FRAMING STRESS AND ASSOCIATED BEHAVIOURS AT WORK: AN ETHNOGRAPHY STUDY IN THE UNITED KINGDOM

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ABSTRACT
Aim: The purpose is to understand more precisely the culture and interpersonal behaviours associated with stress.
Methods: The research was conducted using a qualitative approach through an ethnographic methodology in relation to three companies. The greater part of the data collection period was structured into observations that ranged between 2 and 4 hours per day, 1 to 3 days per week, for a period of 6 months. A total of 10 sites were explored; and on each site, the observations involved activities by 5 to 20 people.
Findings: The results showed the pivotal importance of interpersonal relationships in coping with the uncertainty of working conditions, the coordination of team-work, and managing responsibilities and power interactions. It was found that the impact of stress is multifaceted, affecting the physical status, interpersonal relationships, work performance, and emotional wellbeing of construction workers. The workers who were studied emphasised five sources of support that help moderate work-related stress: additional tools such as communication systems and software, a facilitated access to professional help (e.g. psychological services), organisational changes in leadership, provision of resources for the wellbeing of personnel (e.g. job training) and better teamwork.
Practical implications: The study underlines the importance of dedicated services for stress management and specific training-related abilities devoted to reinforcing positive person organization dynamics. In particular, the abilities should relate to managing the impact of stress in terms of physique, interpersonal relationships, work performance, and emotional well-being.
Originality/value: This is one of the first studies to adopt a psychological perspective for understanding construction scenarios and phenomena and was conducted by a qualified psychologist.

Keywords: Construction, Construction Safety, Constructions Education

INTRODUCTION
The study of stress among construction workers is widespread and has produced a high number of surveys, research studies, reports and case studies (e.g.: Leung, Chan & Yuen, 2010; Bowen et al., 2013; Bowen, Govender & Edwards, 2014; Leung, Chan & Cooper, 2014). As the literature has highlighted, workers in the construction industry (CI) have to

cope with a number of stress factors such as time constraints (e.g. Siu et al., 2004; Alavinia et al., 2007; Charmaz, 2014), unchangeable deadlines from clients (e.g. Bowen et al., 2012; Bowen et al., 2013; Leung, Chan & Cooper, 2014), extreme physical conditions such as high temperatures (e.g. Larsson et al., 2008; Bowen et al., 2014; Rowlinson et al., 2014) and hard manual activities (e.g. Dembe et al., 2005; Ibem et al., 2011; Chan, Leung & Yuan, 2014). The great majority of studies that have investigated the nature of stress among construction workers have been predominantly quantitative. In such a frame, stress has been analysed as a subjective variable through the administration of self-reported measures, i.e. questionnaires, scales or closed-question interviews (e.g. Ofori, Leong & Pin, 2002; Haynes et al., 2004; Leung, Chan & Yuen, 2010; Limm et al., 2010; Ibem et al., 2011; Bowen et al., 2014; Chan, Leung & Yuan, 2014; Enshassi et al., 2015: Zhou, Goh & Li, 2015). The main results of these researches have particularly highlighted how stress has impacted on workers and how it influences the emotional and physical status of individuals. At the same time, there are many important factors that can potentially generate stress and impact on the wellbeing of individuals. For instance, there is scope for evaluating the level of functioning of the work systems of organizations, that is, the values and culture associated with the usual activities, difficulties and types of communication among individuals. There are opportunities for more studies of stress in the CI.

Although the strong link between stress and demanding assignments, uncomfortable physical environments, work overload, and pressure of time in the CI is fairly well known, the contribution of work organisation systems to the generation of stress is contrastingly less known. The work organisation system here refers to the values, culture and representations associated with the CI. These factors have been studied and described in less detail because they are less tangible and less measurable with generic quantitative instruments. The study being reported here thus sought to research into the organisation systems within which individuals work.

The concept of stress is introduced below, followed by the aim and methods of the study. The results are then presented and discussed before the final conclusion is reached.

What is "stress"
The UK Health and Safety Executive (HSE) produces an annual report on the level of stress in organisational settings. The HSE defines work related stress as "*the adverse reaction people have to excessive pressure or other types of demand placed on them*" (HSE, 2018). In 2006, an interesting research commissioned by the Chartered Institute of Building (CIOB) in the UK revealed that, among different stress factors, the most problematic issues were associated with interpersonal and cultural/organisational reasons such as lack of feedback or poor communication, while physical conditions, safety and inadequate equipment accounted for just 10-20% of all factors (Campbell, 2006).

Although a comprehensive overview of stress factors is still not available, the consequences of stress have been described at length in the literature (e.g. Djebarni , 1996; Goldenhar et al., 2003; Leung et al., 2006; Alavinia et al., 2007; Leung et al., 2012; Chan et al., 2016: Chan et al., 2017) . Stress in the CI has been correlated with a higher incidence of mood disorders such as anxiety and depression (Bowen et al., 2014), reduced personal investment in taking care of health status (Dembe et al., 2005; Alavinia et al., 2007; Enshassi, El-Rayyes, & Alkilani, 2015), less involvement and responsibility, and using less energy in work activities (Haynes & Love, 2004; Ibem et al., 2011; Chan et al., 2012; Chan et al., 2014; Leung, Chan & Cooper, 2014). However, the identification of these consequences did not involve the

assistance of qualified health professionals, such as psychologists, and the research was conducted mostly through quantitative studies that involved assessments with questionnaires or other self-reported measures (e.g. Lingard & Francis, 2004; Leung et al., 2007; Lingard et al., 2010; Leung et al, 2011; Mitropoulos et al., 2012; Yi & Chan, 2014). Psychology can present a different perspective that can enhance a better understanding of interpersonal and organisational factors that impact on construction workers' lives. The main application of psychology can contribute to a better description of actions and behaviours in terms of individual differences and social positions (roles and status) (Greenfield, 1996). Thus a psychological perspective was adopted in this fresh study of stress amongst construction workers. This work will permit the greater understanding of the lived culture of construction workers, the meanings of routine activities, and their shared values.

Aim of the study

The aim of the study is to investigate how stress develops and manifests itself in construction settings. More precisely, the current study is focused on investigating 3 different aspects of stress:

- the stress factors
- the consequences of stress and their impacts on construction workers
- the tools and measures to cope with stress

The current research uses a psychological perspective and it is interested in evaluating these three aspects in relation to the well-being and quality of life of construction workers.

METHODS

The current literature has underlined the need to enhance knowledge about stress in the CI with other methods and techniques (Chinyio, Riva and Hampton, 2018). In addition, we postulate that the analysis of relationships, systems, roles, culture and behaviours of people within construction organisations may sometimes not be understood well by using a quantitative approach. In order to capture a more vivid snapshot of the CI system, therefore, the researchers chose to adopt a qualitative approach by using ethnography as a key to the interpretation of organizational dynamics and stress development. In terms of philosophy, the research aligns with interpretism.

Participants

Three companies facilitated the collection of the data which has informed the development of this article. These companies were selected through purposive sampling via their Human Resources departments. A meeting with the chief executive officer (CEO) or with the HR Chief of each organisation was organised with the aim of defining the appropriate methods of data collection, particularly the access to their construction sites and safety measures to be followed. The researcher that was involved in the data collection (a psychologist) had to provide her certification scheme (CSCS card) in order to be allowed into the construction sites (CSCS, 2018). The participants in the research were provided the main information about the study including the rationale and methods to be used to collect data. In addition, all relevant information about confidentiality and privacy were provided including respect for the recent EU General Data Protection Regulation (GDPR). Our University's ethical approval was obtained prior to initiating the practical study procedures.

Ethnographic enquiry

The current study adopted ethnographic informed methods. Ethnography consists of a dedicated work of integration and implementation where different sources of information are combined with each other with the aim of achieving better knowledge about a specific group or culture, and teasing out actions, facts and behaviours into a representative snapshot (cf. Hammersley & Atkinson, 1995). An ethnographic research is based on extensive fieldwork where different data are collected using several channels. An important principle in ethnography is that knowledge "is grounded in the experiences and beliefs of the social group members, enhancing the likelihood of generating successful solutions and interventions" (Krane & Baird, 2005, p. 88). During our ethnography research, the researcher observed, experienced and engaged herself in conversations and tried to achieve an insightful knowledge of the organisational culture and interpersonal dynamics in construction organisations. According to Chatman & Jehn (1994), organisational culture represents the collective values, beliefs and behaviours of members within an organisation.

To ensure better validity of the findings, specific questions were not selected prior to immersion within the field. Using a "grounded" approach, the researcher began with prefigured problems (Hammersley & Atkinson, 1995) and scholarly curiosity (Smith, 2001) about the research area. As the researcher gradually became more familiar with the interactions and dynamics of the participants, informative questions were identified (Smith, 2001), facilitating an ongoing and iterative process between data collection, analysis and interpretation. The research path was selected on key topics relating to the broad area of interest until saturation (Smith, 2001) was judged to be reached. To reach saturation, three methodological approaches were engaged to collect data: making observations, taking field notes and conducting interviews.

The greater part of the data collection period was structured into observations that ranged between 2 and 4 hours per day, 1 to 3 days per week, for a period of 6 months. A total of 10 sites were involved; and on each site, the observations concerned activities performed by 5 to 20 people.

Observation
The observations were made at different construction sites including the site managers' offices, different open air areas where construction workers were operating, temporary offices, tunnels, adjoining streets and grounds. The ethnographer obtained the necessary skills certification required for this interaction, and was careful to avoid being intrusive. Moreover, in light of the possible vulnerability of the research topic, the observer's role was judged most appropriate by the research team, allowing the researcher to interact informally and indirectly (Agrosino & Mays de Perez, 2000) with the participants.

It is important to note that the role of the psychologist was "ecological". Each observation moved the observer into the study environment and closer to the activity of interest; the observer also engaged with the participants but was not intrusive.

Field Notes
Wide-ranging field notes were documented, postulating initial information about the location, setting, behaviours, outcomes and key themes, and were organised in a coherent way. Concurrently, to preserve investigative distance, a reflexive journal was utilised and

updated regularly: it documented the assessments of achievements and difficulties and stimulated the researcher to analytically inspect her suppositions and own feelings in a 'self-aware' manner (Fujii, 2015). Such reflexivity enabled the researcher to be careful not to allow her "own attitudes and behaviours to be the central instrument of analysis" (Hammersley & Atkinson, 1995). The use of a diary was fundamental to synthesising constructive thoughts, enquiries and issues for later consideration or actions.

Interviews
These were central measures as they permitted workers to ascribe significance to observed actions from their own perspectives (Spradley, 2016). Three interview methods were used: unstructured (to increase descriptive information), semi-structured (to investigate and obtain richer information), and colloquial discussions (to enable new issues to arise). These colloquial discussions were used to comprehend diverse perspectives of a story or obtain different stakeholders' views. Throughout, explanations and conversations about an individual's behaviour were sought with an emphasis on their point of view, thoughts and strategies adopted. These dialogues offered a better comprehension of the cognitive and emotional underpinnings of their behaviours. All the participants were interviewed formally at least once, with many being interviewed informally at different times during the data collection period. Altogether, this approach provided a large amount of information.

The behaviour of the ethnographer was respectful. She asked questions only when the workers were free from activities and she did not interrupt any dangerous action. She also used dialogues and conversations (indirectly) with different workers to better extrapolate the meaning of some behaviours and the type of relationships among people.

Five to ten interviews (by means of unstructured, semi-structured and colloquial discussions) were conducted on each site, as broken down in Table 1. While the unstructured and colloquial discussions varied widely throughout all the ethnographic observations, the semi-structured interviews were conducted more precisely, with four people working in offices at the managerial level and 12 people working on sites. Three of the interviewees were women, one of whom was office-based while the other two were site-based.

Table.1 here

Analysis and Ethnographic Product
The ethnographic work was carried out in conformity with standard practices that represent a framework of reference for conducting such a qualitative study. Standard practices are represented by 'procedural rules' that locate ethnography with own characteristics. The common sense of these rules is to describe the components of ethnography, the main techniques used, and the perspective of this approach, which are all aimed at presenting a "thick description" of a phenomenon observed (Brewer, 2000). The research used ethnography as an interpretative method: to analyse the participants' actions in certain context-specific situations and also to understand their interpretation of such actions.

In line with published ethnographic procedures in psychology, a number of criteria were identified and used in order to increase reliability (Spradley, 2016): First, the researcher

immersed herself in the real context of the workers and had the chance to note actions and relationships and comprehend their importance within an ecological context. Second, it was considered indispensable to preserve a good relationship with the workers in order to manage conversations easily and discuss significant contents. Third, the co-authors acted as critical reviewers throughout the study, asking thought-provoking questions about the observations and interpretations of data. Last but not least, the interview transcripts, field notes and reflexive diary were content-evaluated and recurrently discussed to allow the workers' experience to emerge in the best possible way. The results emerged through the participants' opinions with rich in-depth extracts, enriched by the researcher's considerations, so as to provide a snap-shot of the interpersonal and organisational factors that were considered important in stress development in their experience. Potential biases were mitigated (e.g. gender biases and the Hawthorne effect) through the consistency and duration of the observations which were included in normal routine activities. The ethnographer is a qualified Psychologist and a Cognitive Behavioural therapist.

The results of the ethnography followed different steps. First, the researcher engaged in observations and reflected on all data collected to allow the opportunity to understand the meaning of information collected within a broader perspective. Then, the interview transcripts and field notes were manually content analysed and recursively discussed to allow the participants' experiences to emerge.

Content analysis was used as conceptual analysis and relational analysis respectively: whereas the former establishes the existence and frequency of concepts from the observations made, the latter builds on the former by examining the relationships among concepts (Neuendorf, 2017).

RESULTS

Stress factors

Despite the different experiences between office based and site based workers, the meaning and implications of stress between them were very close to each other. So the findings from these two sets of research participants are discussed together and Table 2 gives an overview of the main domains and categories of stress factors that were found.

Table 2 here

Ambiguity

An important source of stress to all construction workers was coping with ambiguity pertaining to (1) limited time, (2) poor communication and (3) limited resources. This uncertainty impacted on both managers and workers on site, as elaborated below.

(1): The amount of tasks to do in too short a space of time was perceived to be out of control for most of the construction workers. The perception of limited time was also reinforced by unpredicted changes in the work flow. While construction activities are established in advance and timed, unpredicted changes do happen recurrently (e.g. encountering uneven grounds, watercourses and asbestos).

Tight deadlines also contribute to increasing the level of stress because they precipitate excessive workloads, forcing a number of workers to work extra hours or during weekends, with a great impact on either their personal life or health status or both.

(2) Lack of communication represents an important source of stress. Construction workers described stress related to difficulties in negotiation. Lack of communication means poor or even absence of feedback, and communication difficulties around negotiations and concessions. This behaviour can be associated with unsafe actions. Construction workers, in general, speculated that poor communication creates a chaotic work environment, including constant interruptions, and poor hygiene conditions. These aspects were directly observed during the ethnographic work. One interviewee explained that: "When you start a job, I receive from the clients and no negotiations are possible: in these cases you work only to finish your job ASAP and this is very dangerous".

(3) Limited resources were also identified as important determinants in the genesis of stress. Although many construction workers generally did not complain about the level of hygiene and order on site, some however complained about how basic supplies and facilities (e.g., kitchen, toilet paper, fridge or microwave) had deteriorated and were not in good condition.

Beyond these three categories, uncertainty was maintained by the organisational culture and associated values and representations. The organisational culture implies that construction workers have the capacity to partake in manual labour and/or organisational activities (depending on their role) and withstand long working hours independently from the conditions of the environment (e.g. climate conditions or temporary office conditions). The typical representation is a worker who is strong and able to cope with uncertainty, which is assumed as a constant unquestioned variable.

Working in teams
Construction workers often work physically close to their colleagues, sharing tasks and monitoring different operative actions. The level of proximity can vary, depending on whether the person is a construction worker on site or in an office.

For construction work on sites, their cooperation with colleagues for 7 to 8 hours per day, all together, meant that their relationship with one another was markedly significant. According to an interviewee: "In this type of work, we all need to learn to get along."

The activity of people working in offices was strictly connected with the management of the workflow. The workers of this type did not cope with any physical proximity but they had to be coordinated temporally in order to respect deadlines, deal with clients efficiently and organise all the activities with colleagues proficiently.

The organisational *culture and interpersonal behaviours* in the CI assume that workers accept their spatio-temporal proximity with other colleagues naturally. However, this aspect is core to establishing all the activities and procedures for working in a safe manner and it develops and grows together with positive relationships of trust and with a number of experiences that mature over time. This aspect is relevant and can cause some problems in

the organisation of activities (especially when the individual is a self-employed worker, works for different contractors and has a scant knowledge of the rest of the group).

Almost all of the construction workers talked about the high number of hours they spent on site. This prolonged presence was central to the stress that many of them experienced. According to one of them: "We work all day all together despite the weather, and this is exhausting." This constancy of presence was sometimes linked to respecting deadlines, and the responsibility of conveying all this information on time to their chiefs or managers.

Handling responsibilities among colleagues
In the experiences collected, handling responsibility was perceived as "stressful" especially when it related to close deadlines, emergency situations or unexpected events. In these situations, a negotiating power-based hierarchy was implemented in order to get the work finished. This generated stress and anxiety, generally. One of the office-based workers offered a detailed account of his sense of burden with his responsibility when he had to respect all the client's expectations. According to him: "You need to be precise, quick and kind at the same time, but you actually are worried, apprehensive and nervous". Similarly, a worker on site described his fatigue as, "when you are working in a house, you have the responsibility to do a good job and the responsibility to finish ASAP to respect the client's expectations".

As in many other industrial settings, the CI considers the 'respect for the client's needs' as absolute even if these needs cause a re-organisation of time-activities and working extra hours. This representation determines not only a very high sense of responsibility in workers but also much stress on them including emotional problems (anxiety, nervousness).

Power and Leadership
Communication and negotiating relationships can sometimes impact negatively on power roles and leadership positions causing a considerable amount of stress. A typical attitude among construction workers, *at any level*, was to express many personal opinions, views and thoughts about planned activities. A number of these opinions and views were often perceived as counterproductive for the whole decision-making processes because they interfered with the work-flow, confused people and consequently increased stress.

During these conversations, the hierarchy of roles was not always clear: on some occasions the plan established by the site manager and approved by the managerial line was extensively discussed by site operators, thereby creating a sense of frustration and confusion. This scenario was more typical in some circumstances such as emergencies or last-minute clients' requests where the priority was 'getting the job done ASAP' and it was related to some categories of workers (particularly self-employed workers).

The organisational culture described by these situations highlights how power and leadership are not always indisputable positions. The level of experience (especially the work experience on sites) is considered very important and it is able to make some changes in the organisational plan of activities as well as generating discussion among colleagues. This aspect was found to be more common with self-employed workers where respect for

hierarchies may not count and communication with peers and supervisors may be confusing.

Stress consequences and their impact on construction workers

Office based and site based construction workers narrated that work-related stress impacted on their physical status, interpersonal relationships, work performance and emotional well-being (highlighted in Table 3). First, in terms of health status, construction workers reported pain, unhealthy eating habits, and frequent tiredness (example of a comment: ''I'm a stress drinker…

I'm so exhausted mentally and physically when I get home, that I am able to do nothing''), and importantly, physical impact: "I had two heart attacks due to my stress"; "I'm 35 and my back pain is ruining my life".

Second, with regard to personal relationships, construction workers reported diminished serenity with family, work–life disproportion, and a poor social life. Third, construction workers reported that their work performance suffered due to anxiety related to reduced time and the effort to finish an activity on time. This stress consequence is also highly intensified by management plans where a new site is usually opened before the current project is closed off. A worker remarked: "Ok, I finished this, what is the next"? Fourth, construction workers described sensations of anxiety, frustration, irritability and depression, reflecting the impact of stress on their emotional status: "Stress puts me in an exasperated mood most of the time".

The emotional impact of construction work causes an especially negative attitude in site workers, who may become reluctant and reticent to complete an activity or to work in teams: "some people become very pessimistic, they start to believe that the way of operating to finish a certain type of activity is too bad or unrealistic".

The research also found a particular consequence of stress among site based workers that was not found in office based workers: the risk of compulsive disorders. Construction workers on site are traditionally prone to having alcohol and drug problems. Two other types of compulsions were identified, albeit dangerous and negative: the use of steroids and gambling, as coping behaviours.

Table 3 around here.

Tools and measures to cope with stress

Construction workers emphasised five sources of support that would help moderate work-related stress. First, they described the need for access to additional tools, including communication systems and software for facing unexpected events and coordinating work better (e.g., ''It would be helpful to have something that tells you when you are at risk of making a mistake"). The structure of this tool was not well identified; however, some applications were repeatedly indicated as pivotal to improving work management and reducing stress, such as the use of a camera to speed up ground assessment operations and monitor teams during operations; a GPS system to identify risky elements (apps with GPS location capabilities help to monitor activities and tasks in a team); and smart communication systems for updating reports about activities, instead of using manual

records. Basic facilities (for instance, a comfortable room for breaks) were also identified by construction workers as important for reducing work stress, particularly when they are working outside.

Second, construction workers described the need for professional help specific to coping with hard working conditions (e.g., deadlines, discussions) and suggested that this help should be included in any job contract in respect of private and confidential matters: "When someone has a problem, he can refer it to the site manager but…there are some problems, like family problems, that you don't say to your site manager". Further, professional help should also promote preventive measures against bullying in a male-dominated industry: "Bullying is typical when you are an inexperienced young boy"; "one time my two bosses put a snake in my car to make fun of me".

Third, several construction workers reported that a leadership team that supported construction workers' activities and collaborations and enhanced collegial relationships professionally and personally would reduce stress (e.g., ''If there are your co-workers that only express their opinions because they always feel authorised to give their opinion…it is frustrating. But… if there are your co-workers that make your activity better … so I wish I had more opportunities to be with my colleagues and learn from them''). In respect of this issue, the employer should promote collaboration within the team and make it possible for them to work better: for example, ensuring tidiness, cleanliness and basic behavioural norms for sharing facilities.

Fourth, construction workers reported that additional resources for personal wellbeing (e.g., mental health resources, job training, and breaks when family issues occur) would help reduce stress (e.g., ''Mental problems are an issue…. In the past, alcohol was very common but today, the use of steroids, cocaine are also common''; "When you have a family problem, you simply don't come to work….there is no way to discuss these problems). Fifth, construction workers reported that organisational changes, including enhanced cooperation (e.g. more flexible working conditions, or gainsharing plans, and other forms of employee participation programmes) and fostering stronger partnerships with clients would help reduce stress and anxiety regarding their job.

DISCUSSION

Construction workers have long been identified as a group of stressed and high-risk persons whose stress levels often exceed those of workers in other industries. In view of this, the current study sought to identify the main stress factors, the consequences of stress and possible measures to be implemented in this environment, by collecting in-depth qualitative information from 3 British Construction Organisations using an ethnography approach. In addition, the study was conducted from a psychological perspective which represents an element of novelty in this field of research.

In term of factors, 'ambiguity' represents an important variable of stress which creates a challenging environment characterised by limited time, poor communication and sometimes limited resources and facilities. This result is consistent with previous published literature (e.g. Leung et al., 2007; Lingard et al., 2010; Leung et al., 2011; Mitropoulos et al., 2012; Bowen et al., 2013; Bowen, Govender & Edwards, 2014; Leung, Chan & Cooper, 2014;

Yi & Chan, 2014). Perhaps the difference between our findings and other previous studies is our in-depth investigation about the organisational culture that sustains this level of stress as constantly high. If someone works in a context where people commonly – *or even better, culturally* – avoid expressing their concerns about communication, resources and facilities (because the typical construction worker representation is that he/she is strong and able to work under any conditions), then it is unsurprising that they are reluctant to discuss these problems.

Another important factor of stress concerns teamwork. In any organisational context, people need to get along with their colleagues. This principle is even more important for construction workers because they work close to each other physically and temporally. Their relationships with colleagues are thus important. Also important is the need to offer them training and education in this regard as it is scarce or sometimes non-existent (Chinyio, Riva & Hampton, 2018).

Our research also found that the level of stress experienced by workers is strictly connected with their level of engagement and commitment in handling responsibilities: the more engaged they are in their activities, the more likely the possibility of their experiencing a high level of stress. The study found a positive association between these two variables. The connection between the level of commitment and elevated stress is well documented in some disciplines, such as medicine and psychology (Gustafsson et al., 2010; Renzi et al., 2016) while it is unreported in the construction discipline. Hence this element of the practical findings is novel in respect of construction practice. Last but not least, the research found that power and leadership are often influenced by the level of practical experience on sites. Many times, career progression in the CI starts from the bottom and the opinions of people working on sites is quite influential and persuasive.

Overall, the present findings are quite novel because they give a totally new perspective in CI research. The novelty is represented not so much in the problems and the factors causing stress (most of them had already been highlighted by the current literature) but rather in the psychological perspective used by this study, in which we tried to discover the mechanisms behind stress factors in terms of people's behaviours. First, these results give an explanation of stress in terms of behaviours adopted. It has been identified how stress factors persist because they are related to unchangeable routines, and learned behaviours. Stress is often related to learned behaviours that are repetitively reinforced. Second, this ethnography permitted an interpretation of stress in relation to culture, values and roles that are typical in CI. Psychology helped to better describe problems in terms of interpersonal relationships, leadership roles and hierarchies which are all factors contributing to stress within an organisation.

The consequence of high levels of stress is alarming and is affecting many construction workers at various levels. The impacts of stress were associated with poor health (particularly cardiovascular problems), reduced personal relationships and low work performance. During a period of stress, the work environment is perceived as a menace to those who are distressed, which causes significant emotional problems (particularly anxiety and depression) which may in turn lead to clinical disorders. Incidentally, the study found

two psychological problems that need to be investigated more and managed: the use of steroids and gambling, which are growing specific issues in the CI.

Different participants believed it is important to have some tools to cope with stress and alleviate the consequences of harmful events or dangerous situations. These tools may represent good support, particularly when they are portable (e.g. apps, software). Published data on the use of such tools in work management are encouraging (Ahtinen et al., 2013; Tetrick & Winslow, 2015; Jimenez & Bregenzer, 2018). Despite this, however, the use of such tools is not fully practised currently and their promotion may thus not be adopted automatically by all workers. The use of tools for management (e.g. electronic diary, To-do-List Apps) after specific training activities and induction periods may be a long-term solution.

Regarding tools and measures to adopt, there is a need for training and sharing of experiences about stress management. It is important to instil knowledge and culture (Fred et al., 2012) of these tools as they can represent a valid support for health and safety in CI with good repercussions on the level of stress. Given that the majority of construction workers identified limited support to cope with personal stress, it is not surprising that additional resources emerged as a separate theme in the context of this study. A number of studies in the CI have conceptualised the importance of training and shared interactions in the context of stress management (e.g. Brunette, 2005; Edum-Fotwe & McCaffer, 2000). Ensuring the proper management of health and wellbeing on construction projects should never be seen as a burden or something to be rigidly separated from other aspects of work activities, or worse, something to be ignored. A well planned and well-run project enhances a safe environment and efficiency and minimises incidences of ill-health and loss of money.

Although ethnography is a laborious methodology for qualitative data acquisition and analyses, the extent to which the results from this study are generalisable to the general population of construction workers is uncertain, due to the relatively small sample size on which they are based. Furthermore, although ethnography attempts to limit the researcher's bias via consensus strategies within the team-work, it is still possible that some of the findings from this study reflect the unique way in which the research team interpreted these data. However, extensive time spent on training, reading independently, and reaching a consensus increased the confidence of the investigators in the objectivity of the findings. Future replication and longitudinal studies with other research teams and additional samples of construction workers would help enhance the external validity of the study.

Longitudinal studies are also needed to cast light on the causal pathways and mechanisms by which construction workers' stress is influenced and its changes over time. Although this present study reveals a great deal about construction workers' experiences, more research is necessary to comprehend better the association between stress factors, construction workers' behaviours and outcomes in order to provide a better basis for interventions that will further promote construction workers' health and wellbeing.

THEORETICAL AND PRACTICAL CONTRIBUTIONS

The psychological perspective gives some ideas and cues for future interventions in stress management. As Psychology is interested in predicting human behaviour, its contribution can lead to the development of new approaches and training in Construction organisations.

The study showed that stress is prevalent in construction and workers are often able to recognise and talk about it. The types and sources of stress are also known by the workers. There are significant public health and policy implications associated with addressing the sources of construction workers' stress at both the individual and organisational level. At the individual level, it is fundamental to find a new strategy to allow workers to deal with stress issues that will guarantee their competence, privacy and quickness at preventing particularly dangerous behaviours (e.g., use of drugs, or gambling). At the organisational level, it is important to provide a continuum of services at the workplace, including protective measures to thwart the predictable sources of stress (e.g., providing targeted support with direct access to psychological and counselling services) combined with specific training activities for construction workers covering several aspects of relationships (e.g., assessable and transparent communication among staff members, assertiveness, equity in the system of hierarchies) to promote resilience, wellness and enhanced job functioning.

A final general recommendation for future studies and research is to find greater and multidisciplinary collaboration with other professional bodies (e.g. Psychology and Health), which is so far rare or sporadic.

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Table 1: Data collection using the interviews

	Semi-Structured	Unstructured	Colloquial
Company 1	5	3	7
Company 2	10	8	10
Company 3	1	0	1

Table 2: Summary of domains and categories divided for office based and site based workers

Domain	Categories	
Stress factors	**Office based**	**Site based**
Uncertainty	Lack of time Pressure Managing difficulties Deadlines Poor communication Absence of collaborations Negotiations Concessions	Lack of time Pressure Quickness Deadlines Lack of basic resources Poor communication Deprivation context Lack of materials Negotiations
Working in team	Trust Sharing opinions Sense of exhaustion Coping with risk Safety procedures Coordination	Proximity Limited space Long time spent No experience Trust Sharing opinions Sense of exhaustion Absence of reciprocal knowledge Coping with risk Safety procedures Coordination Constancy of presence
Handling responsibilities	Taking decisions Autonomy Deadlines Limited time Clients' needs Clients' changes Anxiety Demands exceed time Workload intrusions Mental energy	Taking decisions Deadlines Limited time Emergencies Anxiety Demands exceed time Workload intrusions Fatigue Physical energy
Power and leadership	Control Supervision Mental energy Hierarchies relationships Decision-making process Job positions Clients' requests Level of expertise	Physical energy Mental energy Hierarchies relationships Decision-making process Job positions Ambiguity Power status Clients' requests Job contracts Level of expertise Confusing relationship

Table 3: The impact of stress

Domain	Categories	Some Examples
Health status	- Smoking - Alcohol - Pain - Tremors - Cold/Respiratory system problems - Heart problems - Muscle problems - Nerves problems	"I eat junky foods" "I usually drink beer to survive" "My back pain is terrible" "Freezing cause you cold" "I had a slipped disc due to my job" "I had two heart attacks due to my stress"
Personal relationships	- Endless availability - Problems in family life - Imbalance work/family life - Community life - Teamwork	"My phone rang continuously during my honeymoon…this is not life" "I broke with my partner due to my job" "I have a small child who does not sleep during the night. It is a nightmare my vigilance at work" "I cannot have holiday in summer"
Work performance	- Endless work - Goals - Priorities - Satisfaction	"Before to finish in one site, I have already started with the new one…it is an endless work" "Which is my goal: finish on time or dealing with client request? "Your performance is high, only if your satisfaction is high" "I do not know which are my priorities, too many things to do"
Emotional status	- Anxiety - Frustration - Irritability - Depression - Pessimistic view	"Some people become very pessimistic, they start to believe that the way to operate to finish a certain type of activity is too bad or unrealistic"
Clinical disorders	- Gambling - Cocaine and other drugs - Steroid consumption - Alcohol dependence	"Today is not so infrequent the abuse of steroids or gambling in people working in construction" "I had to work with a colleague suffering from alcoholism and it was hard…at the end the company sent him away" "Some people may use cocaine and we should be able to detect these problems in early"