

Article

Diverse Impact of Sensitive Sub-Categories of Demographic Variables on Safety Climate of High-Rise Building Projects

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Abstract: The identification of significant areas impacting safety performance has always been a key concern for construction management researchers. This paper aims to examine the diversified influence of sensitive sub-categories of demographic variables on construction safety climate (SC). The data relating to fourteen demographic variables and twenty-four formerly validated SC statements were collected from forty-one under-construction high-rise buildings in Pakistan. The variances in respondents' distribution among various sub-categories of demographic variables, and influence of each sub-category of demographic variables on SC statements were analyzed using cross-tabulation, Spearman's rho correlation coefficients, independent sample Kruskal-Wallis and Mann-Whitney U tests. The study comprehends that the employees in the age group of 20 years or below and between 41 and 50 years, engaged for over 48 h per week, having 4 dependent family members, primary education, and/or lesser working experience, attained a comparatively lower SC level. Likewise, frontline workers and foremen are observed to be employed for extended working hours, causing them fatigue. It also discovers that safety alertness level steadily declines once employees get acquainted with their tasks, thus necessitating to arrange periodic refresher safety training sessions. The study recommends concentrating on frontline workers and foremen who are less educated and fall in the age group of 41–50 years by resolving their safety concerns and providing them adequate safety training, promptly replacing their defective equipment, improving worksite conditions, and counselling them about the significance of wearing PPE and adhering to all the safety rules regardless of the difficulty in their enactment. A joint focus on the heightened personal attributes of employees and risky SC statements is expected to enhance safety performance on under-construction building projects. Moreover, the study's results can be cautiously generalized and applied to other countries having similar work environment.

Keywords: demographic variable; safety climate; high-rise building; construction industry

1. Introduction

Most of the developing countries were continuously observing a boom in infrastructure growth, however, sudden outbreak of coronavirus has pushed global economies towards a recession. Pakistan's economy has also endured a sharp contraction, as its growth was

recorded at -0.4% during the fiscal year of 2019–2020 [1], while it was recorded as 9.05% in year 2016–2017 [2]. Recently, it has again observed an increase of 8.06% mainly due to government's support to various industries including the construction industry [1], which is annually contributing 2.53% in National Gross Domestic Product (GDP) [3]; reflecting its major contribution in the economic growth among all other industries.

According to a recent report on labour statistics, 7.61% of the Pakistani labour force is employed by construction industry, however, its accident rate has observed an upsurge, such as 14.1% in year 2013–2014 [4], 16.3% in 2014–2015 and 18.9% in 2017–2018 [5]. Thus, the construction industry can be regarded as an industry with higher number of injuries and fatalities. Consequently, construction projects have suffered from cost overruns, construction delays, extended non-appearance of workers from worksites, lower productivity and conflicts between key construction stakeholders [6,7]. The situation has become more alarming on high-rise building projects, where construction companies are continuously suffering from accidents and fatalities [8–10]. The injuries and fatalities due to falls from height and falling objects are constant threats on these projects, despite strict enforcement of safety management system [10]. Hence, achieving a better safety performance is still a great challenge for construction companies. Such a situation necessitates further probing into current safety measures on these high-rise building projects.

To effectively manage the safety on construction sites, building a positive safety climate (SC) and safety culture has been accepted as a fundamental research strategy worldwide [11,12]. Likewise, to enhance construction safety climate, past studies have emphasized on probing into diversified safety behavior of the employees because of their varied human behavior, regional and cultural conditions, and language barriers [11,13,14].

Since only a few of the research studies have focused on examining the varied human safety behavior in developing countries [15], there is a need to further explore the diversified behavior of the employees belonging to various demographic groups [14]. This research gap becomes even more imperative due to the higher number of injuries and fatalities in developing countries compared with developed countries, mainly due to the scarce spending and inadequate execution of construction site safety measures [11].

Therefore, this research focuses on the exploring the demographic variables in order to enhance safety performance of the employees on under-construction high-rise building projects in developing countries, such as Pakistan. It identifies vital demographic areas and their risky sub-categories, having a relatively lower safety performance level. These perilous sub-categories of demographic variables can be targeted for necessary safety interventions. A joint focus on the highlighted sub-categories of the risky personal attributes of the employees and sensitive SC statements is anticipated to supplement the safety performance on under-construction building projects.

This research paper is structured into five sections. The first section deliberates the differences between safety climate and safety culture, and explains the necessity of exploring demographic variables for enhancing construction safety climate. It is followed by the methodology, and analysis and results sections. The reference to the previous research works (analogous and opposing studies) with comparative analysis of the results is appropriately explicated in the discussion section. The last section covers the study's conclusions and recommendations, followed by its limitations and future research directions.

2. Literature Review

2.1. Safety Climate and Safety Culture

The term safety climate (SC) was used for the first time by Zohar [16] to measure the employees collective safety behavior that how safety measures are being followed at a work place by the employees at a specific moment of time. It has been established as a fundamental and the most powerful consequence to measure and achieve a safer workplace in the construction industry [12,16,17]. It indicates the true priority of an organization towards safety, compared with production and quality [18]. It is considered by researchers as sub-part of the safety culture [19], and an image of on-site safety culture [20].

The SC highlights the existing safety situation and its impact on employees' behavior whereas safety culture places more emphasis on the history and context of safety in an organization [21]. According to Griffin and Curcuruto [22], SC is regarded as the surface features of the safety culture discerned from the workforce's attitudes and perceptions, whereas safety culture refers to the underlying assumptions, beliefs and values that guide behavior in organizations rather than the direct perceptions of individuals. Moreover, SC deals with the human behavior, reflects the true perceived priority of safety in an organization and identifies the potential pitfalls in the organizational management system that may lead to fatal accidents [23,24]. According to Cooper and Phillips [19], the most commonly used leading indicator for examining unsafe behavior and unsafe conditions is measuring the SC. Compared to other accident anticipation measures such as a safety audit, SC survey is a cost-effective and time-saving technique, and it can proactively specify the safety problems before they cause an accident [25].

2.2. Safety Climate and Demographic Variables

The effects of socio-economic and demographic factors have been analyzed in past studies for probing into the diversified research problems, such as: finding public preferences for ride-sourcing services [26], investigating the effect of demographic variables on corruption in construction industry [27], and examining the economic aspects of electricity consumption [28]. These demographic variables and their sub-categories also have a momentous and varied influence on SC. Hence, they have been evaluated to: identifying the SC differences among various employees' groups [14,29], evaluating their impact on construction employees' safety perceptions [30], examining their influence on safety consciousness and safety citizenship behaviour [31], differentiating the perceptions among workers and their managers/supervisors [11,32], and analyzing the work-related illness and injuries among construction workers [33].

A careful review of the aforesaid studies elucidates that demographic variables can significantly influence the SC and impact the individual safety behaviour [34]. It also advocates that there is a considerable relationship between the performance of SC statements and demographic features of construction employees [31]. These demographic variables include personal characteristics of the employees, such as: age, gender, employment, marital status, number of dependents, education level, working experience in the industry and certain habits [11,20,29,30,33,35–39].

Chi et al. [40] investigated construction site's accidents utilizing certain demographic variables, such as age, gender, and years of work experience, and found that demographics could make a difference in perception of safety behavior. Nelson et al. [41] proved that self-reporting of safe behaviors is strongly correlated to gender, age, ethnicity, and education level.

Fang et al. [36] adopted logistic regression to explore the relationship between SC and personal characteristics in Hong Kong. They found that eight personal characteristics of employees namely age, marital status, presence of dependent family members, education level, safety knowledge, drinking habits, whether direct or indirect employer, and breaking safety procedures, strongly influence the SC perceptions. While, five demographic variables including gender, experience in the current company, industry's experience, whether injured or not, and smoking habits, do not have any substantial impact on SC perception. Choudhry et al. [42] used multiple regression analysis to find positive effects on the perceptions of safety among older workers who are married and have more family members to support, whereas younger workers who are unmarried and have no family members to support are usually observed not adhering to the safety instructions. Their research further revealed that workers with educational levels below primary had less perception of SC. Moreover, subcontractors' employees were observed to achieve lower SC as compared to direct employees.

Masood and Choudhry [43] calculated mean SC scores (MSCS) and confirmed that SC perceptions are intensely influenced by demographic factors. They found that employees

in the age group of 41 to 50 years, married, responsible for more than 7 dependents, having basic education, 16-year experience, employed in joint venture projects, and not smoking, have a clear perception of SC. Siu et al. [44] analyzed the impact of age difference on safety attitudes and safety performance of Hong Kong workers with the data collected from 374 Chinese workers of 27 construction sites. They found that older workers exhibited more positive attitude towards safety as compared with younger workers.

The aforesaid review dictates that personal attributes of the employees can considerably influence the SC on worksites, and they have been aptly studied [13,20,35–38,43]. However, sub-categories of the demographic variables have yet not been adequately investigated to evaluate their performance against each SC statement [11]. Therefore, this study attempts to explore key demographic areas and their sub-categories which have a relatively lower safety performance level and can be targeted for necessary safety interventions to enhance safety performance on under-construction high-rise building projects. It is believed that a synergized effort to improve the risky personal attributes of employees and already identified sensitive SC statements will productively enhance the safety performance on under-construction building projects.

3. Methodology

3.1. Questionnaire Design

For this research, a validated questionnaire with minor adjustments was adopted for data collection and to analyze the relationship between demographic variables and SC [45,46]. The questionnaire was presented in English as well as in Urdu. The finalized questionnaire consisted of the two sections of personal attributes and SC statements.

3.1.1. Demographic Variables Section

This section comprised of fourteen questions inquiring the personal attributes of respondents, including: working level, age, marital status, working hours per week, dependent family members, level of education, type of employer/organization, experience in the current company, work experience in construction industry, smoking habit, work trade, city they belong, type of safety training attended, and gender [14,36,37,43,45]. The sub-categories of each demographic variable are elucidated in ensuing sections.

3.1.2. Measurement of SC Section

It comprised of formerly validated twenty-four SC statements clustered into four SC factors [47]. It is clarified that all the aforesaid SC statements were extracted from the validated 38-item survey questionnaire of the Occupational Safety and Health Council of Hong Kong [45,46]. The primary reason for adopting this questionnaire was that it had already been validated for building projects in Pakistan and Hong Kong [45,47]. Moreover, this study's sample was quite similar to Hong Kong construction industry as it was collected from high-rise building projects in Pakistan where safety regulations are justly implemented.

It is of note that some modifications and additions were made in the adopted questionnaire, in light of experts' opinion and literature review, and considering the importance given to regional and cultural values in past studies [48]. Respondents were asked to give their level of agreement to SC statements on a 5-point Likert scale, with 1 being strongly disagree to 5 being strongly agree [17,36,42,48]. The detailed development and validation of the 24-item SC scale clustered into 4 factors (Table 1), as well as its applicability to Pakistani construction industry, is expansively reported in Zahoor et al. [47].

Table 1. Validated twenty-four items safety climate scale clustered into four factors.

No	SC Statements and SC Factors	Mean
	Management commitment and employees' involvement in health and safety	
SC1	Company really cares about the health & safety of the people who work here	2.841
SC2	Adequate health & safety training is given by the company to perform the job safely	2.751
SC3	People here always wear their personal protective equipment when they are supposed to	2.704
SC4	All the people who work in my team are fully committed to health & safety	2.901
SC5	There is always good communication here between management and workers about health & safety issues	2.808
SC6	Sufficient resources are available for health and safety here	2.798
SC7	Time pressures for completing the jobs are reasonable	2.822
SC8	My workmates would react strongly against people who break health & safety procedures	2.831
SC9	Working with defective equipment is not at all allowed	3.047
	Safety enforcement and promotion	
SC10	The company/management encourages suggestions/feedback from the employees, on how to improve health & safety	3.225
SC11	There is always good preparedness for emergency here	3.461
SC12	Accidents which happen here are always reported	3.657
SC13	Management always motivates and praises the employees for working safely	3.624
SC14	Safety posters and publications are effectively used for safety awareness	3.535
SC15	Necessary precautions are taken against fall protection	3.601
SC16	Supervisors carry out the job hazard analysis before start of each activity	3.113
	Applicability of safety rules and safe work practices	
SC17	Some health & safety rules/procedures do not reflect how the job is to be carried out	2.324
SC18	Some health & safety rules or procedures are difficult to follow as they are either too complex or not practical	2.611
SC19	Sometimes it is necessary to take risks to get the job done within given time	2.404
SC20	Some health & safety procedures are too stringent in relation to the associated risks	2.461
SC21	Some jobs here are difficult to do safely due to physical conditions on site	2.305
	Safety consciousness and responsibility	
SC22	I am very clear about my responsibilities for health & safety	4.047
SC23	Work health & safety is not my concern—it is not my responsibility	4.048
SC24	Regular safety inspections are very helpful to improve the health & safety of workers	4.151
	Overall mean SC score	3.086

Note: The validated SC factors and their relevant SC statements have already been reported in detail in Zahoor et al. [47].

3.2. Sample Size

As the sampling of the questionnaire can significantly affect the generalizability of the findings, an effort was made to collect the responses from the employees working at different levels and representing various stakeholder organizations, including clients/owners, main contractors, subcontractors, consultants and experts from academia. A sample size of 450 was targeted with the aim to reduce the sampling error by collecting a larger data set, and to ensure that data-set was at least 9 times to the 24 observed variables of SC scale and also above the safe threshold of 200 [47,49]. The data were collected from 41 under-construction high-rise building projects (at least 70 m high) in Pakistan. These projects were spread over 6 major cities; Karachi (28), Lahore (7), Rawalpindi and Islamabad (3), Faisalabad (2), and Hyderabad (1). Before distributing the questionnaire, respondents were briefed about its importance and were requested to fill it truthfully. The confidentiality of their response was also guaranteed. A total of 600 survey questionnaires were circulated during the period from March to June 2019; however, despite repeated requests, only 426 valid responses could be collected with a response rate of 71%. The reliability of the collected data and methodology adopted for data treatment have already been comprehensively described in Zahoor et al. [47]. The same has been adhered to in this study.

3.3. Data Analysis

SPSS was used to calculate and analyze the descriptive statistics of all the demographic variables. Cross-tabulation was conducted to check the variance in respondents' distribution among various sub-categories of demographic variables. Kolmogorov-Smirnov and Shapiro-Wilk normality tests were conducted to know the data normality [50]. As all of the demographic variables and SC statements were found to be non-normal ($p < 0.05$), non-parametric tests were conducted [50,51]. Accordingly, instead of Pearson correlation coefficients, Spearman's rho correlation coefficients were calculated to analyze the correlations among demographic variables [52].

To analyze the effect of various sub-categories of each demographic variable on twenty-four SC statements, independent sample Kruskal-Wallis and Mann-Whitney U tests were conducted [51,53]. Demographic variables were treated as independent variables whereas MSCS of each SC statement was treated as a dependent variable [36]. It resulted in identifying the statistically different cases (twelve in number), which were further analyzed by calculating MSCS of the sub-categories of heightened demographic variables.

4. Analysis and Results

4.1. Demographic Data Descriptive Analysis

Out of fourteen (14) designated demographic variables, only ten (10) could be investigated, including: working level, age, marital status, working hours per week, dependent family members, level of education, type of employer/organization, service in the current company, work experience in construction industry, and smoking habit. The distribution of 426 respondents among these demographic variables and their sub-categories are summarized in Table 2. It is pertinent to state that three demographic variables of work trade, city they belong, and type of safety training attended, could not be analyzed as sufficient information was not provided by the respondents. Similarly, demographic variable of gender could not be analyzed as almost all of the valid responses were provided by the male employees [39].

Besides having varied experience of working on building projects, respondents had represented different working levels and types of employers/organizations (Table 2), such as: 19.95% frontline workers working as labour (N = 85), 6.1% foremen (N = 26), 19.25% site engineers (N = 82) and 13.62% supervisors (N = 58). The supervisory staff was further employed in the capacity of supervisors (N = 37) and surveyors (N = 21). Similarly, 23% (N = 98) were employed at managerial levels working in the capacity of construction managers (N = 55), resident engineers (N = 26), and project managers (N = 17). Likewise, 18.08% (N = 77) were safety officials working as safety officers (N = 31) and safety inspectors (N = 46).

The respondents' distribution as per type of their employer/organization was: clients/owners (N = 77), main contractors (N = 88), subcontractors (N = 133), consultants (N = 86) and academic experts (N = 42). Likewise, over 65% of the respondents (N = 277) had three or more family members to support including their parents. It is, however, encouraging that very few of the respondents (5.2%) smoked while at work. The statistics also revealed that 51.88% of the respondents represented the main and subcontractors, and they were mostly involved in the on-site construction activities. Moreover, over 90% of the respondents had a work experience of less than 5 years with their current employer, depicting a trend of frequently changing the employers. It was revealed as one of the main reasons for construction companies to not invest in the safety training of their workers.

Interestingly, young engineers and workers were found more cooperative in giving their feedback to the survey questionnaire as compared to the experienced employees. This is evident from the fact that over 68% of the respondents were under the age of 40 years, and over 50% of the respondents had a work experience of fewer than 10 years. Overall, the analysis of descriptive statistics depicts that this study's data-set reasonably embodies all types of employers/organizations, working levels, age groups, family responsibilities and education levels.

Table 2. Respondents’ distribution as per sub-categories of demographic variables.

Demographic Variable	Total (N = 426)	Demographic Variable	Total (N = 426)
Working Level		Age	
Frontline Worker	85 (19.95%)	20 years or below	93 (21.83%)
Foreman	26 (6.1%)	21–30 years	105 (24.65%)
Site Engineer	82 (19.25%)	31–40 years	94 (22.06%)
Supervisor	@ 58 (13.62%)	41–50 years	79 (18.55%)
Construction Manager	# 98 (23%)	51–60 years	43 (10.09%)
Safety Official	& 77 (18.08%)	61 years or above	12 (2.82%)
Gender		Marital status	
Male	426 (100%)	Single	107 (25.1%)
Female	-	Married	319 (74.9%)
Working hours per week		Dependent family members	
Less than 40 h	13 (3.1%)	None	15 (3.5%)
41 to 48 h	77 (18.1%)	1 to 2	134 (31.5%)
49 to 56 h	133 (31.2%)	3 to 4	166 (39%)
Over 56 h	203 (47.7%)	5 to 6	100 (23.5%)
Level of education &		7 or more	11 (2.6%)
Below primary	21 (4.93%)	Type of employer/organization	
Primary	32 (7.51%)	Client/Owner	77 (18.08%)
Middle	41 (9.62%)	Main contractor	88 (20.66%)
Secondary	17 (3.99%)	Subcontractor	133 (31.22%)
Diploma	135 (31.69%)	Consultant	86 (20.19%)
Degree or higher	180 (42.25%)	Academia	42 (9.86%)
Experience in the current company		Work experience in construction industry	
Less than 1 year	174 (40.85%)	Less than 5 year	133 (31.22%)
1–5 years	213 (50%)	6–10 years	81 (19.01%)
6–10 years	24 (5.63%)	11–15 years	106 (24.88%)
11–15 years	10 (2.35%)	16–20 years	68 (15.96%)
More than 15 years	5 (1.17%)	More than 20 years	38 (8.92%)
Smoking habit			
I don’t smoke		157 (36.9%)	
I smoke, but not at work		247 (58.0%)	
I smoke even at work (including lunch time & break)		22 (5.2%)	

Note: The percentages may not add to 100 because of rounding errors. # 55 are construction managers, 26 are resident engineers and 17 are project managers. & 31 are safety officers and 46 are safety inspectors. @ 37 are supervisors and 21 are surveyors. & Level vis-à-vis Years of education: Primary = 5 years, Middle = 8, Secondary = 10, Diploma = 12, Degree = 16 years.

4.2. Cross-Tabulation

Cross-tabulation was conducted to get a better picture of the distribution of various sub-categories of the demographic variables among the respondents. The results are displayed in Tables 3–5 and Figure 1. Cross-tabulation helped in determining the respondents’ distribution, as: (1) working level vis-à-vis type of employer/organization and level of education, and (2) working hours per week vis-à-vis working level and work experience in the construction industry.

The results in Table 3 revealed that 85 frontline workers symbolized both the main contractors (N = 42) and subcontractors (N = 43) groups, whereas, foremen (N = 26) represented only subcontractor group. It is pertinent to state that only those academic experts (N = 42) were invited to participate in SC survey who were providing consultancy services on building projects at various working level, such as supervisors (N = 2), construction managers (N = 33) and safety officials (N = 7). Likewise, the consultant group represented the supervisory consultants only (and not the design consultants) who were employed by the client/owner to monitor the quality of under-construction projects.

Table 3. Respondents' distribution as per their working level vis-à-vis type of employer/organization.

Working Level	Type of Employer/Organization					Total
	Client/Owner	Main Contractor	Subcontractor	Consultant	Academia	
Frontline Worker	-	42	43	-	-	85
Foreman	-	-	26	-	-	26
Supervisor	13	7	17	19	2	58
Site Engineer	20	22	16	24	-	82
Construction Manager	15	10	22	18	33	98
Safety Official	29	7	9	25	7	77
Total	77	88	133	86	42	426

Table 4. Respondents' distribution as per their level of education vis-à-vis working level.

Level of Education	Working Level						Total
	Frontline Worker	Foreman	Supervisor	Site Engineer	Construction Manager	Safety Official	
Below primary	21	-	-	-	-	-	21
Primary	32	-	-	-	-	-	32
Middle	32	9	-	-	-	-	41
Secondary	-	8	9	-	-	-	17
Diploma	-	9	47	3	1	75	135
Degree or higher	-	-	2	79	97	2	180
Total	85	26	58	82	98	77	426

Table 5. Respondents' distribution as per their working hours per week vis-à-vis working level.

Working Hours Per Week	Working Level						Total
	Frontline Worker	Foreman	Supervisor	Site Engineer	Construction Manager	Safety Official	
Less than 40 h	1	-	1	2	2	7	13
41 to 48 h	-	-	18	15	22	22	77
49 to 56 h	35	3	16	16	37	26	133
Over 56 h	49	23	23	49	37	22	203
Total	85	26	58	82	98	77	426

Referring to Table 4, most of the site engineers and construction managers possessed a university level qualification in their respective fields. Likewise, most of the supervisors (47 out of 58) and safety officials (75 out of 77) completed at least a diploma level certification in civil and occupation safety and health, respectively. However, frontline workers were found to be uneducated, having a maximum of middle-level education with no safety certification. Notably, none of the safety officers possessed a university degree in occupational safety & health. Even the safety directors possessed only a national/international level certification in safety, in addition to their professional degree in civil engineering or construction management. Such a situation dictates to organize regular safety training workshops for frontline workers, foremen and supervisors.

Appallingly, a large percentage of workforce (78.87%) i.e., 336 out of 426 respondents were employed for more than 48 h per week, as shown in Tables 2 and 5. It was clarified by most of the frontline workers and foremen that they are recurrently employed, with their consent, for paid overtime; however, this causes them a higher level of fatigue and tiredness. Nonetheless, a steady decline was observed in working hours per week with an increase in the industry experience, as displayed in Figure 1. This necessitates the enforcement of strict regulations by government agencies to reduce working hours, especially for frontline workers and foremen.

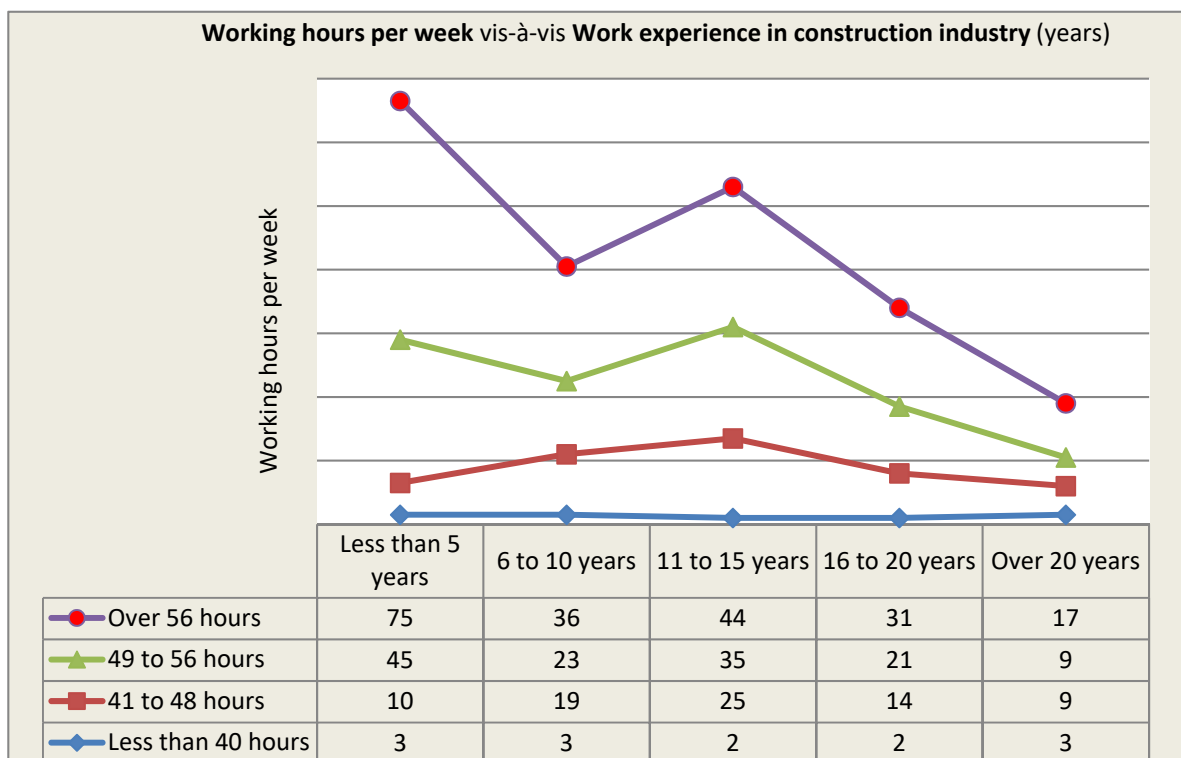


Figure 1. Respondents’ distribution as per their working hours per week vis-à-vis work experience (years) in construction industry.

4.3. Mean SC Level of All Sub-Categories of Demographic Variables

Mean SC values were calculated for all sub-categories of demographic variables to examine the differences in their SC levels. A careful analysis of the statistics tabulated in Table 6 revealed that the two demographic variables of the type of employer/organization and smoking habit did not have any significant difference in SC score of their respective sub-categories, however, they had developed noteworthy impact on other demographic variables.

Among various sub-categories of working level, supervisors achieved a higher safety performance level (mean = 3.162) than all other sub-categories. The results also revealed that employees who were married (mean = 3.891), aged between 21 to 40 years (mean = 3.164) and over 50 years (mean = 3.179), worked for less than 40 h per week (mean = 3.263), had 5 or more dependent family members (mean = 3.368), had more than 5 years of service in the current company (mean = 3.878), and 15 years of work experience in the construction industry (mean = 3.178), attained a relatively higher SC level than other related sub-categories. Conversely, employees in the age group of 20 years or below (mean = 2.919) and between 41 to 50 years (mean = 2.941), working for over 48 h per week (mean = 2.752), having 4 or less dependent family members (mean = 2.991), having only primary level of education (mean = 2.917), and less than one year of experience in the current company (mean = 2.454), achieved a relatively lower SC level than other related sub-categories. A special focus on these sensitive sub-categories of demographic variables can markedly enhance overall SC level.

Table 6. Mean SC level of each sub-category of the demographic variables.

Demographic Variable	Mean	Demographic Variable	Mean
Working Level		Age	
Frontline Worker	3.079	20 years or below	2.919
Foreman	3.022	21–30 years	3.164
Supervisor	3.162	31–40 years	3.164
Site Engineer	3.030	41–50 years	2.941
Construction Manager	3.082	51–60 years	3.179
Safety Official	3.103	61 years or above	3.182
Gender		Marital status	
Male	3.083	Single	3.061
Female	-	Married	3.891
Working hours per week		Dependent family members	
Less than 40 h	3.263	None	2.907
41 to 48 h	3.192	1 to 2	2.912
49 to 56 h	2.752	3 to 4	2.991
Over 56 h	2.696	5 to 6	3.368
Level of education		7 or more	
Below primary	2.914	Type of employer/organization	
Primary	2.917	Client/Owner	3.163
Middle	3.209	Main contractor	3.056
Secondary	3.181	Subcontractor	3.039
Diploma	3.128	Consultant	3.093
Degree or higher	3.156	Academia	3.115
Experience in the current company		Work experience in construction industry	
Less than 1 year	2.454	Less than 5 year	3.065
1–5 years	2.567	6–10 years	3.066
6–10 years	3.878	11–15 years	3.059
11–15 years	2.987	16–20 years	3.178
More than 15 years	2.996	More than 20 years	3.183
		Smoking habit	
		I don't smoke	3.063
		I smoke, but not at work	3.085
		I smoke even at work (including lunch time & break)	3.084

4.4. Data Normality

Normality test calculates the probability of knowing whether the sample is drawn from a normal population or not [9]. The hypotheses for the normality test are:

H0. The data are not significantly different than a normal population.

H1. The data are significantly different than a normal population.

If the sig. value for normality test is higher than 0.05, it implies that the data are normal and vice versa [10]. For small sample sizes with less than 50 responses, the Shapiro-Wilk normality test is preferred, whereas for large samples the Kolmogorov-Smirnov normality test with Lilliefors adjustment is applied [50]. As the sig. values for all demographic variables and twenty-four SC statements were observed to be less than 0.05, null hypothesis was rejected. Therefore, non-parametric tests were conducted for further analysis of the non-normal data [50,51].

4.5. Correlation among Demographic Variables

As this study's data-set was non-normal, Spearman's rho correlation coefficients were calculated to check the existence of correlations among demographic variables [51]. A sig. value of more than 0.05 implied that no correlation existed between the variables and vice versa [52]. The sig. values and correlation coefficients of the ten (10) demographic variables are formulated in Table 7. These values also represent the positive or negative strength of the correlations.

Table 7. Non-parametric correlations among the demographic variables.

No	Demographic Variable	Spearman's Rho	1	2	3	4	5	6	7	8	9	10
1	Working level	Correlation Coefficient Sig. (2-tailed)	1									
2	Age	Correlation Coefficient Sig. (2-tailed) N	0.643 ** 0.000 426	1								
3	Marital status	Correlation Coefficient Sig. (2-tailed) N	0.695 ** 0.000 426	0.731 ** 0.000 426	1							
4	Working hours per week	Correlation Coefficient Sig. (2-tailed) N	−0.274 ** 0.000 426	−0.148 ** 0.002 426	−0.231 ** 0.000 426	1						
5	Dependent family members	Correlation Coefficient Sig. (2-tailed) N	0.481 ** 0.000 426	0.667 ** 0.000 426	0.588 ** 0.000 426	−0.092 0.059 426	1					
6	Level of education	Correlation Coefficient Sig. (2-tailed) N	0.586 ** 0.000 426	0.603 ** 0.000 426	0.708 ** 0.000 426	−0.137 ** 0.005 426	0.418 ** 0.000 426	1				
7	Type of employer/organization	Correlation Coefficient Sig. (2-tailed) N	0.170 ** 0.000 426	0.322 ** 0.000 426	0.197 ** 0.000 426	−0.229 ** 0.000 426	0.239 ** 0.000 426	0.230 ** 0.000 426	1			
8	Experience in the current company	Correlation Coefficient Sig. (2-tailed) N	0.366 ** 0.000 426	0.425 ** 0.000 426	0.414 ** 0.000 426	−0.064 0.184 426	0.339 ** 0.000 426	0.327 ** 0.000 426	0.093 0.054 426	1		
9	Work experience in construction industry	Correlation Coefficient Sig. (2-tailed) N	0.577 ** 0.000 426	0.944 ** 0.000 426	0.638 ** 0.000 426	−0.131 ** 0.007 426	0.624 ** 0.000 426	0.446 ** 0.000 426	0.290 ** 0.000 426	0.427 ** 0.000 426	1	
10	Smoking habit	Correlation Coefficient Sig. (2-tailed) N	0.000 0.996 426	−0.072 0.138 426	−0.120 * 0.013 426	0.019 0.701 426	−0.069 0.158 426	−0.142 ** 0.003 426	0.045 0.351 426	−0.001 0.980 426	−0.057 0.240 426	1

** Correlation is significant at 0.01 level (2-tailed), * Correlation is significant at 0.05 level (2-tailed). No correlation exists between variables if $p > 0.05$.

The results revealed that most of the demographic variables, except few, were strongly correlated with each other as they achieved sig. values of less than 0.05, such as working level, age, marital status, level of education and work experience in construction industry. It also decrees that most of the demographic variables influence each other.

Nonetheless, no correlation existed among the demographic variables of dependent family members and working hours per week. Likewise, experience in the current company could not be correlated with type of employer/organization as well as working hours per week. Similarly, working hours per week could not develop any correlation with dependent family members, experience in the current company, and smoking habit. Moreover, smoking habit could not develop any correlation with most of the demographic variables except for having a negative correlation with marital status and level of education.

A diminution was observed in smoking habit with an increase in the level of education, as both variables were negatively correlated, having a correlation coefficient value of -0.142 . Likewise, existence of a negative correlation of -0.12 between smoking habit and marital status depicts that married employees smoke less as compared to unmarried employees. In the same way, working hours per week were negatively correlated with many of the demographic variables, such as work experience in the construction industry. Figure 1 also displays that working hours per week decrease, especially for all the sub-categories of over 48 h, with an increase in the work experience in the construction industry. This implies that employees with less experience are overburdened in terms of working hours, which adversely effects the safety performance [37]. Surprisingly, working hours per week could not develop any correlation with dependent family members, experience in the current company, and smoking habit.

4.6. Effect of Demographic Variables on SC—Independent Sample Kruskal-Wallis and Mann-Whitney U Tests

The safety performance for all of the sub-categories of ten (10) demographic variables have been summarized in Table 6 and discussed in Section 4.3 above. However, the distribution of these sub-categories among twenty-four SC statements was further analyzed. Independent Sample Kruskal-Wallis test was performed for nine demographic variables having more than two sub-categories [51]. While, Mann-Whitney U test was conducted for the demographic variable of marital status having only two sub-categories [53]. A sig. value of less than 0.05 implied that the distribution of a particular SC statement was not same (i.e., statistically different) among various sub-categories of a demographic variable and vice versa [51]. The results are summarized in Table 8. As sig. values for most of the SC statements were observed to be higher ($p > 0.05$), it can be inferred that there is no significant difference in safety performance levels (i.e., the distributions) of various sub-categories of demographic variables, except for a few which are examined in detail in ensuing sub-section.

Table 8. Independent sample Kruskal-Wallis and Mann-Whitney U tests.

SC Statement	Mean SC Score	Significance Value—The Distribution of SC Statements across Sub-Categories of Each Demographic Variable									
		Working Level *	Age *	Marital Status **	Working Hours per Week *	Dependent Family Members *	Level of Education *	Type of Employer/Organization *	Experience in the Current Company *	Work Experience in Construction Industry *	Smoking Habit *
SC1	2.841	0.284	0.016	0.579	0.122	0.268	0.272	0.465	0.274	0.473	0.124
SC2	2.751	0.678	0.016	0.240	0.201	0.326	0.432	0.456	0.579	0.586	0.121
SC3	2.704	0.279	0.039	0.121	0.579	0.121	0.131	0.794	0.179	0.392	0.282
SC4	2.901	0.772	0.349	0.784	0.444	0.849	0.358	0.755	0.246	0.634	0.337
SC5	2.808	0.268	0.176	0.406	0.433	0.517	0.225	0.130	0.619	0.699	0.161
SC6	2.798	0.652	0.410	0.955	0.199	0.076	0.389	0.627	0.685	0.542	0.892
SC7	2.822	0.102	0.147	0.134	0.542	0.322	0.162	0.818	0.867	0.889	0.533
SC8	2.831	0.334	0.153	0.741	0.245	0.193	0.327	0.591	0.200	0.507	0.317
SC9	3.047	0.004	0.024	0.454	0.437	0.022	0.413	0.982	0.372	0.018	0.369
SC10	3.225	0.833	0.063	0.849	0.563	0.180	0.101	0.343	0.982	0.963	0.518
SC11	3.461	0.107	0.230	0.032	0.433	0.126	0.758	0.608	0.646	0.461	0.151
SC12	3.657	0.801	0.281	0.151	0.993	0.474	0.230	0.237	0.127	0.364	0.760
SC13	3.624	0.742	0.108	0.278	0.888	0.826	0.654	0.841	0.587	0.524	0.719
SC14	3.535	0.915	0.380	0.339	0.457	0.737	0.219	0.785	0.105	0.614	0.926
SC15	3.601	0.602	0.626	0.302	0.513	0.522	0.398	0.473	0.291	0.889	0.717
SC16	3.113	0.764	0.545	0.945	0.191	0.755	0.850	0.365	0.310	0.314	0.455
SC17	2.324	0.441	0.309	0.941	0.654	0.970	0.437	0.390	0.105	0.693	0.801
SC18	2.611	0.340	0.189	0.343	0.824	0.372	0.462	0.753	0.021	0.310	0.093
SC19	2.404	0.385	0.642	0.591	0.181	0.193	0.613	0.360	0.872	0.288	0.091
SC20	2.461	0.666	0.331	0.575	0.536	0.643	0.500	0.992	0.310	0.893	0.319
SC21	2.305	0.049	0.018	0.305	0.904	0.358	0.005	0.303	0.202	0.106	0.850
SC22	4.047	0.438	0.530	0.657	0.187	0.633	0.441	0.839	0.558	0.961	0.532
SC23	4.048	0.490	0.958	0.997	0.954	0.134	0.892	0.945	0.293	0.610	0.092
SC24	4.151	0.488	0.666	0.750	0.245	0.852	0.845	0.908	0.905	0.679	0.674

** Independent sample Mann-Whitney U tests, * Independent sample Kruskal-Wallis test.

4.7. Demographic Variables Having Varied Safety Performance Levels for Their Sub-Categories

As highlighted in Table 8, a few of the demographic variables had achieved varied safety performance levels for their sub-categories ($p < 0.05$) against certain SC statements. They include: working level, age, level of education, experience in the current company, dependent family members, work experience in construction industry, and marital status. These seven demographic variables and their corresponding SC statements (SC1, SC2, SC3, SC9, SC11, SC18 and SC21) are further analyzed and deliberated below.

4.7.1. Working Level

MSCS of each sub-category of the demographic variable of working level against the highlighted SC statements (i.e., SC9 and SC21) is shown in Table 9. The results indicate that foremen achieved a relatively lower performance level (MSCS = 2.38) for SC9 (i.e., working with defective equipment is not at all allowed), whereas supervisors attained a higher SC level (MSCS = 3.34). Supervisors also achieved a higher SC level (mean = 3.162) than other sub-categories of working level (Table 6). This reflects that people at managerial levels are generally perceived to have achieved a higher SC level at their worksites, however, foremen and frontline workers do not agree with their perception [11,37], as defective equipment is persistently found on worksites. Hence, construction companies must ensure to immediately replace non-defective equipment, especially for the foremen and frontline workers.

Table 9. Mean values of SC statements for significantly different demographic variables (Age and Working level).

Demographic Variable		MSCS			
Working Level				SC9	SC21
Frontline Worker				2.41	2.14
Foreman				2.38	2.58
Supervisor				3.34	2.37
Site Engineer				2.97	2.35
Construction Manager				3.05	2.57
Safety Official				2.98	2.55
Age (years)	SC1	SC2	SC3	SC9	SC21
20 or below	2.83	2.87	2.88	3.24	2.19
21 to 30	2.71	2.67	2.56	2.95	2.30
31 to 40	3.10	2.71	2.61	2.84	2.63
41 to 50	2.53	2.42	2.43	2.84	2.14
51 to 60	2.93	2.93	3	3.40	2.35
61 or above	3.33	3.42	2.92	3.50	2.58

Likewise, for SC21 (i.e., some jobs here are difficult to do safely due to physical conditions on site), frontline workers attained a relatively lower performance level (MSCS = 2.14) than other sub-categories of working level. It specifies that frontline workers had a different opinion than other employees. Noticeably, SC21 also achieved the lowest SC level (mean = 2.305) compared with other SC statements (Table 1). Hence, there is a need to improve physical conditions at worksite for all working levels, especially for frontline workers, so as to complete all jobs safely and achieve better SC level.

4.7.2. Respondents' Age

MSCS of each sub-category of the demographic variable of age, against the highlighted SC statements (i.e., SC1, SC2, SC3, SC9 and SC21) is shown in Table 9. The results dictate that employees aged between 41 to 50 years achieved the lowest MSCS for SC1 (i.e., the company really cares about the health & safety of the people who work here), SC2 (i.e., adequate health & safety training is given by the company to perform the job safely), SC3 (i.e., people here always wear their PPEs), and SC21 (i.e., some jobs here are difficult to do safely due to physical conditions on site). Likewise, performance level of SC9 (i.e., working

with defective equipment is not at all allowed), for the age groups between 31 to 50 years, was lower (MSCS = 2.84) than the other age groups.

For the overall SC level (Table 6), employees in the age group of 'over 50 years' relatively achieved a higher SC level (mean = 3.179) [39,44], while SC level of the employees in the age group of '41 to 50 years' was found to be relatively lower than other age groups (mean = 2.914). Hence, it can be concluded that construction companies need to focus more on the age group of '41 to 50 years' by really caring about their health & safety, providing them adequate safety training, and emphasizing on the significance of wearing PPEs [37]. Likewise, their defective equipment must be immediately replaced and physical conditions at worksite must be improved so as to complete all jobs safely.

4.7.3. Level of Education

Among all sub-categories of level of education (Table 10), employees with below primary and primary level of education achieved a relatively lower MSCS of 1.61 and 1.68, respectively, for SC21 (i.e., some jobs here are difficult to do safely due to physical conditions on site) [35,38]. A similar situation is noted in the overall SC level where employees with below primary and primary level of education achieved a lower performance level of 2.914 and 2.917, respectively, among all sub-categories of the level of education (Table 6). Likewise, SC21 achieved the lowest SC level (mean = 2.305) compared to all other SC statements (Table 1). Such a situation accentuates to provide safe working conditions at construction sites, especially for the employees having only primary level of education.

Table 10. Mean values of SC statements for significantly different demographic variables (Education, Family members, Experience in company/industry and Marital status).

Demographic Variable	MSCS	Demographic Variable	MSCS
Level of education &	SC21	Dependent family members	SC9
Below primary	1.61	None	2.85
Primary	1.68	1 to 2	2.87
Middle	2.12	3 to 4	2.94
Secondary	2.18	5 to 6	3.98
Diploma	2.29	7 or more	4.12
Degree or higher	2.52		
Experience in the current company	SC18	Work experience in construction industry	SC9
Less than 1 year	2.48	Less than 5 year	3.01
1–5 years	2.77	6–10 years	3.13
6–10 years	2.88	11–15 years	2.24
11–15 years	3.00	16–20 years	3.38
More than 15 years	2.99	More than 20 years	3.42
Marital status	SC11		
Single	3.20		
Married	3.46		

& Level vis-à-vis Years of education: Primary = 5 years, Middle = 8, Secondary = 10, Diploma = 12, Degree = 16 years.

4.7.4. Experience in the Current Company

As shown in Table 8, safety performance levels of various sub-categories of experience in the current company were observed to be same ($p > 0.05$) for all SC statements, except for SC18 (i.e., Some health & safety rules or procedures are difficult to follow as they are either too complex or not practical). The results in Table 10 indicate that employees having an experience of less than one year and 1–5 years, achieved a relatively lower MSCS of 2.48 and 2.77, respectively, for SC18.

Noticeably, SC18 also achieved an equitably lower SC level (mean = 2.611) among all other SC statements (Table 1). Likewise, employees with 11–15 years and over 15 years of experience in the current company achieved a slightly lower SC level of 2.987 and 2.996, respectively (Table 6). Contrarily, mean SC level for those employees who have

worked in the current company for 6–10 years was relatively higher (mean = 3.878). This indicates that alertness level towards safety declines once employees get conversant with their everyday job.

Hence, there is a need to provide periodic/refresher safety training sessions to all the employees on regular basis. Likewise, employees with less than one year of experience in the current company need to be signaled regarding the significance of all health and safety rules and procedures, irrespective of facing any hitches in their enactment at project sites.

4.7.5. Dependent Family Members and Work Experience in Construction Industry

Safety performance levels of various sub-categories of the two demographic variables of dependent family members and work experience in construction industry were observed to be same ($p > 0.05$) for all SC statements except for SC9 (i.e., working with defective equipment is not at all allowed), as shown in Table 8. SC9 also achieved a relatively higher SC level (mean = 3.047) compared with other SC statements (Table 1). The aforesaid two demographic variables were further explored for their performance against SC9.

Among various sub-categories of dependent family members, as shown in Table 10, employees having 5 or more family members achieved a relatively higher performance level (MSCS = 3.98) for SC9 [42], while employees having 4 or less family members achieved a lower safety performance level (MSCS = 2.94). Similarly, among several sub-categories of work experience in the construction industry, employees with an experience of 11–15 years had a relatively lower performance level (MSCS = 2.24) for SC9, whereas employees with an experience of over 15 years attained a relatively higher performance level (MSCS = 3.38).

Considering the overall SC, employees having a work experience of over 15 years in the construction industry (mean = 3.178) and/or having 5 or more dependent family members (mean = 3.368) achieved a higher SC level than other sub-categories (Table 6). This finding partially supports the study of Agumba and Haupt [35] that has reported the occurrence of the highest number of accidents to the employees with lesser experience.

Henceforth, construction companies should concentrate on providing non-defective equipment to those employees who are having 4 or less dependent family members and 11–15 years of work experience in the construction industry. It will not only help in augmenting the performance level of SC9 against the pinpointed demographic variable's group but will boost the overall SC at worksite.

4.7.6. Marital Status

Safety performance level of marital status was observed to be same ($p > 0.05$) for all SC statements, except for SC11 (i.e., there is always good preparedness for emergency here), as shown in Table 8. Among all SC statements, SC11 achieved a relatively higher SC score of 3.461 (Table 1). Likewise, SC level of married employees (mean = 3.891) was noticed to be slightly higher than the unmarried employees (mean = 3.061), as shown in Table 6 [36,42]. Similarly, for SC11, married employees achieved a relatively higher MSCS of 3.46, compared with unmarried employees who achieved a score of 3.20 (Table 10). This may be due to the presence of an enhanced sense of responsibility among married employees [38].

5. Discussion

The study has critically analyzed the impact of the ten (10) personal attributes of the employees and their corresponding sub-categories on the twenty-four SC statements in Pakistani construction industry. The analysis of descriptive statistics indicates that the current study's data-set was highly reliable and all-inclusive for the analysis, as it contained the responses from all types of employers/organizations, working levels, age groups and education levels. Moreover, most of the demographic variables, except few, were noticed to be strongly correlated with each other. This implies that demographic variables do influence each other. The working hours per week was correlated with all the demographic variables except dependent family members, experience in the current company, and smoking habit.

However, it was negatively correlated with work experience in the construction industry. A negative correlation also existed between marital status and smoking habit. Similarly, smoking habit developed a correlation with only two demographic variables of marital status and level of education. On the other hand, experience in the current company could not be correlated with working hours per week and type of employer/organization.

Overall, the study could not find a noteworthy difference in the perception of SC among various sub-categories of type of employer/organization i.e., contractors, subcontractors, consultants and academia. This is in contrast with the findings of Choudhry et al. [42] and Fang et al. [36], wherein a relatively lower SC level was achieved by the subcontractors, compared with clients/owners, main contractors and consultants. Likewise, the married employees were observed to be more safety compliant due to their enhanced sense of responsibility. It was quite encouraging to observe a lesser percentage of employees smoking at their worksite, and the number of smokers among married employees were fewer than the unmarried employees. Furthermore, no significant relationship was sensed between smoking habit and SC [36]. Nevertheless, a decrease was observed in the smoking habit with an increase in the level of education.

It is worth stating that people at managerial levels perceived to achieve a higher SC level at their worksites, but frontline workers and foremen did not agree to their perception. It is aligned with the findings of Chan et al. [11] and Mosly and Makki [29]. These frontline workers were found to be less educated, having middle level of education, at the most. Also, they have not attended any certified safety training. According to Agumba and Haupt [35], the higher the education level, the higher the safety perception; thus, a formal education system is needed for safety awareness of all employees, especially for the frontline workers [31,38]. It was also observed that safety alertness level generally declines among the employees once they get accustomed with their tasks; thus, necessitating to conduct refresher safety training session periodically. Similar findings are accentuated by the study of Han et al. [30], wherein continued safety refresher training is suggested for the employees in the middle of their career.

The study articulates that young employees with less than one year of experience in their current company need to be counseled about the importance of implementing each health and safety rule and procedure, regardless of the difficulty in their implementation at worksites [31,39]. It was also noticed that employees tend to regularly change their company/employer; therefore, employers vacillate when it comes to allocating ample funds for safety training of their employees, considering it to be overgenerous and unviable investment.

According to Fang et al. [36] and Choudhry et al. [42], employees who are married, older, and having more dependent family members generally achieve a higher SC score. This study also concludes that employees who are married, aged between 21 to 40 years and over 50 years, supporting 5 or more family members, working for only 40 h per week, having over 5 years of service in the current company and/or more than 15 years of industry experience, attained a fairly higher SC level. This finding is partially supported by past studies wherein employees over 50 years of age were found to achieve higher SC level [13,44]. Saedi et al. [14] have also concluded that the older and married employees and those with more family members are observed to be more safety compliant.

On the other hand, employees in the age group of 20 years or below and between 41 to 50 years, working for more than 48 h per week, having 4 or less dependent family members, having only primary education, and/or less than one year of experience in the current company, achieved a comparatively lower SC level. This is partially supported by the findings of Lin et al. [39] and Meng and Chan [31] that has observed a poor safety behavior among the young and unmarried employees having less industry experience. It is also in line with the findings of Agumba and Haupt [35], Meng and Chan [31] and Vahed et al. [38] wherein employees having below primary level of education had a relatively lower performance level.

The results also dictate that construction companies need to focus more on frontline workers and foremen, who have 4 or less dependent family members, primary education and fall in the age group of '41 to 50 years' by really caring about their health and safety, providing them adequate safety training, swiftly replacing their defective equipment, providing safe physical conditions at worksites, educating them regarding significance of wearing PPEs, and adhering to all the safety rules and procedures regardless of their implementation difficulty.

The demographic variable of working hours per week was observed to be negatively associated with industry's experience. On most of the worksites, workers were employed for more than 48 h per week, though with their consent. Especially, the employees with lesser experience were overstretched in terms of working hours; thus, causing them a higher level of fatigue. Hence, there is a need to enforce strict regulations by government agencies to reduce working hours, especially for frontline workers and foremen.

In addition to the aforementioned risky demographic variables, safety performance can be boosted by concentrating on the sensitive SC statements having bottommost performance level, as shown in Table 1 [47]. Noticeably, these sensitive SC statements pertain to safe work practices, physical conditions at worksite, and applicability/practicality of safety rules and procedures. They include: SC21 (i.e., some jobs here are difficult to do safely due to physical conditions on site) (mean = 2.305), SC17 (i.e., some health & safety rules and procedures do not reflect how the job is to be carried out) (mean = 2.324), SC19 (i.e., sometimes it is necessary to take risks to get the job done within given time) (mean = 2.404), SC20 (i.e., some health & safety procedures are too stringent in relation to the associated risks) (mean = 2.461), and SC18 (i.e., some health & safety rules or procedures are difficult to follow as they are either too complex or not practical) (mean = 2.611).

Given the above, there is a need to emphasize on improving the identified risky sub-categories of demographic variables, besides focusing on the SC statements having poorer safety performance level. It is believed that a joint focus on the underscored sub-categories of the demographic variable (i.e., personal attributes of the employees) and heightened SC statements will enhance the safety behavior of workers on under-construction building projects.

6. Conclusions and Recommendations

This study has investigated the ten (10) demographic variables and their sub-categories, for their associations with each other, as well as, their influence on the overall SC and corresponding twenty-four SC statements. Most of the demographic variables were observed to be correlated with each other, meaning thereby that they significantly impact each other.

The study found that the married employees smoke less as compared to single ones. Likewise, with an increase in the level of education, a decrease was noticed in the smoking habit. As expected, married employees were observed to be more safety compliant due to their enhance sense of responsibility. Likewise, people at the managerial level achieved a higher level of safety perception than the frontline workers and foremen who did not agree to managers' perception. It is of concern that frontline workers were observed to be mostly uneducated, having no safety training certification; thus, necessitating to launch a formal education system for safety awareness of all employees, especially for the frontline workers. As displayed in Figure 1, employees with less experience were distressingly overstressed in terms of working hours (for over 48 h per week), thus causing them a higher level of enervation. Therefore, the study endorses to enforce strict safety regulations by government agencies to reduce the working hours to 40 h per week, especially for the frontline workers and foremen.

The study concludes that employees who are married, aged between 21 to 40 years and over 50 years, supporting 5 or more family members, working for only 40 h per week, having more than 5 years of service in the current company and/or more than 15 years of industry experience, achieved a reasonably higher SC level. In contrast, employees in the age group of 20 years or below and between 41 to 50 years, working for more than

48 h per week, having 4 or less dependent family members, having only primary level of education, and/or less than one year of experience in the current company, attained a comparatively lower SC level. These employees' groups can be targeted for enhancing their safety behavior through safety education and training, and by granting incentives and promotions based on their safety performance. The study also realizes that frontline workers and foremen, who are less educated (having primary education), fall in the age group of '41 to 50 years' and having 4 or less dependent family members, need special attention. It is recommended to provide them adequate safety training, inculcating the importance of wearing PPEs, and ensuring the safe physical conditions at worksites. They should also be provided with non-defective equipment.

The study spotted that employees tend to regularly change their employer, thus making it inoperable and disproportionate for the employers to invest in the safety training of their employees. Moreover, safety alertness level was noticed to be declining among the employees after getting accustomed with their tasks; it necessitates conducting periodic refresher safety training sessions to maintain the safety alertness level among all employees, especially frontline workers and foremen. Likewise, employees with less working experience need to be sensitized regarding the significance of implementing each health and safety rule and procedure, regardless of the level of difficulty in their implementation at worksites.

This research has contributed to the body of knowledge by exploring those sub-categories of the demographic variables which were having the lowest safety performance level and were negatively impacting the identified sensitive SC statements. They can be targeted for necessary safety interventions. The study finally concludes that a synergized effort by key stakeholders in improving the safety behavior of the risky sub-categories of each demographic variable, and focusing on the sensitive SC statements pertaining to unsafe work practices and unsafe physical conditions at worksite (accentuated in Discussion Section), can productively complement the safety performance on worksites.

Limitations and Future Research Directions

The study has certain limitations. Simple analysis techniques have been adopted to identify the risky sub-categories of demographic variables. The data were mainly collected from six major cities in Pakistan, as high-rise buildings do not exist in all cities. Moreover, respondents had symbolized only the high-rise building projects, and representation of female employees could not be ensured during the survey, therefore, caution should be used while extrapolating this study's results to other cultural and regional settings with similar work environment. Yet, the study's methodology can be adopted to find the influence of various sub-categories of the demographic variables on SC in other industries of Pakistan as well as other developing countries. The study recommends conducting a cost-benefit analysis between the safety investment and the cost of accidents, in the regional context, to convince the construction stakeholders regarding the benefits of safety investment.

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