1 Article

2 Relationship of Work Context and Work Stress
3 among Sonographers in Riyadh, KSA

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17 Abstract: Work context is essential to understand in relation to handle the stress at work that
18 ultimately creates a feeling of satisfaction or dissatisfaction among health professionals. The
19 current study was conducted to investigate the relationship of work context and work stress among
20 sonographers (n=153) in Riyadh, Saudi Arabia. Additionally, the study provided a gender-based
21 comparison of both variables among sonographers. Work context was measured by administering
22 subscale of work context derived from Work Design Questionnaire. Whereas, work stress was
23 measured by Job Stress Scale. In addition, relationship of lifestyle was explored with work context
24 and work stress. Data was collected through survey research forms. Results revealed the significant
25 relationship of work context and work stress (r=.251, p=.002). Among lifestyle variables, perceived
26 good health (r = .214, p=.008) and sleep (r=.242. p=.003) were found positively related with
27 satisfaction toward work. Whereas, the strong positive correlation was found between work context
28 and frequency of physical activity (r=.255, p=.005). No significant difference was found among male
29 and female sonographers. The findings of this study contributed to evaluating the working
30 condition of sonographers in relation to work stress. Effective strategies for better working settings
31 as well as strategies for achieving satisfaction in work will be discussed to enhance the performance
32 of sonographers.

33 Keywords: work context; work conditions; work stress; job satisfaction; lifestyle; sonographers;
34 ergonomics

35 1. Introduction
36
37 Healthcare professionals are exposed to the risk of work stress due to many reasons, that can
38 affect their mental health status [1]. Several studies have explored various kinds of mental health
39 aspects that formed by the work design and work structure [2]. Working context can enhance and
40 impair mental health simultaneously [3,23,4]. Some studies investigated the effects of ‘work-life
41 balance’, have proved the existence of interactions among waged work, family, public and social life
42 [5]. Health professionals particularly, sonographers if not having excellent work context can suffer
43 from several health issues, for example, musculoskeletal injuries (MSI) [6]. The literature revealed
44 that health professionals face an elevated level of stress which leads to low self-esteem, low mood,
45 somatic complaints, sleep disturbances, and burnout [7]. This high level of stress of health
46 professional’s grounds for both individual and organizational problems. Moreover, it can negatively
47 affect the standards of the expected health care services.
Work stress is one of the elements that negatively affect the performance of healthcare providers. It is caused by many reasons; sometimes it is related to personal characteristics, habits, lifestyle, personal incompetence and perceptual predispositions. Sometimes it arises from external sources, for instance, social interactions at the workplace which are specifically the work relationships and interactive contacts which have a significant effect on the quality of life at the workplace [8]. Sometimes work context including ergonomics, equipment used, working conditions provoke stress [9,10]. Health care professionals cannot provide the best of their potentials if the level of stress is high due to either reason [10,11].

Sonographers as professional health care providers have reported a high prevalence of work-related musculoskeletal pain and discomfort [12,13]. Some latest studies indicated the high prevalence of neck and shoulder pain among female sonographers [14,15]. Other researchers also studied the stress-related risk factors such as disproportionate workload, time pressure, tough or difficult tasks, insufficient rest breaks, monotony in conducting the same tasks, and the physically poor work environment conditions are considered as additional factors affecting health care professionals [16]. Further, there are other elements that cause stress such as long duration of standing required by the service, sleeplessness due to being on night shifts, and eating disorders [17].

Job stress is common among health care providers rather than any other profession, i.e. the increased workload, work environmental factors and work disparities [18]. Radiologist in New Zealand, have experienced reduced levels of stress in the private clinics rather than their counterparts in the public ones [19]. This is beside their exposure to distinctive kinds of stressors which are mainly the intensive contact with patients who undergo pains and death [20]. Studies showed that people suffered from occupational stress have also suffered from poor psychological well-being [21]. Work stress may get increased among female professionals due to the family responsibilities that compel them to respond in an imbalanced manner. Work stress and dissatisfaction of job might be greater among female professionals or sonographers due to the family, social and professional demands [22].

The work environment includes many dimensions having biopsychosocial features of the work setting [23]. These dimensions determine the satisfaction level of workers and their level of stress [24]. The working conditions are representing the central aspects that induce the level of stress [1, 23]. For the clinical intervention to get effective outcomes; the personal characteristics of the healthcare providers are significantly related to the positive change that these healthcare providers must leave in promoting the health of their clients. The current study reflects on the outcomes of an investigation that explores the sonographers’ work experiences at the work environment and its relations to mental health. Furthermore, various lifestyles have been studied in relation to work context and work stress.

After reviewing literature following hypotheses were formulated:

- There will be significant relationship of work context and work stress among sonographers in Riyadh.
- There will be significant relationship between lifestyle, work context and work stress among sonographers in Riyadh.
- There will be significant difference among male and female sonographer on work context and work stress level.

2. Materials and Methods

The present study used correlational research design. The research method applied is quantitative in nature in which survey technique using two standardized self-report questionnaires were employed. The study was conducted to investigate the relationship of work context and work stress among sonographers in Riyadh during May 2016-April 2017.

The sample of this study was comprised of (n=153) sonographers of Riyadh. Participants were approached in governmental as well as private sectors. Qualified sonographer appointed at various hospitals were included. Minimum work experience was at least 6 months. The tenure of 6 months was considered to avoid adjustment problem.

A brief rating scale was prepared to measure the lifestyle. It included the factors of perceived health, the frequency of physical activity and average sleep. Work Stress Scale [25], measures the level
of job satisfaction and opportunity for expression and achievement. It has 20 items. It can be scored as yes or no (0 and 1). More than 16 has been considered as satisfaction. Meanwhile, less than 10 scores signify stress at the job. Work Context Subscale is derived from Work Design Questionnaire developed by Morgeson and Humphrey in 2006 [26]. It contains 14 items altogether. Work Context Subscale has further 4 domains namely Ergonomics (3 items), Physical Demand (3 items), Work Conditions (5 items), and Equipment Use (3 items). This instrument uses a 5-point Likert scale. Responses range from strongly disagree (score 1) to strongly agree (score 5). The third item of ergonomics domain has reversed scoring. A higher score indicates satisfaction with work setting.

All the ethical considerations were fulfilled before conducting the study. Ethical approval from the Departmental scientific sub-committee and Research Ethical committee of College of Health and Rehabilitation Sciences (application code: Z-F004), Princes Nourah Bint Abdulrahman University was sought. Before approaching participants, a letter explained the purpose of the study was sent to hospital administration for getting permission. Consent forms were provided to the subjects to indicate their willingness to participate in the study and to gather demographic information. Participants were assured about the confidentiality of their information. Then standardized scales were administered to individuals. Data was collected by using both means of individual administration and by online survey forms.

Collected data was analyzed by using SPSS (V. 24). Regression analysis was used to measure the predictive association of work context and work stress among sonographers. Additionally, one sample t-test was calculated to confirm the tendency of scores in the group. Pearson coefficient of correlation was conducted to measure the relationship between lifestyle variables with work context and work stress. Lastly, for comparison purpose among male and female sonographers on the variable of work context and work stress, independent sample t-test was calculated.

3. Results

Regression analysis was conducted to measure the predictive association of work context and work stress. Initially, Pearson’s Correlation was conducted to measure the relationship of subscales of work context with the sum of scores and with work stress. Results in (Table1) indicated that the subscales of work context are having inter consistency with the total score of the work context. Subscale of ergonomics (r=.580, p < .01), physical demand (r=.499, p < .01), work conditions (r=.781, p < .01) and equipment use (r=.689, p < .01) were found strongly correlated with total work context scores. Further job satisfaction (work stress) scores also found highly significant correlation with subscale of work condition (r=.261, p < .01) and ergonomics (r=.201, p < .05). Results are also approving that there was a significant positive correlation between work context and work stress (r=.251, p < .01) among sonographers. Furthermore, regression analysis confirmed the predictive relationship F(1,151)=10.193, p<.002, R²=.063. of work context on stress level.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Ergonomics</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Physical demand</td>
<td>.140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Work conditions</td>
<td>.296*</td>
<td>.071</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4) Equipment use</td>
<td>.243*</td>
<td>.302*</td>
<td>.320*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5) Work Context</td>
<td>.580*</td>
<td>.499*</td>
<td>.781*</td>
<td>.689*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Work Stress</td>
<td>.201*</td>
<td>.025</td>
<td>.261*</td>
<td>.114</td>
<td>.251*</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01, *p < .05

Model Summary of Multiple Regression Analysis
ANOVA for the Regression Equation, work context on work stress among sonographers

<table>
<thead>
<tr>
<th>Model</th>
<th>S</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>217.424</td>
<td>1</td>
<td>217.24</td>
<td>10.193**</td>
<td>.002</td>
</tr>
<tr>
<td>Residual</td>
<td>3220.786</td>
<td>151</td>
<td>21.330</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3438.209</td>
<td>152</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p < 0.01

Beta Coefficients for predictors of Work stress among sonographers

<table>
<thead>
<tr>
<th>Predictors</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>4.594</td>
<td>.992</td>
<td>1.536</td>
<td>1.127</td>
<td>.27</td>
</tr>
<tr>
<td>Work Context</td>
<td>.187</td>
<td>.059</td>
<td>.251</td>
<td>3.193**</td>
<td>.002</td>
</tr>
</tbody>
</table>

**p < 0.01

One sample t-test was conducted to confirm the comparative results for the variables of work context and work stress. Results (table 2) indicated that sonographers of Riyadh scored high on both variables that showed high satisfaction toward their job context (t=98.02, p < .05) and toward their job (t=36.59, p < .05). Moreover, the mean score on work stress is higher than cut off point that confirms the higher job satisfaction level of sonographers in general (M=14.07>10).

Table 2. Results of One-sample t-test and Descriptive Statistics for Work context and work stress among sonographers in Riyadh.

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>n</th>
<th>Comparison Value</th>
<th>95% CI for Mean Difference</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Context</td>
<td>50.65</td>
<td>1.391</td>
<td>153</td>
<td>-</td>
<td>50.647, 51.67</td>
<td>98.02*</td>
<td>152</td>
</tr>
<tr>
<td>Work Stress</td>
<td>14.07</td>
<td>2.756</td>
<td>153</td>
<td>10</td>
<td>13.31, 14.83</td>
<td>36.59*</td>
<td>152</td>
</tr>
</tbody>
</table>

* p < .05

To measure the relationship of lifestyle variables with work context and job satisfaction, Pearson’s product moment correlation was conducted. Results (Table 3) are showing the strong positive relationship between physical activity and satisfaction with work context (r=.225, p<.01). Whereas, job satisfaction was found highly correlated with perception of health (r=.214) and healthy average sleep (r=.242, p<.01).

Table 3. Correlation between lifestyle, work context and work stress.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Health</th>
<th>Physical activity</th>
<th>Sleep</th>
<th>Work Context</th>
<th>Work Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>-.116</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep</td>
<td>.250**</td>
<td>-.066</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Context</td>
<td>.139</td>
<td>.225**</td>
<td>.053</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work Stress</td>
<td>.214**</td>
<td>-.109</td>
<td>.242**</td>
<td>.251**</td>
<td></td>
</tr>
</tbody>
</table>

**p < .01, *p < .05

To permit comparison across domains, results (Table 4) shows that there is no statistically significant difference among male and female sonographers on the variables of work context and
work stress. Although cutoff score for work stress is 10 but male sonographers (M=15.36) were found more satisfied with their job as compared to female sonographers (13.72).

Table 4. Gender difference in Work context and work stress among sonographers in Riyadh.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Gender</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>Comparison Value</th>
<th>95% CI for Mean Difference</th>
<th>t</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td>Male</td>
<td>51.21</td>
<td>1.256</td>
<td>33</td>
<td>-</td>
<td>-1.767, 3.208</td>
<td>.572</td>
<td>151</td>
</tr>
<tr>
<td>Work</td>
<td>Female</td>
<td>50.49</td>
<td>1.835</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>Male</td>
<td>15.36</td>
<td>2.869</td>
<td>33</td>
<td>10</td>
<td>-1.87, -3.481</td>
<td>1.774</td>
<td>151</td>
</tr>
<tr>
<td>Stress</td>
<td>Female</td>
<td>13.72</td>
<td>2.629</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p > .05

4. Discussion

Work design or work context represent the satisfaction and self-motivational aspect of workers [27]. Furthermore, it is related to the efficiency and level of performance. If the person finds working environment or context appropriate to work that will increase the motivation, satisfaction and performance level. Work context including standardized ergonomics, appropriate physical workload, good working conditions, and use of equipment under controlled procedures, can enhance the work efficiency [28]. All the factors in work contexts are equally important. Ergonomics allows the sonographers to complete their tasks in an appropriate manner that can help to maintain their physical health and protect them from work-related injuries. Therefore, the factor of ergonomic is found having (33%) effect on satisfaction with work context. Second variable of physical demand is explaining the load of work and explaining the variation of 24%. Working condition was found the most influencing factor with the variation of 61%. Fourth variable was equipment use that is related to technology and complexity. This variable was found having the second greatest impact factor (47%). This has been statistically supported in this current study. All the subscales of work context were highly correlated with total scores. It represents that sonographer in Riyadh were experiencing high quality of working environment under standardized application of procedural protocol. It was found in previous researches that if health professionals were not having good working settings that affects their satisfaction level and performance as well [24, 29]. Additionally, another result is valuable to explain regarding significant relationship of job satisfaction with work conditions and ergonomics. These variables were found contributing to the satisfaction level or alternately decreasing the stress level among sonographers. Predictive association of work context with stress level strengthened the results.

Lifestyle has been found impacting the physical and psychological health of health care professionals [7]. In referring to the sonographers, healthy lifestyle of physical exercise it was found correlated with satisfaction to work context. It is similar to previous studies that addressed the issue of reducing the chances of injuries by providing recommendations to improve the lifestyle of sonographers. Morton and Delf in 2008 [9], have discussed various themes related to musculoskeletal injury among sonographers and suggested that muscle strengthening exercises, stretches and relaxing can help to prevent injuries. Other studies [12, 6] also recommended to raise the awareness of sonographers due to high ratio of MSI occurrence, ergonomics, psychological effects on health. Moreover, average sleep and perception of good health was found correlated with job satisfaction. It is consistent with previous studies, where sonographers perceived that their life had been compromised by their work and impact upon their sleep patterns [30].

Although in previous studies it was found that female sonographer were having higher occurrences of MSI thus it was hypothesized to measure the difference of satisfaction with work context and job among male and female sonographers. However, no significant difference was found on both of the variables. It can be explained by having less number of male participant in the study.
Whereas, difference of mean scores is providing some valuable results. Mean score of male sonographers is high on satisfaction with the working environment as well as on job satisfaction (work stress). On job satisfaction, both groups scored higher mean than the comparison value. It can be explained due to conducting the standardized procedure of protocol approved by Ministry of Health for all sonographer that yields no difference.

There are some limitations of the study. The respondents of this current study were predominantly female sonographers which demands for increasing male sonographers in future similar studies to compare the different responses between males and female sonographers.

A similar study should be extended to other regions in the Kingdom of Saudi Arabia to obtain a broader interpretation of the factors that influence sonographers’ psychophysiological wellbeing as well as job satisfaction. Furthermore, the sonographers’ job satisfaction and overall organizational contexts mainly the psychological correlates of work context particularly the social and interpersonal interaction among sonographers need to be investigated for specific socio-economic and development purposes. The lifestyle of diet, work/rest cycle, taking care of health and smoking (health-harming behaviours) can be included.

To improve the work context for sonographers, it is recommended to provide hands-on, multidisciplinary training programs to offer essential information for machine users experience through ongoing proven evaluation techniques. It is also recommended for sonographers to demonstrate several bodily exercises for example; stretching techniques to enable them to avoid repetitive strain injuries. It is essential to take frequent breaks at work, to get up and walk or stretch, to break the extended sitting cycle and to reduce the severe effects of sitting. Awareness regarding work/rest cycle to administration and sonographers can increase the satisfaction level towards work.

5. Conclusions

It can be said that work context is neither just related to physical comfort (i.e. avoiding fatigue) nor with work efficiency solely. Satisfaction with the working environment can be directly related to psychological factors just like stress. It was found that if sonographers are satisfied with ergonomics, physical demand of work, work conditions and equipment use it may lead toward the satisfaction of work context, increased motivation and productivity. On the other hand, satisfaction with work context can lead toward satisfaction towards job or lesser levels of stress. Some essential life-styles were highlighted in this study. Physical exercise, average sleep and perception of health were correlated with work context and work satisfaction. Specific, considerations should be given to regulate the extreme work assignments and time pressures as it has been proved from the literature that these factors may augment the work stress and increase or worsen the emotional/psychological reactions of sonographers and might lead to stress and MSI. This study has also recommended that healthcare settings must work to create conducive work conditions for its employees that are conducive to employees' satisfaction with autonomy, competence, and affiliation.

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Author Contributions: U.Z and L.F.H conceived and designed the survey; L.F.H gathered all the permission and contacted to hospitals via email; S.S.A and S.M.A.E released and the recruited email and survey; H.D.Q and U.Z analysis and interpreted the data; U.Z and S.S.A have drafted the work and revised it.

Conflicts of Interest: The authors declare no conflict of interest.
References


