

IMMIGRANT MENTAL HEALTH AND LEAN CONSTRUCTION – A BIBLIOGRAPHIC ANALYSIS

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ABSTRACT

The mental health of construction workers is a topic that has received increasing attention in academic circles in recent years. Today, the crisis related to workers' psychological well-being directly affects the Lean Construction (LC) community, which seeks to increase productivity by reducing waste and promoting respect for people. This study focuses on immigrants, who represent a substantial portion of the global workforce, and examines the existing literature that connects LC and mental health to assess whether this body of research explicitly considers the immigrant population. This examination was performed using VOSviewer software and a visual bibliographic analysis of Keyword Co-occurrence Network mapping over time. After a thorough screening process, 19 articles were selected from a sample of 821 based on their connection to the main topic of this study. These articles showed no connection between mental health of immigrants in the LC literature. The ultimate goal of this paper is to consider immigrants within the conversation of social wastes in LC and to present the gap in the literature involving this group. In addition, it aims to promote future research for the benefit of the area and the creation of a sector that effectively supports all types of workers.

KEYWORDS

Lean construction, mental health, immigrants, social waste, human potential.

INTRODUCTION

Well-being is a topic of concern in different areas of the workplace. In recent years, workers' mental health has received increasing attention (Newaz et al., 2022), and contemporary literature views it as a major and growing public health issue (Gaillard et al., 2020). Previous studies indicate that the construction industry negatively impacts the mental health of its workers by creating stressful, dangerous, and high-pressure work environments, leading to suicide, depression, and other mental health disorders (Pamidimukkala, et al., 2025).

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For example, in 2021, suicide deaths took a toll among construction workers. Data shows that almost one fifth (17.9%) of reported suicide deaths occurred in the construction sector (Harris et al., 2024). In addition, the overall suicide rate was 32 per 100,000 workers, while the construction industry scored males = 56 and females = 10.4 (Sussell et al., 2023). Considering the data on the crisis currently facing the industry, it is pertinent to draw a parallel between mental health and Lean Construction (LC). One of the pillars of LC is productivity and workflow improvements; however, true implementation becomes controversial when attempting to advance the development of the industry while significantly overlooking the mental health and well-being of employees.

Regarding the mental health and well-being issue, this paper attempts to focus on the major demographic of immigrant construction workers. Evidence from different regions of the world contributes to the understanding that immigrants constitute a significant part of the global construction workforce. For instance, as of June 2025, 51.9 million immigrants lived in the United States (Kramer et al., 2025), and in the latest available census related to the rate of immigrants in the US workforce, 25.7% of them were working in the construction industry (American Immigration Council, 2023). In Malaysia in 2012, 69% of construction workers were immigrants, and in Australia immigrants represented 16% of construction workers (Abdul-Rahman et al., 2012). Amidst this current mental health crisis among construction workers, immigrant workers are at high risk of psychological distress and disorders due to unique challenges (Syed et al., 2024). Difficulties such as language barriers (Wang and Rotimi, 2025), cultural/religious differences, and low safety and health awareness and knowledge (Lyu et al., 2025) disproportionately affect immigrant workers, taking a toll on their mental health, and negatively affecting project development and workflow. As awareness has increased, construction companies have commenced implementing interventions to address this issue of poor mental health (Duckworth et al., 2022).

LITERATURE REVIEW

HUMAN POTENTIAL

One of the key areas of impact for Lean Construction has been not only continuous improvement, but also the concept of “respect for people,” given that people’s knowledge, decisions, and well-being are directly linked to project outcomes. Respect for people plays a crucial role in LC, considering that the success of any system or process depends on the commitment, motivation, and respect for the individuals who comprise it (Erazo-Rondinel et al., 2024). These perspectives emphasize that workers should not be treated as production inputs, but as fundamental pieces for project success, with human potential being a central concern for the development of the industry.

Human potential is not only tied to physical work, but also to cognitive capacity, decision making, creativity, discipline, and emotional state, among others. Because these capacities influence how workers solve problems, collaborate with others, and respond to project demands, workers’ well-being and mental health become directly relevant to LC. In fact, leaders are typically more familiar with the effects of mental health problems through employee absenteeism and ineffective workplace productivity practices (Oswald et al., 2019). From this perspective, neglecting workers’ mental health not only creates human and organizational strain, but also contributes to the underutilization of human potential. This concern becomes even more relevant when viewed through the lens of social waste, which, according to Macomber and Howell, helps explain how the exclusion of vulnerable groups and mental health issues directly influence the loss of value in projects and, consequently, in organizations.

SOCIAL WASTE

The LC literature focuses on the identification and minimization of different types of waste, including underutilization of human resources (Karningsih et al., 2018). One of the main objectives of waste elimination is the improvement of efficiency, which is commonly associated with production, management, and business, but rarely is tied to the well-being of the workers. In modern industry and business, efficiency is often understood primarily as cost reduction (Ohno, 1988). However, when organizational efforts focus mainly on minimizing expenses, the social welfare and well-being of workers could easily be neglected. This neglect reflects another form of waste identified in lean literature: the underutilization of human potential, which can lead to poor performance, negative value, and consequently, loss of capital (Macomber & Howell, 2004).

Although lean thinking has been around for decades, the focus has largely been on the technical aspects of projects rather than the human and social ones (Arroyo and Gonzalez, 2016). Given this, the concept of social waste seeks to interconnect process and physical waste in lean (Araki & Smith, 2025), and it serves as a means of avoiding the loss of human potential value within project contexts. While it is challenging to quantify the value of a life, past studies have sought to find a dollar figure to quantify the annual economic cost of suicide, which totaled about \$61.26 million (Araki & Smith, 2025). Therefore, neglecting mental health is not only an ethical problem, but also a matter of lost human potential and productivity. This results in economic losses within Lean Construction.

In this way, social waste becomes not just a theoretical form of lean thinking, but an active part of caring for the physical and mental well-being of the workforce and, therefore, of valuing human potential at the individual level. It is essential to emphasize the importance of addressing social waste in a lean environment so that people are cared for, potential is not lost, and the industry continues to contribute to the economy with a stable structure. Since the lean community has been paying close attention in recent years to the social issues and well-being of workers in the industry, this becomes the ideal place to consider immigrants, who are often a part of the “invisible wastes” of construction, as part of the social waste conversations in the LC literature. In this way, this specific community can count on more attention, care, and consequently better physical and emotional well-being.

Immigrant workers experiencing stress due to language barriers are less productive, less confident, and more likely to make avoidable mistakes. Lower safety and health awareness may increase the likelihood of riskier choices, injuries, and delays. Cultural differences can cause conflict among workers resulting in lower productivity and the chance of missing out on valuable input from overlooked workers (Lyu et al., 2025). All these possible scenarios highlight the loss of human potential because such situations inhibit immigrant workers from performing at their full productivity level.

OBJECTIVE

Being a pioneering study for linking areas not commonly addressed together, such as lean construction and the mental health of immigrants, this paper pursues two aims. First, demonstrate to the Lean Construction academic community that the invisibility faced by immigrants should be treated as a form of social waste. In addition, lead the discussion on how to address the mental health of immigrants in relation to waste reduction and respect for people. Second, identify gaps in the literature regarding LC and mental health among immigrants. Through this, emphasize the need for more attention to this relationship, which currently greatly affects the development of the industry.

To fulfill these aims, this study followed two phases of bibliographic analysis: (1) examining the relationship between mental health and well-being within lean construction in

the current literature, and (2) after phase 1, a search was conducted to find out if any of the selected articles mentioned or focused on immigrants or any vulnerable subgroup. A bibliographic analysis was used due to its ability to identify research hotspots or trends over time (Cheng et al., 2024). Finally, this study used VOSviewer software to create a network visualization and map the existing literature with keyword co-occurrence, thematic clusters, and research trends. The final objective is to promote future research and discussions that contribute to the development of the sector.

APPROACH

Published studies and research have shown to influence policy change when sufficient consistent literature exists on a topic (Suazo-Galdames et al., 2025). Conducting more peer-reviewed studies leads to deeper trust and confidence in findings (Sense About Science & Elsevier, 2019). A driving factor behind research and discussion of mental health in construction is to provide direction for and promote effective interventions within the industry (Saraji & Mehany, 2025). Therefore, the volume of peer-reviewed studies can significantly impact the quality and reach of mental health interventions in the construction industry.

Conversely, a lack of literature can cause important issues to go unnoticed or undetected. On the topic of migrant construction workers' struggles with mental health, recent studies have identified critical gaps in the existing literature, especially in underrepresented regions like the UAE and South Africa (Lyu et al., 2025). Conducting a formal literature review will further illustrate such a gap if one exists. Thus, one point of interest is to see if Lean Construction literature rarely addresses the mental health of immigrant workers as a specific subject.

Although workers' mental health is receiving increasing attention in the literature (Newaz et al., 2022), existing studies commonly generalize discussions on mental health without distinguishing vulnerable groups. The construction industry workforce is diverse, with many different types of people from different nationalities, each group being exposed to unique stressors. The lack of focus on subgroups indicates a gap within Lean Construction research. This further prompts the unfortunate case that immigrant workers' mental health is rarely addressed as a distinct subject in the LC literature.

METHODOLOGY

This study employed a structured literature review to examine how immigrant workers' mental health and related people-centered concerns have been addressed within, or alongside, the LC literature. A search was conducted in the Scopus database using the following keyword string: ("immigrant*" OR "migrant*" OR "foreign worker*" OR "undocumented" OR "undocumented worker*" OR "international worker*" OR "ethnic minority*" OR "refugee*" OR "non-native") AND ("construction" OR "construction industry" OR "construction sector" OR "construction worker*" OR "building industry" OR "civil construction") AND (("mental health" OR "psychological" OR "stress" OR "depression" OR "anxiety" OR "burnout" OR "wellbeing" OR "well-being" OR "emotional exhaustion" OR "psychosocial") OR ("lean construction" OR "lean thinking" OR "lean management" OR "lean principles" OR "lean methods" OR "continuous improvement" OR "Last Planner System" OR "LPS")).

The search strategy was intentionally broad, seeking to capture literature at the intersection of immigrant construction workers, mental health and well-being concerns, and Lean Construction-related concepts. Rather than assuming that this intersection was already well established in the literature or that no connection would be found, the search was designed to allow the screening process to reveal the extent to which these themes would converge in the final sample. No publication year restriction was applied, and no subject area filter was at the database search stage.

A total of 821 records were identified through the Scopus database. The screening process was conducted in three stages: title screening, abstract screening, and full-text screening. During title screening, 500 records were excluded because they were clearly unrelated to the construction context, immigrants, mental health and well-being concerns, or LC-related people-centered issues. This resulted in 321 remaining articles. During abstract screening, 171 articles were excluded after not addressing the intersection of construction, worker well-being or mental health, and the broader people-centered focus of the study, leaving 150 articles for further review. In the final stage, full-text screening led to the exclusion of 131 articles that did not demonstrate sufficient relevance to the objective of this study after further examination. Although these papers contained at least one of the relevant search terms, they were excluded because they focused on processes, technical construction issues, general productivity concerns, or other broad workforce topics, without a substantive connection to LC-related people-centered issues, mental health, or well-being. This resulted in a final sample of 19 articles for data extraction and analysis.

The inclusion criteria were: (1) peer-reviewed publications indexed in the Scopus database; (2) studies focused on the construction industry; and (3) the main focus of the studies was at least one of the following themes: mental health or well-being, psychological factors, or people-centered concerns relevant to Lean Construction. Articles were included when they offered substantive relevance to the objective of this study, even when they did not directly address the immigrant workers. This was important because the study sought not only to identify direct treatments of immigrant workers' mental health but also to assess whether the broader LC literature and worker well-being meaningfully included this population. Notably, none of the selected articles addressed immigrant construction workers as a central analytical focus while also substantively engaging both mental health or well-being concerns and LC-related people-centered issues. This absence supported the decision to retain studies that were most closely aligned with this intersection. The exclusion criteria were: (1) studies outside the construction context; (2) studies not addressing worker mental health or well-being, or related people-centered issues; and (3) studies that mentioned relevant terms only but without connection to the objective of this study.

For each of the 19 selected articles, as part of the bibliographic analysis, data was collected on authorship, year, location or scope, study type, primary theme, and relevance to LC and worker mental health or well-being. This data was used to support the descriptive summary and thematic interpretation of the final sample, particularly by identifying the main people-centered themes addressed in the literature. The final set of studies was imported into VOSviewer software to examine term co-occurrence patterns and identify recurring concepts across the selected studies.

SUMMARY OF SOURCES

All papers included in the final sample were examined to validate their relevance to the key themes of this review: LC-related people-centered issues, worker mental health, and well-being. Tables 1 and 2 offer a descriptive summary of the sources and serve as a map of the final body of work. They show how each study relates to the themes of this investigation and explain why each study was included in the review. This organization shows that the selected studies are the most relevant literature available at the intersection being examined. It also highlights a central finding of the review: immigrant construction workers are not addressed in this people-centered LC literature.

Table 1: Summary of sources

Authors, Source & Year	Type of Study	Key people-centered contribution	Immigrant workers focus?
Kon, et al., IGLC - 2025	Systematic Literature Review and Field Observations.	Highlight of worker well-being barriers, such as suicide.	No
Araki and Smith, IGLC - 2025	Literature-Based Analysis.	Relationship between worker well-being, suicide, and LC principles.	No
Pérez et al., IGLC - 2024	Quantitative Survey and Statistical Analysis.	Practices mentioned improve physical and mental well-being.	No
Arroyo and Villanueva, IGLC - 2024	Exploratory Qualitative Case Study.	Blame-free environment based on respect for people.	No
Fernandes et al., IGLC - 2024	Quantitative Study.	Suggestions related to mental health, strategy, transparency, and governance.	No
Lee et al., <i>Buildings</i> 2023, 13(6), 1479	Bibliometric Review.	A bibliometric review highlighting technological tools and human factors, such as well-being.	No
Peinado and Costa, IGLC - 2023	Conceptual Review of Lean-based Workers.	Communication drives motivation and well-being.	No
Bajjou and Chafi, ECAM - 2022	Quantitative Survey Study.	Safety, training, and involvement improve workers' well-being.	No
Padia et al., IGLC - 2022	Quantitative Survey Study.	Quantitative survey study with statistical analysis.	No
Bou Hatoum et al., IGLC – 2022	Qualitative Survey Case Study.	Results showed that respect, honesty, benefits, safety, and clarity were the top five most important factors. However, well-being was ranked 13th.	No
Hyarat et al., Project Mngmt. and Engineering – 2022	Systematic Literature Review.	Lack of training, difficulty understanding new technology, and poor communication skills have all shown to negatively affect stress levels/workers' well-being.	No
Oke et al., ASTI - 2021	Quantitative Study.	Stress on contractors was identified as one of the challenges of implementing LC.	No

Table 1: Summary of sources (continued)

Authors, Source & Year	Type of Study	Key people-centered contribution	Immigrant workers focus?
Solaimani and Sedighi, Journal of Cleaner Production - 2020	Systematic Literature Review.	Overlooking human resource management can result in worker dissatisfaction or affect their well-being.	No
Demirkesen et al., IGLC - 2019	Quantitative Study.	Stress and pressure in deadlines was identified as a workforce barrier.	No
Oguntona et al., AISC - 2019	Quantitative Study.	Top five barriers to LC practices implementation. Stress creation on contractors was perceived as a barrier.	No
Brady et al., ECAM- 2018	Exploratory Qualitative Case Study.	LC management improves transparency, reducing stress and worker dissatisfaction.	No
Dias Filho et al., IGLC - 2018	Experiment Implementing a Mediation Program.	There is a demand to implement meditation on the job site to improve wellness.	No
Fuemana et al., IGLC – 2013	Qualitative Study.	Improved communication enables a better flow of resources and affects the stress levels and overall well-being of the whole construction team.	No
Polesie, P. IGLC – 2010	Qualitative Study.	Lean implementation can negatively affect employee wellness.	No

FINDINGS

The keyword co-occurrence network analysis, represented in Figure 1, reveals the temporal evolution and presence of certain terms in the current literature analyzed. The size of each node represents the frequency with which this keyword occurs, while the color gradient indicates the year of publication, showing which direction the literature has been evolving over the years. This network reveals a main concentration of studies focused on traditional Lean Construction topics, such as productivity, project management, planning, and waste reduction, which dominate both old and new fields in publications.

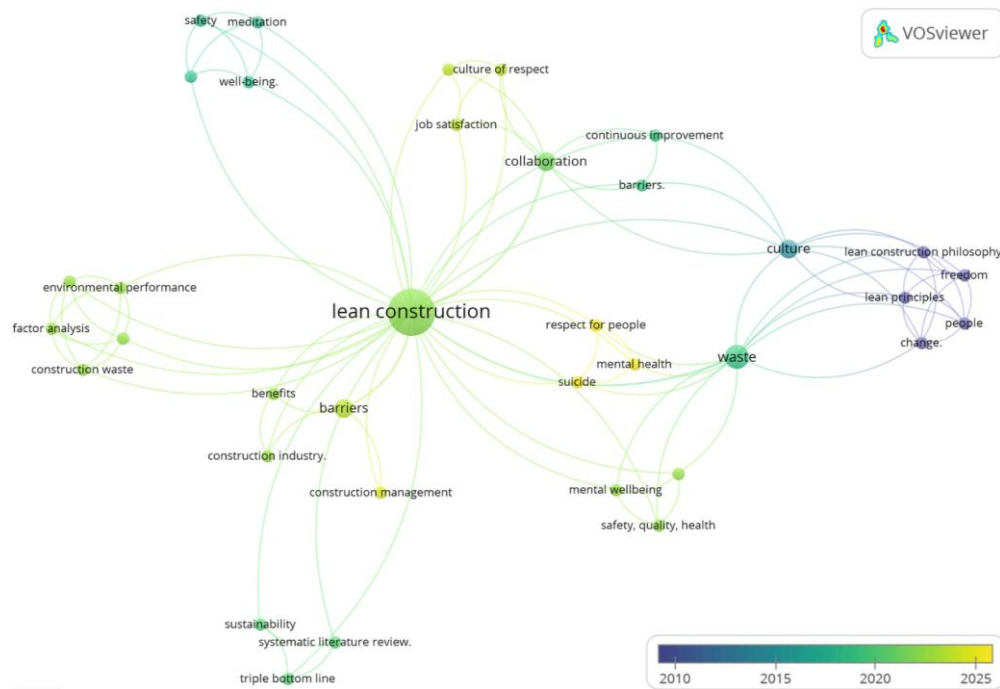


Figure 1: Keyword co-occurrence network as graphed over time

Furthermore, it is possible to observe that topics such as mental health, suicide, well-being, and respect for people still appear as small nodes, demonstrating the existence of these topics in the literature but also their lack of strength. In addition, these subjects are being addressed more frequently in recent years, which reaffirms the statement made earlier in this paper that mental health has received increasing attention in the literature (Newaz et al., 2022). At the same time, the analysis indicates a lack of studies involving vulnerable groups who suffer from mental health issues. Although immigrant-related terms were part of the search strategy, the final sample showed little to no substantive engagement with immigrant construction workers as a central analytical focus within discussions of Lean Construction, mental health, and worker well-being.

Also, through the keyword co-occurrence network shown in Figure 2, it is possible to see different types of clusters that have been identified in the literature and their correlations, thus concluding that part of the literature touches on the subject of culture, in relation to barriers faced in construction. Being part of one of the challenges that workers face, it naturally correlates with the wastes of the lean construction philosophy. The literature already recognizes that culture plays an important role when it comes to creating an industry that values diversity and respect and seeks the well-being of its workers. However, when it comes to the specific terms language and migration, there are no occurrences in the literature.

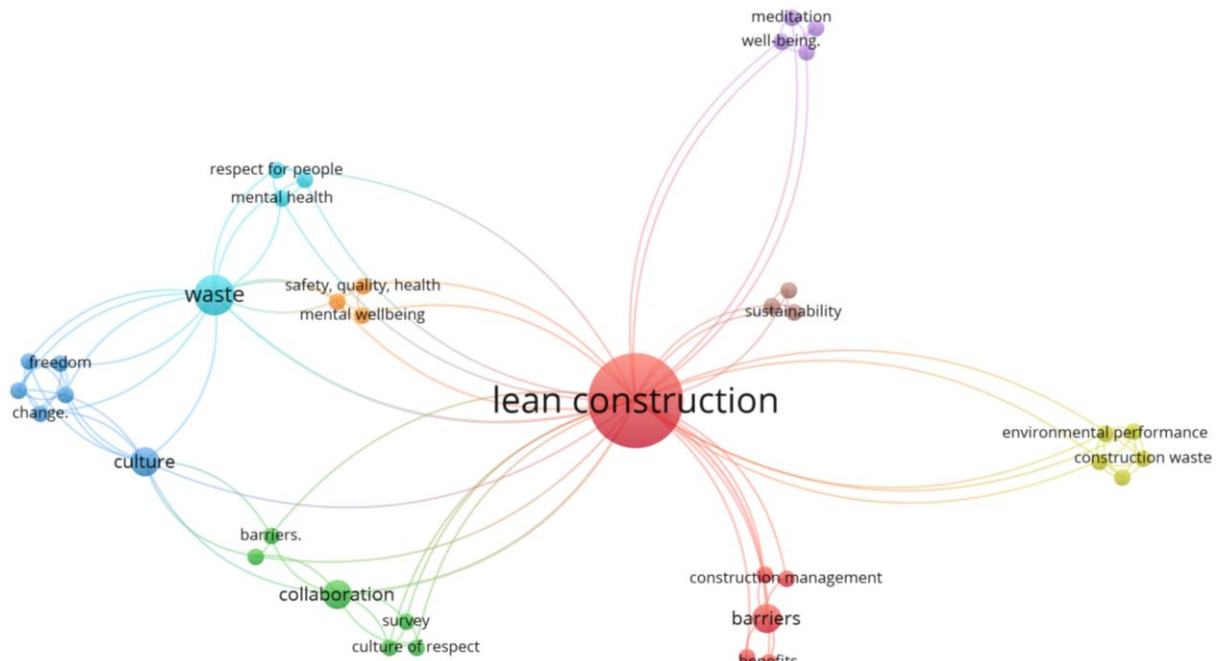


Figure 2: Keyword co-occurrence network - clusters analysis

DISCUSSION

From the findings of this literature review, it is evident that mental health is severely overlooked in lean construction practices. In lean construction literature, focus is placed elsewhere, showing the general lack of attention or discussion that mental health issues receive. Treating a challenge as severe as mental health struggles as secondary can even cause issues considered primary to worsen. Safety, productivity, and efficiency are all negatively impacted by mental health issues among workers (de Oliveira et al., 2023).

Despite claiming a focus on waste mitigation in lean construction, attempts to reduce psychological suffering are severely lacking. Waste reduction efforts are inefficient when major issues are ignored. Motivation, energy, satisfaction, ability, and worker productivity are all wastes created as a result of untreated psychological distress. To truly achieve the lean principle of waste mitigation, significant efforts must be made to reduce psychological distress.

In the vast library of lean construction literature, the stark absence of discussion of immigrants is alarming. As a significant percentage of the construction industry, immigrant workers should be represented in more studies and reviews. In the case of the keyword co-occurrence analysis, it is expected that a node be dedicated to immigrants or migrants, showing repetitive mention. However, as shown in Figure 2 and Figure 3 which graph the topics covered by construction related literature, there is no node for “immigrants” in either chart. The fact that immigrant workers are not represented at all while unrelated topics such as “collaboration,” and “factor analysis,” are graphed further proves that immigrant workers continue to be an “invisible waste” in lean construction literature. Topics that have less of an impact on human potential are preferred. This lack of representation signifies a deficiency of awareness regarding immigrant workers and their situation (Machimbidzofa, 2025). Immigrant workers have unique struggles and may not respond the same way to lean construction principles as native workers (Roelofs et al., 2011). Attempting a one-size-fits-all solution on a diverse group of workers is ineffective and wasteful.

This issue can be addressed by bringing more awareness to the need of studies of immigrant construction workers. It is not an unsolvable issue; it just needs work. If researchers understood this need, more effort would be dedicated. It is essential to the lean community and the entire

construction industry that more research be done in relation to immigrant workers. Further research involving immigrant workers would raise awareness to the public of their specific challenges. More literature on this topic would serve as a guide for companies and policies to address issues specific to immigrant workers (Orrenius & Zavodny, 2009). It would motivate the lean construction community and the public to put pressure on construction companies to implement quality mental health and well-being interventions. In contrast, continuing to ignore such a weighty problem will only lead to its worsening.

Returning to the principle of minimizing waste in lean construction, all attempts are rendered futile when a major waste is overlooked. Efficiency cannot be achieved if exceptions exist (Salem et al., 2006). If the mental health and well-being of immigrants remain unnoticed, the lean community remains unconcerned and its success is hindered. This paper calls out to all proponents of lean construction theory to recognize the enormous waste of human potential through the neglect of the mental health and well-being of immigrant construction workers. Addressing this deficiency of attention and action will significantly contribute to the mission and goals of lean construction.

CONCLUSION

To conclude this study, it is necessary to explain its limitations and opportunities for further research. The sample of articles taken from the Scopus database may not be fully reflective of existing literature on immigrants. Additionally, this study only included articles connecting immigrants with lean construction which may have excluded relevant articles that do not explicitly reference lean construction.

Regardless, it is suggested that future studies on the link between LC and the mental health of immigrants be conducted, so that the well-being of this population becomes a priority. As previously cited, the global workforce relies heavily on immigrants, meaning that any interventions to improve the mental health and well-being of immigrant construction workers can have a positive effect on millions of people worldwide. This in turn can also lead to economic benefits, for through better conditions and care for immigrant workers, millions of dollars will be saved, and projects will have greater success, which naturally means profit in the construction industry.

The LC community, which year after year focuses on how to create more effectiveness in construction processes having respect for people, can serve as one of the main champions for immigrants' well-being and mental health. This can be the place where minorities can feel valued and where the industry can have more open spaces for conversation, support, and care. Lean Construction advocates can set this example to the world and use their influence to promote positive change. In addition, it can push for more research related to immigrant workers and their specific mental health and well-being challenges. Such research and studies will aim to identify unique challenges and analyze intervention methods. It is believed that research can transform the current state of the industry through evidence-based findings. Consequently, research can raise awareness and inform decisions focused on developing the sector and addressing the needs of its most important asset: its workers. This is crucial, for when lean construction literature overlooks immigrant workers, the rest of the construction industry does too.

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