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# Gender-perceived workplace stressors by New Zealand construction professionals

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## ABSTRACT

The construction workplace is male-dominated and stressful, but little is known about gender-based differences in its stressors. This research examined the effect of gender and personal attributes on stressors in the New Zealand construction industry at four major levels: (1) individual, (2) group, (3) organizational, and (4) extra-organizational. Target respondents were professional construction members from Site Safe New Zealand, with 317 completed questionnaires and statistical analysis using the two-sample t-test, Kruskal-Wallis test, and Levene's test. The findings show that females have higher qualifications than males, but males have about ten years more experience and more completed projects than their female counterparts. Males reported significantly higher technical skills than females and there was no significant difference between genders regarding sector involvement. At the individual level, females were most affected by role conflict stress and the perception of different treatment because of gender. Males felt significantly higher stress over the variable 'on/off-site office/administration building conditions'. At the group level, there were no significant gender differences, but sexual harassment warranted further investigation. Within the organizational and extra-organizational levels, no variables differed significantly between genders. The construction workforce has a strong gender imbalance and efforts are needed to address this through better work-life balance.

## ARTICLE HISTORY

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## KEYWORDS

Construction industry;  
gender; personal attributes;  
stressor levels

## Introduction

In New Zealand (NZ), 10.5% of the workforce is in the construction industry, which is 3.5% higher than the UK workforce (Chan and Aghimien 2022). The NZ construction sector is the country's fourth largest employer, with 292,800 workers (MBIE 2022). However, NZ has a shortage of skilled construction workers, driving up costs and causing supply chain bottlenecks. There are massive capacity constraints during heavy demand and large workforce layoffs at all skill levels during downturns. These hinder strategic planning, skills investment and sustainable growth within this sector. The skills shortages, cost over-runs, fragmented and cyclic nature of the industry, coupled with demanding clients, problematic project relationships, migrant-dependent labour force, and lack of technological competencies, contribute to work-related stress and unsafe behaviour (Brown et al. 2020; Jelodar et al. 2020; Rees-Evans 2020; Davidson et al. 2021; Jenkin and Atkinson 2021; van Heerden et al. 2021; Pennington 2022).

The global construction industry has a strongly patriarchal culture and a predominantly male workforce (Norberg and Johansson 2021), with an estimated 9-15% female workers (Navarro-Astor et al. 2017; mConstruction Health and Safety NZ 2022). Reducing the gender imbalance may be a key factor in improving the sector's productivity (Rosa et al. 2017), so it is important to understand which factors are important in attracting and retaining females. There are several studies looking at the barriers preventing women from working in construction (Afolabi et al. 2019; Lekchiri and Kamm 2020; Naoum Shamil et al. 2020; Tijani et al. 2021; Ghanbaripour et al. 2023). There are studies comparing gender-based differences in performance in the construction industry

(Arditi et al. 2013), but there are relatively few studies looking at the effect of gender-based differences in perceived stress and in methods used for dealing with stress. These include early research on Australian construction professionals by Loosemore and Waters (2004) and more recent studies in Australia (Sunindijo and Kamardeen 2017), Sri Lanka (Panojan et al. 2022; Perera et al. 2022) and Nigeria (Jayeola et al. 2024). Similarly, in the NZ construction sector, the link between perceived work-related stress and gender is poorly understood and this is the research gap addressed here.

A conceptual framework (Figure 1) was developed to investigate the effect of gender and personal attributes on the perceived stressors at four major levels (individual, group, organizational and extra-organizational) in the NZ construction industry. The research objectives are:

1. To explore the relationship between gender and personal attributes, and
2. To show the effect of gender on perceived stressors in the context of the New Zealand construction industry.

Two research questions were formulated for this research study:

*RQ1: Do personal attributes differ significantly between females and males?*

*RQ2: Is there a significant difference in how females and males perceive the four major stressor levels?*

The paper is structured as a review of the literature, description of the methodology, analysis of the results, conclusions, recommendations, and a discussion of the impact of the work.

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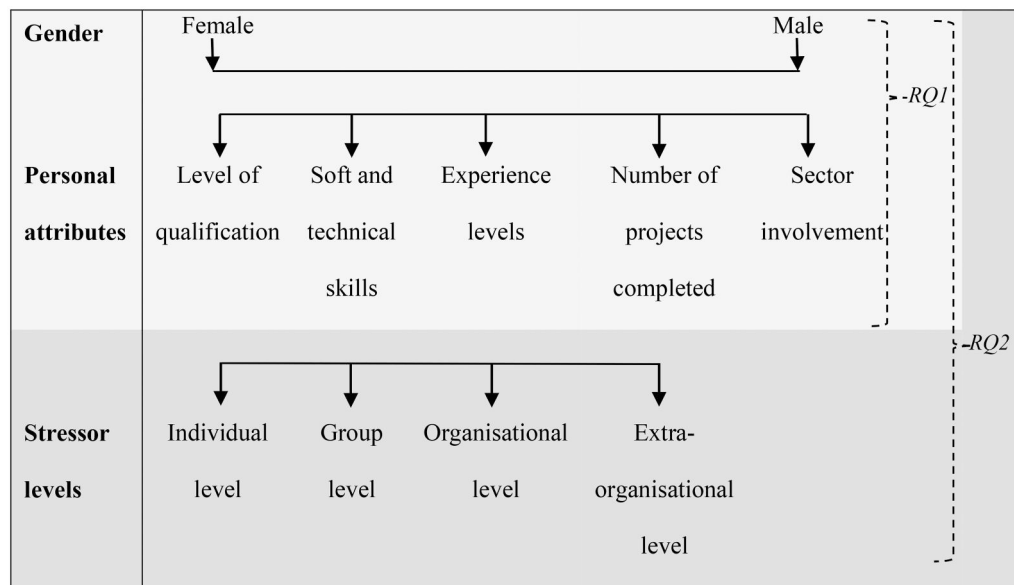


Figure 1. Conceptual framework.

## Literature review

The literature suggests that the construction industry is perceived as a complex, dynamic and challenging work environment (Senaratne and Rasagopalasingam 2017). Typical construction industry core stressors are: long working hours, large workload, time pressure, cognitive pressure, emotional challenges, communication and collaboration problems, unrealistic project schedules and budgets, and unethical practices on projects. These work-related stressors are also core triggers for adverse psychological and physical behaviours such as high absenteeism, burnout, fatigue, emotional distress, anxiety, depression, job dissatisfaction, organizational detachment, job disengagement, low esteem, changes in sleep patterns, lack of performance, lack of concentration, forgetfulness, poor decision making and suicide (Cattell et al. 2016; Sunindijo and Kamardeen 2017; SiteSafe 2019; Palaniappan et al. 2023).

### Post-Covid workplace stress is on the increase in the construction industry

A 2020 global survey of 2,081 construction industry professionals found high incidents of stress (97%), anxiety (87%), depression (70%), fatigue (96%), poor concentration (95%), feeling overwhelmed (91%), and low self-confidence (86%), experienced at least once within the last 12 months (Rees-Evans 2020). In NZ, construction worker's mental health related issues increased from 43% in 2021 to 47% in 2022 (Masilamani 2022). To reduce suicide rates and improve the general well-being of construction workers, the organization 'MATES in Construction' was launched in 2008 in Australia and in 2019 in New Zealand. Towards the end of 2021, a survey of 1,202 members showed a significant increase in workers' anxiety, fear, and frustration with the three major workplace stressors being high workload, COVID-19 protocols, and pressures from delays (Masilamani 2022; Morrison et al. 2022).

Globally, construction delays and cost overruns lead to long working hours and increased risk of accidents (Liu and Low 2011). Research suggests a positive correlation between stressors and accidents/injuries (Gouett et al. 2011; Nahrgang et al. 2011; Clarke 2012; Leung et al. 2016; Zheng et al. 2020). In New

Zealand, the construction sector ranks third (after Agriculture and Forestry) for work-related injury claims, with:

- an average of 31,600 work-related injuries reported yearly from 2002 to 2021, (StatsNZ 2022).
- 6,294 injuries resulting in more than one week away from work from October 2020 to October 2021 (WORKSAFE October 2020-October 2022).
- 91 fatalities from 2011 to 2021 (mConstruction Health and Safety NZ 2022).

With the current increase in skills shortage, supply chain challenges and lack of material available in NZ, the pandemic has exacerbated the pre-COVID stress levels experienced by construction workers (Liang et al. 2022; Rokooei et al. 2022).

### Gender effect on perceived workplace stressors

Early research found that females working in low level administration jobs experienced lower workplace stress than males (Tung, 1980; Davidson and Cooper 1980). However in managerial roles, while both genders were exposed to similar stressors, females had a stronger reaction to stress and were more likely to seek social support for it than males (Lim and Teo 1996; Kreitner and Kinicki, 2001). At that time little was known about the gender effect within the construction industry because its workforce was mostly male, with less than 1% of females in managerial roles in the UK construction industry (Ginige et al. 2007). However, amongst UK construction architects, females reported significantly lower overall job satisfaction and significantly higher stress-related health issues and work-life conflicts (Sang et al. 2007). Studies that considered stressors from all aspects of living (not just work) again found that females suffered more from stress but were better at coping with stress. The main stressors for females were from balancing work with family commitments and health-related events while men rated relationships, finance and work as major stressors (Matud 2004).

There has been an increase in females studying built environment degrees, but recruiting and retaining early-career women in construction jobs remains challenging (Oo et al. 2020; Zheng

et al. 2020). Female construction professionals experience unfair treatment (sexism and gender bias), role ambiguity, insecure employment, high workload, poor parental leave practices and work-family conflict, all contributing to burnout (Enshassi et al. 2016). Rosa et al. (2017) categorized these into three main barriers for females to succeed in the construction industry, namely stress, family-work life balance, and an unfavourable/biased opinion towards women. There have been very few studies specifically focussed on gender-based differences in stressors within the construction sector. In the Australian construction industry, males and females have some common stressors (such as time pressure, excessive workload, long work hours, and unpleasant work environment) but females face more discrimination, bullying, and sexual harassment leading to lower retention rates (Sunindijo and Kamardeen 2017). Additionally, in Sri Lanka and Nigeria, studies showed that females in construction were more stressed than males by family responsibilities and relied upon social networks to manage stress (Panojan et al. 2022; Perera et al. 2022; Jayeola et al. 2024).

In broader studies (beyond the construction industry) on gender-based reactions to stress, recent studies show that people have varying levels of resilience to stress (Samele et al. 2018) and that males and females have different mechanisms for coping with stress. Females talk about their stress with their network of family and friends whereas males tend to be more reserved and 'de-stress' through leisure activities (Kneavel 2021).

In summary, there is little research on gender-based differences in stressors within the construction workplace. This work will add to that body of knowledge in the New Zealand context and offer insights into addressing the gender imbalance in the global construction industry.

## Research method

### Sample size and expected response rate (power analysis)

A statistical power analysis assessed whether we could collect sufficient data to find meaningful differences between male and

female responses. Here, meaningful is defined as equivalent to at least a 0.5 standard deviation difference between population mean responses based on a two-sample t-test with equal variance.

It was assumed that the required sample size should give an 80% probability (power) to reject the null hypothesis of equal means with this level of actual difference. Since number of males in the construction industry vastly outnumber females, the most important determinant of power was the size of the smaller sub-sample, i.e. the number of females.

In New Zealand, the construction sector employs 292,800 workers, of whom 15% are females. Assuming a ratio of 0.15:0.85 for females ( $n_f$ ) to males ( $n_m$ ), the predicted sample ratio,  $n_f/n_m = 0.1765$ , requiring 333 observations for 80% power, with at least 50 females (Georgiev 2023). The data subsequently collected included 67 females, exceeding the minimum requirement, and 250 males. This was satisfactory from a power point of view (power exceeded 85%).

### Data collection tool (questionnaire development)

A questionnaire (Figure 2) was developed based on an instructive model of occupational stress with four major stressor levels: (1) individual, (2) group, (3) organizational and (4) extra-organizational (Kreitner and Kinicki 2001). 'Individual level stressors' arise directly from a person's work responsibilities and task demands (Fernet et al. 2004), for example, muscular stress while lifting, carrying or putting down objects. 'Group level stressors' include managerial behaviour and group dynamics, thus confirming that ineffective managers can create stress for their subordinates (Jacobs 2019). 'Organizational level stressors' typically affect substantial numbers of workers, for example, technophobia, loud noise, poor lighting and dirty environment. 'Extra-organizational level stressors' include factors outside the organization, such as work-life balance, socioeconomic status, etc. (Kreitner and Kinicki 2001).

Our questionnaire covers five parts (A, B, C, D and E). Part A focuses on demographics, including gender, years of

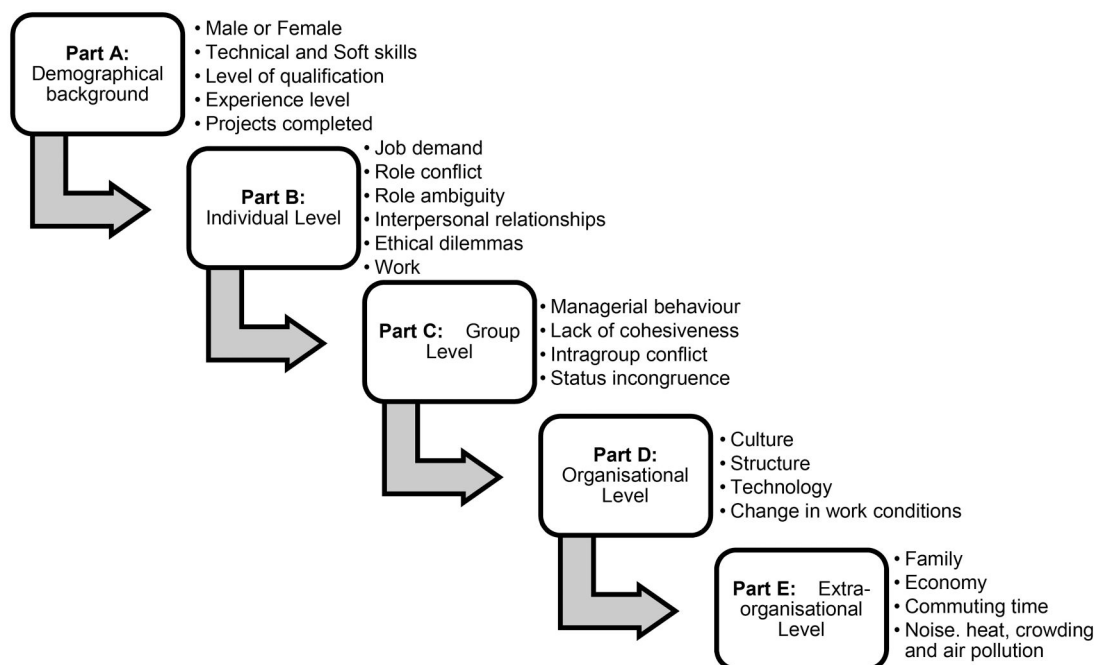


Figure 2. Description of the different subsections of the questionnaire.

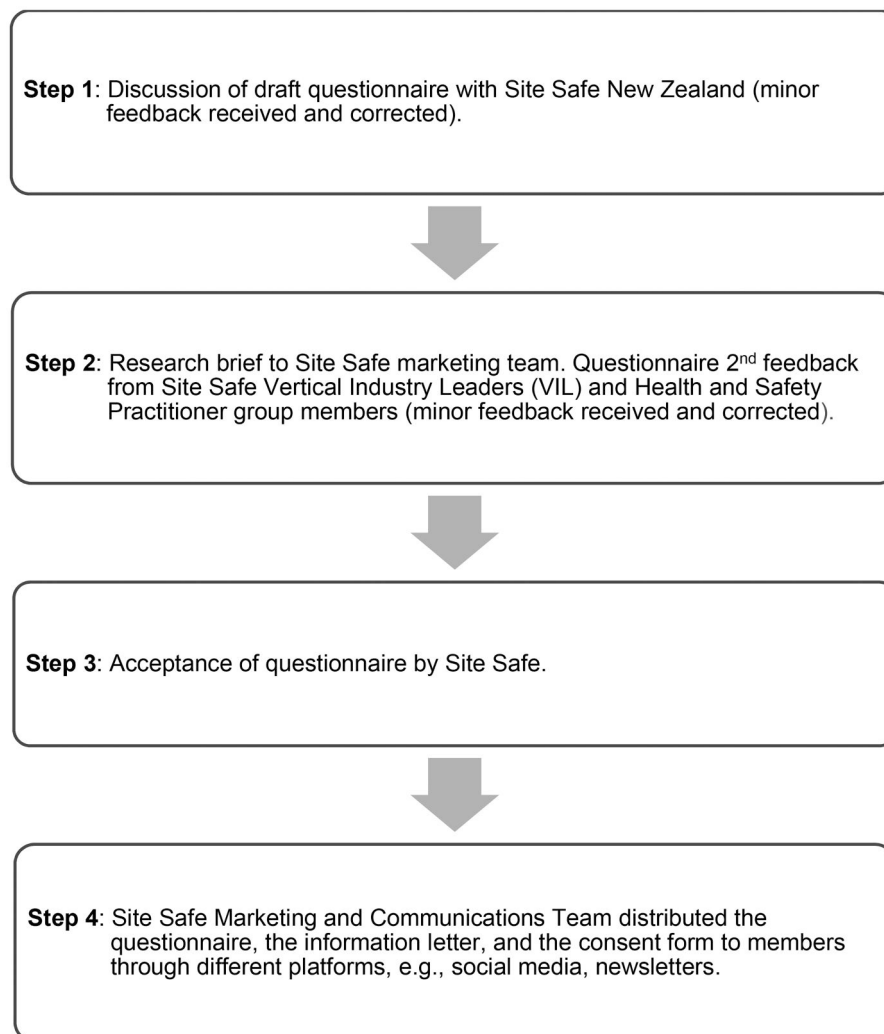
experience, qualification, projects completed in the NZ construction industry and level of soft/technical skills. Soft skill is 'interpersonal and intrapersonal abilities that help individuals master performance in particular social contexts' (van Heerden et al. 2023). Technical skill is 'factual knowledge required to do a job' (Hunt 2007). Part B questions examine individual level stressors, such as job demand, role conflict, role ambiguity, interpersonal relationships, ethical dilemmas, and work stressors (overload, underload, monotony and pacing of work). Part C focusses on group level stressors such as managerial behaviour, lack of cohesiveness, intragroup conflict, and status incongruence. Part D focusses on organizational level stressors such as culture, structure, technology and change in work conditions. Part E focusses on extra-organizational level stressors including family, economy, commuting time, noise, heat, crowding and air pollution. At all four levels, we analysed differences relating to gender, with the other demographic variables considered potential confounders.

#### **Expected response rate and development of the collection tool**

The questionnaire and data collection were developed collaboratively with Site Safe New Zealand, a safety-training business with over 6,200 member organizations and 292,800 members. In 2020,

Massey University signed a memorandum of understanding with Site Safe to assist in recruiting participants and facilitating the research. The development involved several steps (Figure 3). First, the research background and draft questionnaire were reviewed by Site Safe's researcher. Feedback was used to modify the questionnaire, for example, to include open-ended questions to capture any stressors not specifically mentioned in other questions (Step 1). In Step 2 the questionnaire was reviewed by two of Site Safe's member organizations, namely the Vertical Construction Leaders Group and the Health and Safety Practitioners Group. The aim of both of these groups is to improve the sustainability, reputation, health and safety of New Zealand's vertical construction industry. The Health and Safety Professionals Group works towards standardizing site-based health and safety policy and procedure, focusing on industry critical risks. Outcomes of the group are raised to the Vertical Construction Leaders Group and implemented through key stakeholders to generate alignment and improve health, safety, and wellbeing performance across the construction industry. Industry participation was used to ensure validity of the research, to foster buy-in from key construction stakeholders and to encourage high survey response rates.

After acceptance from Site Safe, the questionnaire was finalized (Step 3). The Site Safe Marketing and Communications team distributed the questionnaire to their customers through



**Figure 3.** The development of the collection tool.

different platforms, e.g. social media, newsletter, etc. (Step 4). An information letter and consent form were attached to the questionnaire.

### Data analysis and reporting

The Likert-type scale is suitable for measuring attitudes, perceptions, or opinions (Bowling 2023). To measure the impact of the stressors on respondents and the stress reduction strategies a 5-point Likert scale was adopted, with standardized responses of 1: very low impact, 2: low impact, 3: moderate impact, 4: high impact, and 5: very high impact. Reliability was assessed using IBM SPSS statistical software, and most data analysis was undertaken using Minitab 19 (©2022 Minitab LLC) statistical software.

The mean was used to test the null hypothesis that male and female responses are identical. The logic is that if males and females have the same pattern of response, then they will have the same patterns of 1's, 2's, 3's, 4's and 5's within the 5-point Likert scale. Conversely, if the means are significantly different for males and females, then this implies a different response pattern for males and females.

Firstly, we examined for differences in mean stress response and variability of stress between males and females for each stressor. Next, we investigated whether differences existed in mean stress between males and females when responses were adjusted for years of experience, qualification level and number of projects completed. The adjustment was conducted using a regression model of the stress response on gender with the other variables as covariates. Statistical significance was judged by the  $p$ -value, where  $p < 0.01$  is highly significant,  $p < 0.05$  is significant, and  $p < 0.1$  is marginally significant. When an effect is statistically significant, the regression coefficient indicates whether there is a positive or negative correlation between each response and the explanatory variables. Regression analysis is particularly beneficial for in-depth discussion and critical analysis of the results. The two-sample  $t$ -test was used for simple comparisons of means and the Kruskal-Wallis test was used for comparison of medians (e.g. number of industry sectors). Levene's test was used for comparison of variances (e.g. for relatively less

uniformity among females) and the standard Pearson correlation coefficient was used for the strength of correlated variables.

## Analysis of results

### Responses received

Data was collected from 30 June to 31 July 2020, with two distributions of the survey to increase the response rate. 430 questionnaire responses were received; higher than the minimum sample size of 333 responses required by the power analysis. However, 113 responses were removed due to incomplete data, where respondents did not answer one or more questions. The remaining 317 completed questionnaires (95% of the required sample size) were used to investigate the stress variables between females and males. There were 250 male responses and 67 female responses; the latter being fortuitously higher than expected which meant the power to detect differences of 0.5 standard deviations continued to exceed 80%.

### Gender differences in reported highest level of qualification and stressors

The respondents were asked to report their highest qualification level, with options ranging from Level 4 (Certificate), Level 5 (Advanced Certification), Level 6 (Diploma), Level 7 (Bachelor's degree), Level 8 (Master's or PhD degree) and an open option to specify any other highest qualification. Figure 4 illustrates the level of qualification according to gender.

Our data showed that 88% of respondents reported the highest level of qualification between Level 4 (Certificate of Achievement) and Level 7 (Bachelor's degree). Comparing genders, females reported higher levels of qualification (Diploma, Bachelor's degree, Master's degree or higher) than males (58% female vs 43% male). This difference is statistically significant (Kruskal-Wallis test,  $p$ -value = 0.042) with a median qualification Level 6 (Diploma) for females and Level 5 (Certificate) for males. There was a significant positive correlation between the highest qualification (coded 3-8) and stress at the individual level, from role conflict mean (correlation  $r=0.188$ ,  $p$ -value = 0.002), role ambiguity mean ( $r=0.145$ ,  $p$ -value = 0.020),

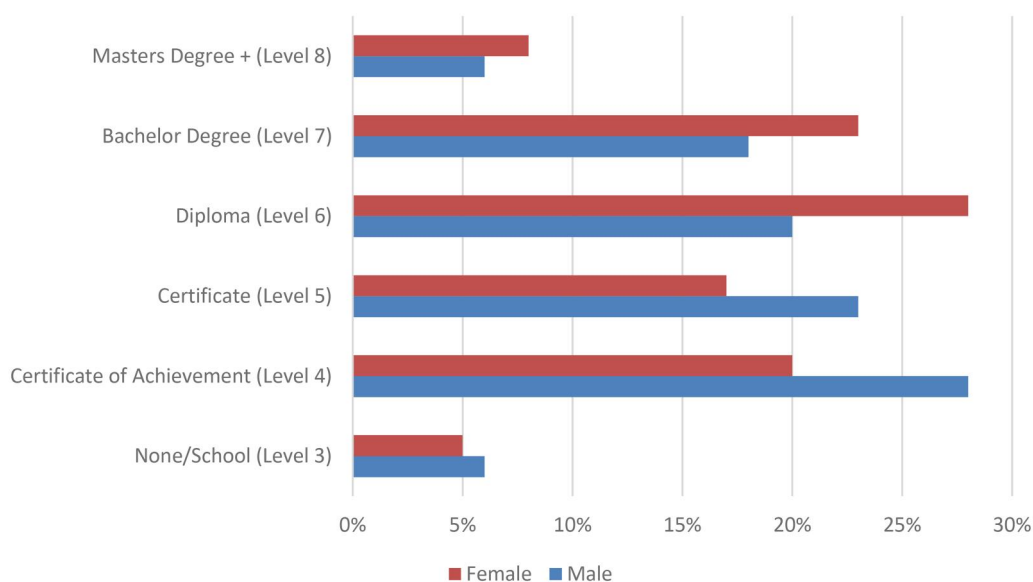


Figure 4. Level of highest qualification by gender.

interpersonal relationships mean ( $r=0.133$ ,  $p$ -value = 0.033), and ethical dilemmas mean ( $r=0.136$ ,  $p$ -value = 0.030). There was a similar positive correlation between the highest qualification level and stressors at both the group level mean ( $r=0.166$ ,  $p$ -value = 0.009) and the organizational level mean ( $r=0.186$ ,  $p$ -value = 0.006).

#### **Gender differences in reported years of experience, number of completed projects, sector involvement, technical/soft skills and stressors**

Relating to the 'reported number of years in the construction industry', the findings showed that the male workers averaged ten years more industry experience than female workers ( $22.80 \pm 10.06$  years vs  $12.25 \pm 8.99$  years). With less time in the construction industry, it was expected that female workers would report a lower number of completed projects compared to male workers and this was verified by the data. Figure 5 shows the percentage of males and females for each of the three completed project categories (0-5 projects, 6-10 projects and more than 10 projects).

27.7% of females had completed 0-5 projects, compared with 4.0% of males. Conversely, 71% of females had completed more than 10 projects compared with 87% of males. Female workers averaged 5.1 completed construction projects compared with 7.1 completed projects for males.

The next analysis looked at the respondent's involvement in different sectors of the construction industry (Figure 6). The reported top five sectors for all participants were residential (9.6%), commercial/retail (9.3%), infrastructure (7.1%), industrial (4.4%), office (2.8%) and defense (0.31%). The highest percentage of respondents (33.5% on average) only worked in one sector. For those who had worked in multiple sectors the data showed 45.5% of the respondents worked in two to three sectors, 18.6% in four to five sectors and 2.2% in six to seven sectors.

There was no significant difference between males and females regarding how many sectors they were involved with

(Kruskal-Wallis test for equal medians,  $p$ -value = 0.461). Comparing genders, 39.1% of females and 32.0% of males were only involved in one sector.

The number of years of experience, number of projects completed and involvement in multiple construction sectors all contribute to developing technical and soft skills needed to complete projects. The questionnaire responses relating to this (Figure 7) show that 88% of male respondents rated their technical knowledge as 'high' to 'very high', and 89% rated their soft skills as 'high' to 'very high'. For female respondents, 53% rated their technical skills as 'high' to 'very high', and 75% rated their soft skills as 'high' to 'very high'. The results show that males report higher perceived levels of technical knowledge than females, but both genders report similar soft skills levels.

The gender, years of experience, number of completed projects, technical/soft skills level, and multi-sector involvement were tested for correlation with the four stressor levels. The results show no relationship between stressor level and number of projects completed per gender. However, a weak relationship ( $p$ -value = 0.060) was found between stressor level and mean role conflict, years of experience and gender.

#### **Reported stress variables at the four major stressor levels**

The research considered stressors at four levels: (1) individual, (2) group, (3) organizational, and (4) extra-organizational. The reliability of reported responses was tested using Cronbach's alpha value with alpha values greater than 0.7 indicating a high level of internal consistency among the Likert scale responses. Alpha values for the individual level stressors were: job demands (0.908), role conflict (0.846), role ambiguity (0.849), interpersonal relationships (0.917), ethical dilemmas (0.881), and work (0.734). The mean alpha value (averaged over all component stressors within each level) was: 0.872 for group-level stressors, 0.897 for organizational-level stressors, and 0.839 for extra-organizational-level stressors. Since all values were greater than 0.7, this confirms the reliability of the questionnaire response measures. In

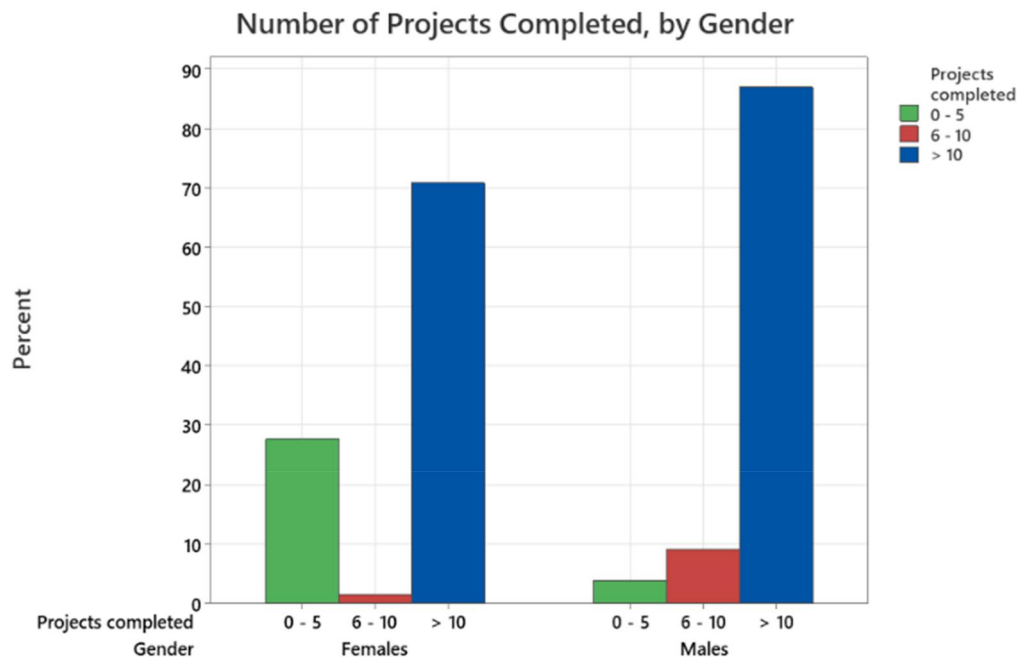
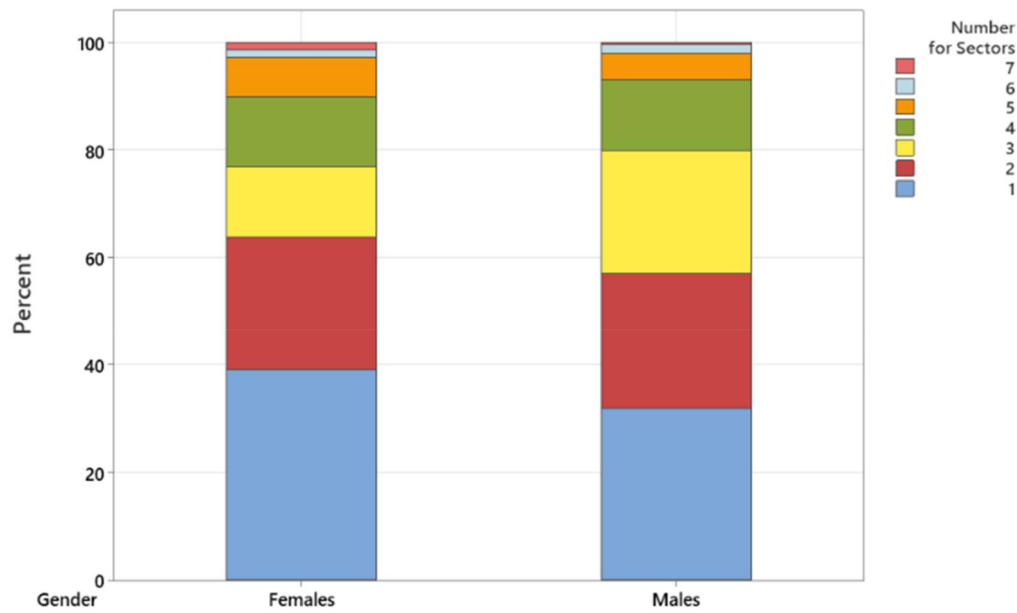
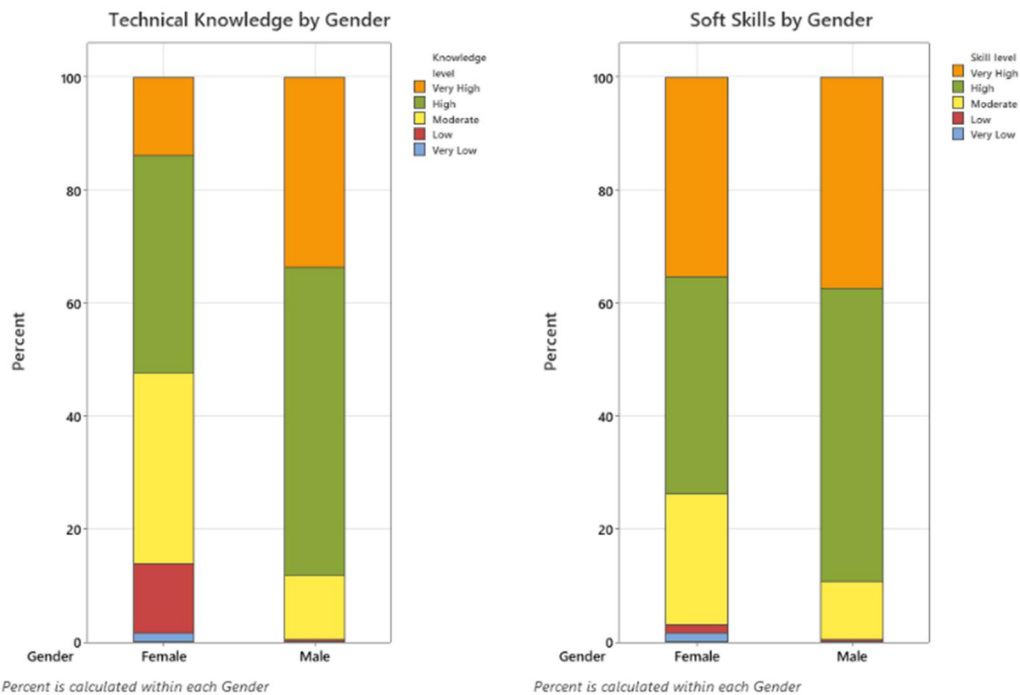


Figure 5. Number of projects completed by gender.



Percent is calculated within each Gender

Figure 6. Different combinations of the sector involvement by gender.



Percent is calculated within each Gender

Percent is calculated within each Gender

Figure 7. Different technical and soft skills by gender.

addition, the responses at all four stressor levels had a low variance, indicating that the data are clustered closely around the mean, confirming reliability. The mean value of responses was used to test the hypothesis that male and female responses are identical at each of the four major stressor levels and the results are shown in Table 1.

#### Stressors at the individual level

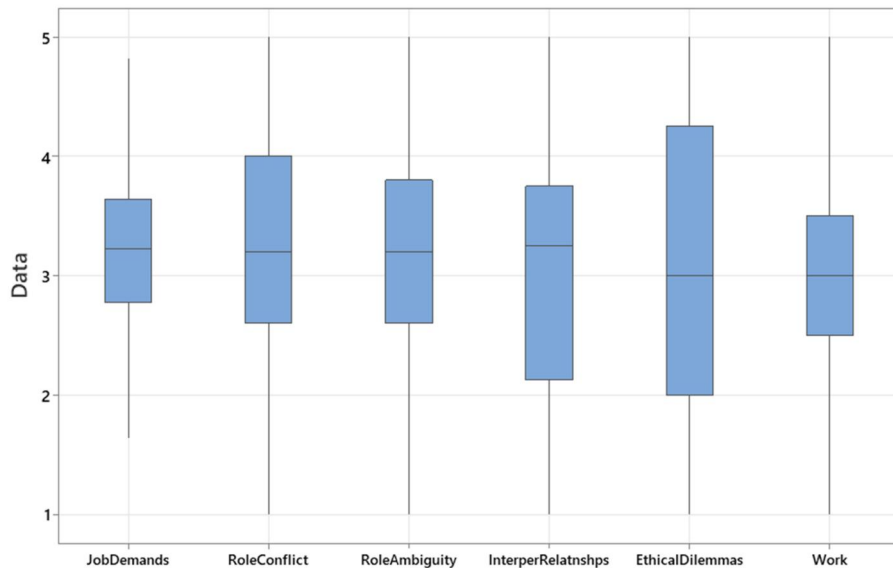
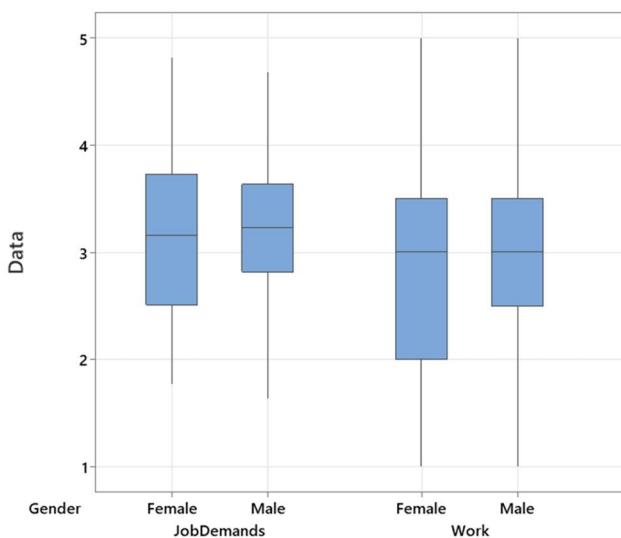
Within the individual level stressors, the variables investigated were stresses arising from job demand, role conflict, role ambiguity, interpersonal relationships, ethical dilemmas, and work.

Figure 8 boxplot summarizes the responses for these sub-cluster variables.

For job demands, role ambiguity, and work, the box representing the middle 50% of opinion is relatively short, with symmetrical upper and lower portions, meaning the respondents show considerable agreement. For role conflict the upper portion is larger because 27% of respondents feel role conflict has a high/very high impact on their stress. Conversely for interpersonal relationships, the lower portion is larger showing that respondents feel that this has a low impact on their stress. The box is the widest for ethical dilemmas indicating wide variation in responses, with 30% of respondents feeling this has a low/very

**Table 1.** The mean values of the four major stressor levels.

Variable	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
<b>Individual Level</b>							
• Job Demand	3.21	0.64	1.64	2.77	3.23	3.64	4.82
• Role Conflict	3.26	0.89	1.00	2.60	3.20	4.00	5.00
• Role Ambiguity	3.13	0.91	1.00	2.60	3.20	3.80	5.00
• Interpersonal Relationship	2.99	1.04	1.00	2.13	3.25	3.75	5.00
• Ethical Dilemmas	3.03	1.34	1.00	2.00	3.00	4.25	5.00
• Work	2.95	0.90	1.00	2.50	3.00	3.50	5.00
<b>Group Level</b>							
organizational Level	2.95	1.03	1.00	2.17	2.83	3.83	5.00
Extra-organizational Level	3.27	0.95	1.00	2.60	3.40	4.00	5.00
Extra-organizational Level	3.04	0.95	1.00	2.40	3.00	3.60	5.00

**Figure 8.** Sub-cluster stressors within the individual level.**Figure 9.** Job demands and work stressors by gender.

low impact on their stress but 33% feeling that it has a high/very high impact on their stress.

Using t-tests, we investigated the relationship between gender and the 47 variables within the six categories of job demands ( $n=22$ ), role conflict ( $n=5$ ), role ambiguity ( $n=5$ ), interpersonal relationships ( $n=7$ ), ethical dilemmas ( $n=4$ ), and work ( $n=4$ ). The results show a significant positive correlation

between the highest qualification and role conflict means ( $p$ -value = 0.002), role ambiguity mean ( $p$ -value = 0.020), interpersonal relationships mean ( $p$ -value = 0.033), ethical dilemmas mean ( $p$ -value = 0.030). Under the 'job demands' category, males felt significantly higher stress over the variable 'on/off-site office/administration building conditions' (males 2.65 vs. females 2.31,  $p$ -value = 0.043). Under the 'ethical dilemmas' category, females felt higher stress due to 'different treatment because of gender' (males 2.31 vs. females 3.21,  $p$ -value = 0.001). Indeed, on average, females rated ethical dilemmas almost one category higher than males in terms of stress impact.

Considering stress impact from job demands and work (Figure 9), the two-sample t-tests found no significant differences in mean values between males and females. However, for job demands females had significantly higher variance than males ( $p$ -value = 0.014, Levene's test) and work ( $p$ -value = 0.002) and were marginally higher in terms of the total sum for individual-level variables ( $p$ -value = 0.075). In each case, females were more variable than males in their response to the different stressors.

### Stressors at the group level

Within the group level stressors, the variables investigated were managerial behaviour, lack of cohesiveness, intragroup conflict, status incongruence, sexual harassment, and workplace violence. At the group level, these variables were not significantly related to gender, although sexual harassment supported further

investigation ( $p$ -value = 0.087), as it was considered more impactful by the females (mean 2.57 vs. 2.18 for males).

The gender and level of qualification were tested for correlation with the group-level stressors. The results show a significant positive correlation between the highest qualification and group level mean ( $p$ -value = 0.009). The other summary variables did not have a simple linear relationship with qualification.

#### **Stressors on an organizational level**

Within the organizational level stressors, the variables investigated were organizational environment, organizational structure, organizational leadership, technology, and introduction of change in work conditions. Within this level, these variables were not significantly related to gender. However, females scored technology marginally higher (i.e. more stressful) than their male colleagues (3.19 vs. 2.91 for males,  $p$ -value = 0.091). The gender and level of qualification were tested for correlation with the organizational level stressors. The results show a significant positive correlation between the highest qualification and organizational level mean ( $p$ -value = 0.006). The other summary variables did not have a simple linear relationship with qualification.

#### **Stressors on an extra-organizational level**

In the extra-organizational level stressors, the variables investigated were family, economy, commuting time, noise, heat, crowding and air pollution, and lack of mobility (ability to move freely). Within this level, no variables differed significantly between genders. The results show no significant positive correlation between the highest qualification and extra-organizational level stressors. The other summary variables did not have a simple linear relationship with qualification. However, this does not mean that qualification level will never impact extra-organizational level stressors.

### **Discussion of findings**

The following is a discussion of the research results and a comparison with findings reported in the literature.

#### **Gender-based differences in the reported highest level of qualification and stressors**

A large proportion of male construction workers reported the highest level of qualification at certificate levels 4 (28%) and 5 (23%), suggesting that male workers are more likely to train as tradespeople (plumbers, electricians, builders). 59% of females held qualifications at a diploma level 6 or higher, compared to 44% of men. This supports the notion that females get higher qualifications to ensure a better position (office-based instead of site-based with more flexible working hours), career progression, and salary in the construction industry (Norberg and Johansson 2021).

There is general consensus that people with lower socioeconomic status experience higher levels of stress (Adler et al. 1994; Lunau et al. 2015). However, recent studies suggest that this is only true with stable status hierarchies (Knight and Mehta 2017) and that when there are unstable hierarchical changes, those with higher status are most stressed. Our research found that workers with higher qualifications reported more stress than

those with lower qualifications, but the reasons for this were not investigated and this is an area requiring further study.

#### **Gender-based differences in the reported years of experience, number of completed projects, working in multiple sectors, technical/soft skills and stressors**

On average, females have considerably lower industry experience than males ( $12.25 \pm 8.99$  years and 5.1 completed projects, compared with  $22.80 \pm 10.06$  years and 7.1 completed projects). This, coupled with the low (20%) proportion of female respondents, reinforces the findings that the construction work environment remains masculine-oriented and difficult for females to enter and craft long-lasting successful careers (Norberg and Johansson 2021; mConstruction Health and Safety NZ 2022).

Respondents who had completed 0-5 projects (at the early stage of their construction career) was 27.7% for females and 4.0% for males (Figure 5). This may support the research of Oo et al. (2020) and Zheng et al. (2020), that there is an increase in female students in built environment degrees entering the construction workforce. The large decrease in females in the 6-10 completed project category is concerning; the provision of more senior female role models for early-career construction females might help ameliorate this problem (Ayre et al. 2011; Rosa et al. 2017).

Both genders had similar experience working in several different sectors within the industry and would therefore have accumulated diverse skills to handle the challenges on new projects (van Heerden AHG 2018). Male and female respondents reported similar soft skills, but males reported much higher technical skills than females, despite females having higher qualifications (Figure 4). This suggests that females have less confidence regarding technical construction aspects, which may make them more vulnerable to chronic stress, discrimination, bullying and sexual harassment (Sunindijo and Kamardeen 2017; Baker and Bourke 2022).

The correlation between gender, experience and stressors was weak but did suggest that females were more impacted by stress from role conflicts than males. With increasing experience, the stress from role conflicts decreased in females, but it increased in males, perhaps from their taking on new roles.

#### **Stressors at the individual level**

Female perceptions of all individual level stressors were much more variable than male perceptions. As mentioned above, females were most stressed by role conflict factors and, within the category of 'ethical dilemmas' they found different treatment because of their gender to be most troubling. However, when stressors were compared (Figure 9), males had higher average stress from job demands and there was no gender-based difference in average work stress. There may be a tendency for females to choose jobs with lower demands and work pressures, so that they can achieve a better work-life balance that accommodates caring for children (Enshassi et al. 2016; Rosa et al. 2017; Oo et al. 2020).

#### **Stressors at the group level**

At the group level, there was no significant gender-based difference in perceived stressors. However, within these stressors, the sexual harassment category warrants further study. The literature reports that sexual harassment of women is a persistent problem,

both in professional jobs (Bowen et al. 2014; Sunindijo and Kamardeen 2017) and in non-professional jobs in the construction industry (Wright 2013).

### **Stressors on an organizational level**

There was no significant gender-based difference in perceived stressors at the organizational level. However, females reported more stress from the technical skills category. Technology changes rapidly in the construction industry and this can be a challenge to females returning to work after maternity leave (Naismith et al. 2017). In New Zealand, parental leave is 26 weeks, but only for a single caregiver over one continuous period (MBIE 2020). Several European countries provide better parental leave, for longer periods and for both parents (Ward 2020). It might be worthwhile for the New Zealand government to investigate alternative policies around parental leave to give young females more flexibility and assistance in their early career development.

### **Stressors on an extra-organizational level**

Extra-organizational level stressors such as family, economy, commuting time, noise and heat, and lack of mobility have the potential for psychosocial harm for both genders (Sherratt 2018). This can cause psychological health risks such as depression, anxiety, sleep disorders, and suicidal ideation (Lovelock 2019). On average, we found no significant gender-based differences in these stressors, but others have shown that females typically experience greater stress than males from work-family conflict (Sang et al. 2007).

## **Conclusion and implications**

Globally, there is a lack of consensus on whether there is a difference in the way male and female construction professionals perceive and react to work-related stressors. Our study has investigated this in the context of the New Zealand construction industry, looking at four levels of stressors. Across all levels, the findings show little evidence of major gender-based differences but highlight several gender-based subtleties.

Compared with males, the female respondents had higher qualifications, enabling them to secure better positions, with higher pay and more flexible work hours. On average, female respondents had about ten years less work experience and about two fewer completed projects than their male counterparts, probably because females are obliged to spend time on child-rearing and family issues. The latter may explain why female respondents report lower technical skills than males.

There was much more variability in the ranking of different individual level stressors for females than males. Females were most affected by role conflict stress and reported different treatment because of their gender, reinforcing the notion that the construction workplace remains discriminatory towards women. Male respondents were most stressed by job demands such as pressure to complete projects on time, high workloads, high interrupt levels, and unpredictable, inflexible, long working hours. These are commonly reported characteristics of the global construction industry. There was no significant gender-based difference in the group, organizational, and extra-organizational level stressors, but sexual harassment of women needs further investigation.

The findings presented here contribute to the body of knowledge on gender-based differences in stressors within the New Zealand construction industry. This is useful to key stakeholders in addressing the gender imbalance and the stressful nature of construction jobs. However, change requires participation at all levels within the industry, from individual construction businesses to government policies. Improvements can be achieved through initiatives such as implementing non-discriminatory behaviour protocols, adaptable rewards and recognition systems, better parental leave policies, continuous training and skills development programs, strong mentorship for both genders, and free confidential access to mental health support programs. More effort is needed to address the gender-imbalance that still exists in the construction industry workforce, both in terms of attracting more females to the profession and retaining them. This can be done through clearer definition of career advancement pathways, technical skills maintenance and using the experiences of female role models for planning work-life balance and stress management.

While this study adds significantly to our understanding of how stress is perceived by different genders in the New Zealand construction industry, the authors acknowledge some limitations. The first is that different respondents (e.g. different genders or people with different levels of education) may interpret the questions differently. Definitions and examples within the questionnaire were used to reduce this effect's impact. Next, although about 15% of the New Zealand construction workforce is female, a disproportionate number of females (21%) answered the survey. This could be because females were more willing to comply with requests, or they had more opportunities to respond because of their office-based roles, or because females tend to feel more impacted by stressors.

### **Disclosure statement**

The authors reported no potential conflict of interest.

### **Ethical approval**

This research was conducted under an overarching project reviewed and approved by the Massey University Human Ethics Committee: Human Ethics Northern Committee, New Zealand, Ethics Notification - NOR 19/47.

### **Data availability statement**

All materials (data and supporting information) are available specifically on request under terms and conditions agreed upon during the full ethics review process at Massey University.

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