phase of the research will be to gather relevant empirical material: interviews, company documents and participatory observation experiences.

2. Previous Research on the Dark Side of Leadership

Charisma, in the sense used by Max Weber [1], literally means "*the gift of grace*". It is used by Weber to characterize self-appointed leaders followed by people who are in distress and who need to follow the leader because they believe him to be extraordinarily qualified [2]. The actions of charismatic leaders are enthusiastic, and with such extraordinary enthusiasm, fraternization and exuberant community sentiments can be pursued. For this reason, charismatic heroes and prophets are viewed as truly revolutionary forces in history [3]. Weber characterized charisma as 'specifically outside the realm of everyday routine and the profane sphere, a direct antithesis of rational and traditional authority. Inherently transient, volatile, and evanescent, charisma in its pure form 'exist(s) only in the process of originating. It cannot remain stable, but becomes either traditionalized or rationalized, or a combination or both [1].

According to Washburn and Clements [4], Kets de Vries [5] has identified several of those shadows that leaders fail to recognize.

1) Mirroring is the tendency among leaders to see themselves as their followers perceive them and to feel they must act to satisfy the projections or fantasies of the followers. A certain amount of mirroring is part of human existence. Our understanding of the world will always reflect some shared perceptions of what is real. But in a crisis, even the best of us is likely to engage in distorted mirroring. The impact of mirroring distortion is most serious when leaders use their authority and power

to initiate actions that have serious, negative consequences for the organization.

2) Narcissism in leaders reflects a distorted view of the self. Narcissists need power, prestige and drama, and they enjoy manipulating others. These qualities draw them to positions of leadership, but, at more extreme levels, the results are disastrous. They can become intolerant of criticism, unwilling to compromise and frequently surround themselves with sycophants. While these people appear to be ideal choices for leadership positions, they may fall victim to the distortions of their narcissistic tendencies that are reinforced by their positions.

3) Leaders can suffer from an inability to differentiate and verbalize emotion, or what can be called emotional illiteracy (or "alexithymia"). These individuals do not respond to their emotions, and are easy prey for the distortions of others'. "In the case of these individuals, the general human tendency toward mirroring seems to have been carried *ad absurdum*" [5]. Emotional illiterates closely resemble the stereotypical bureaucrat of "organization man". They may be viewed within certain organizations as ideal candidates for leadership positions. While they are controlled, structured and dispassionate, they lack the emotional abilities to empathize, energize, foster creativity and respond appropriately to conflict. They contribute to a mediocrity that drives out excellence.

4) Leaders at times fall victim to the fear of letting go, even though they know they no longer fit the demands of the job. This may result from strong ego identification with a leadership position. In this case, the loss of position and power suggests a condition of nothingness, which is countered by great intentness, single-mindedness and persistence. Another factor contributing to the fear of letting go is the "Talion Principle," or the fear of reprisals. While in leadership positions, individuals are at times forced to make decisions that have unpleasant consequences for others. People who give vent to the paranoid fear of retaliation hang on to power and even resort to pre-emptive action against others [4].

The fear of nothingness can lead to the "edifice complex." The fear that their legacy will be destroyed motivates them to hold on to power as long as possible and may be expressed in generational envy, inducing them to block younger people's careers. All of these foster actions, which are potentially destructive to organizations and their members. It is important to realize that not all these counterproductive behaviours emanate from leaders. Contrary to what might be suggested by transformational leadership theory, inspired and empowered followers can take actions that produce decidedly negative consequences for the leader. For example, followers who have strongly authoritarian personalities are likely to conform unquestioningly or they may react to the charismatic

qualities of the leader by mimicking or idealizing. Additionally, followers may seek to ingratiate themselves with leaders in order to be valued and rewarded. Such reactions can deprive leaders of important feedback and alternative perspectives [4].

3. The Features of the Narcissistic Leader and Trust

Burke [6] sees that focusing on two basic categories of bad leadership, ineffective and unethical, identifies seven types of bad leaders that are most common. Type, here, refers to a pattern of leader and follower behaviour that is maintained over time:

1) Incompetent – lacks the will or skill to create effective action or positive change

2) Rigid – stiff, unyielding, unable or unwilling to adapt to the new

3) Intemperate – lacking in self-control

4) Callous – uncaring, unkind, ignoring the needs of others

5) Corrupt – lies, cheats, steals, places self-interest first

6) Insular – ignores the needs and welfare of those outside the group

7) Evil – does psychological or physical harm to others

The first three types of bad leaders are incompetent; the last four types are unethical. Incompetent leaders are the least problematic (damaging) while unethical leaders are the most problematic (damaging). One must also consider both means and ends. Ineffective leaders fail to achieve the desired results or to bring about positive changes due to a shortfall in means. Unethical leaders fail to distinguish between right and wrong. Ethical leaders put followers needs before their own, exhibit private virtues (courage, temperance) and serve the interests of the common good [6].

Narcissistic leaders are vulnerable to these kinds of dangers. The organizational and social contexts here should be understood as regulative to the extent that they provide (symbolic, discursive, material, etc.) input that in various ways affects identity work. In psycho-dynamically oriented literature it is often suggested that individuals defend their identity against threatening aspects of the social context. Through a variety of defensive mechanisms, perceptions of reality are distorted or deflected, leaving a valued identity unaffected by actual social interactions. The point here is not to elaborate on various defensive mechanisms, but rather to highlight that self-identity in some instances can become loosely connected to actual social interactions. Based on this we suggest that self-identity may assume characteristics of fantasy; that is, an idea or a belief that is not significantly affected by actual behaviour [7].

Choi characterizes the qualities of the narcissistic leader as follows. For the narcissistic leader, the world

revolves on the axis of self, and all other people and issues closely orbit them. They present various combinations of intense ambitiousness, grandiose fantasies, feelings of inferiority and overdependence on external admiration and acclaim. Narcissistic leaders also tend to overestimate their own achievements and abilities while stubbornly refusing to recognize the quality and value of the same in others. Another characteristic is their tendency to exploit in interpersonal contexts, in which others are taken advantage of in order to indulge their own desires. Because narcissistic leaders tend to use others to advance their own goals, they are notorious for being unable to empathize with those they lead. This enables them to pursue their own ends without restraint [8].

Tourist and Vatcka [9], in their ENRON study, have argued that many of the dynamics found within Enron resemble those of organizations generally regarded as *cults*. In particular, it described the existence and the downsides of charismatic leadership – a compelling and totalitarian vision, intellectual stimulation aimed at transforming employees' goals while subordinating their ethical sense to the needs of the corporation, individual consideration designed to shape behaviour, and the promotion of a common culture which was increasingly maintained by punitive means. The one exception is that, as the general literature testifies, cult members donate most of their money and possessions to their chosen cause. They endure great hardship. Enronians, by contrast, were well paid, with the promise of much greater wealth to come. On the other hand, most saw their retirement savings wiped out in Enron's collapse, lost everything they had invested in its shares and received nothing more than a US$ 4000 severance payment when it filed for bankruptcy, while top managers were paid exceptionally generous retention bonuses. Overall, the organizational culture strongly resembles that of many well-known cults, as does the behaviour of Enron's leaders. There have been many attempts to portray the Enron scandal as a one-off or at least a rare occurrence.

Arnott [10] put forth that trust, which is a belief in the reliability of a third party, particularly when there is an element of personal risk, lies at the heart of the marketing concept. Any successful relationship, from friendship and marriage to partnerships and business transactions, is dependent to a greater or lesser extent upon the degree of trust between the parties. The interest of management researchers in the topic only began in the mid-1980s with investigations into the interpersonal relationships between buyers; although, published work on trust was still running at less than five papers per year. This changed with the works of Moorman *et al.* [11] on the trust relationship between businesses and marketing research agencies, Morgan and Hunt [12] with their commitment-trust model of relationship marketing, and McAllister [12], who categorized trust on the basis of two dimen-

sions: 1) the cognitive; and 2) the affective [9].

One can present empirical data that demonstrates that trust is present in all *psychological* contracts, but that it may differ in nature, and this has implications for the transactional or relational nature of the psychological contract. Understanding the bases of trust that operate in the psychological contract and the implications of their manner of operation may well have practical implications for the management of the employment relationship. For example, an employer is unlikely to be able to develop and benefit from affective trust if there are frequent breaches of cognitive trust. Cognitive trust and transactional obligations appear to operate as hygiene factors that must be adequate before the relationship can move to a more relational/affective level [14].

Shamir and Lapidot [15] state that the social-psychological literature on trust in organizational superiors implies that it is an interpersonal phenomenon, based on the superior's behaviours and on the subordinates' perceptions of the superior's behaviours and qualities. The sociological literature, in contrast, implies that trust in a superior is a property of the system in which the superior-subordinate relationship is embedded. They see that trust is both an interpersonal and a collective phenomenon and focus on the linkages between three levels of trust: the system level, the group level, and the individual level. They use a longitudinal quantitative analysis of cadets' trust in their team commanders and a qualitative analysis of critical incidents of trust building and erosion to develop and support three propositions. First, trust in a superior reflects the subordinates' trust in the system that the superior represents. Second, subordinates employ criteria derived from systemic properties such as collective identities and values to evaluate the trustworthiness of their superior. Third, team processes play a major role in the social construction of trust in a superior and in translating systemic considerations into criteria for evaluating the trustworthiness of superiors. They continue that for all these reasons, it seems reasonable to suggest that future studies of trust in organizations, and especially of trust between leaders and subordinates, should pay more attention to the *collective* aspects of the phenomenon. Theoretical models of trust should be extended beyond the current emphasis on interpersonal processes to include systemic considerations and group-level processes as well.

4. Conclusions

The brief presentation set forth above suggests several points. The dark side of charisma and managerial failures stigmatize organizational life nowadays. Therefore, it is more and more important to try to develop means to give us concrete devices for improving leadership practices. Fear, threats, egoism, narcissism, brutality and cultism are such things that will cause fatal damage to organiza-

tional trust and commitment. Leaders who betray their followers may miss out on opportunities to be trustworthy forever. Leaders can lose trust only once. However, in work-organizations employees act to earn their living, and thus affective or emotional commitment may lay more in the background compared with other social or private life organizations, such as in the family. A human being is a gregarious actor, and trusting on his companions is fundamental to survival.

Signals of trust could be:
- altruism
- benevolence
- fairness
- respect

These elements could pave the way to ethical leadership.

According to Valumbwa *et al.* [16], *authentic* leadership theory likewise contains distinctive components that are not considered by ethical leadership theory. Specifically, the focus on self-awareness, relational transparency and balanced processing all represent features of authentic leadership not captured in operational definitions of ethical leadership. As is the case with ethical leadership, there is some conceptual overlap between authentic and transformational leadership. Transformational leadership is composed of five components: attributed charisma, idealized influence, inspirational motivation, intellectual stimulation and individualized consideration. However, attributed charisma has been described as representing the leadership's impact and reflecting follower attributions, and not necessarily leader behaviour. Leaders with idealized influence tend to place follower needs over their own needs, share risks with followers, and demonstrate devotion to a set of underlying principles and values. Such leaders are "role models for followers to emulate; can be counted on to do the right thing; and display high standards of ethical and moral conduct" compared to values of efficiency and professional integrity and may require change efforts.

Charismatic leaders have the power and the ability to manipulate and misguide people. To prevent this misbehaving, it is important to promote processes of transformative ethical leadership. Thus, commitment, value-congruence, and communality are in the play key positions. Charismatic leaders could be weak persons with destructive narcissist power [17]. Maybe, for example, models of authentic/servant leadership and care-ethics are the right means for better life in organizations. I agree with Choi who put forth that taken together, charismatic leadership is not equally applicable to all situations. Some situations have a higher degree of receptivity to charismatic leadership, which in turn, raises the concerns of the fit between charismatic leadership and contextual factors. Thus, an awareness of the contextual influences on the effectiveness of charismatic leadership has impor-

tant implications for leadership practices [8]. The contexts should be taken into account carefully in the decision of the placement of leaders who have charismatic characteristics [17]. In addition, the training of charismatic leaders should also be guided by the consideration of contextual factors [18]. Therefore, the consideration of contextual factors will allow organizations to reap greater benefits from the motivational effects of charismatic leadership.

Charismatic leadership [8] is comprised of three components: envisioning, empathy, and empowerment. These key components stimulate the followers' needs for achievement, affiliation and power. These motivational effects of charismatic leadership then act to improve the followers' role perceptions, task performance, job satisfaction, sense of collective identity, group cohesiveness, organizational citizenship behaviour and self-leadership. In addition, the motivational effects of charismatic leadership will be moderated by various contextual factors [8].

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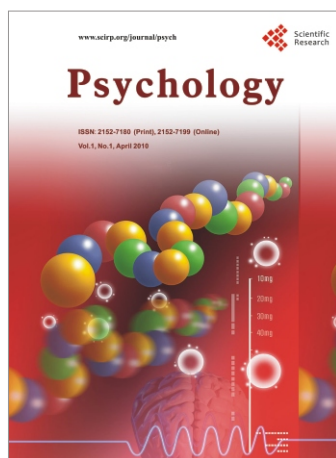
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