

Article

# 'Lean Dancing': How Involvement in Continuous Improvement and Lean Techniques Relate to Hospital Performance and Workers' Wellbeing through Autonomy

Robert van Kleeff \*, Jasmijn van Harten, Eva Knies and Paul Boselie

Utrecht University School of Governance, Utrecht University, Bijlhouwerstraat 6,  
3511 ZC Utrecht, The Netherlands

\* Correspondence: r.vankleeff@uu.nl

**Abstract:** This study examines Lean—conceptualized as Involvement in Continuous Improvement and Lean Techniques—in hospitals. Specifically, we aim to determine the extent to which hospital workers' perceptions of Lean are related to perceptions of their performance and wellbeing, and to what extent these relationships are explained by autonomy. Our data (n = 754) come from a Lean implementation study in a Dutch hospital, and are analysed using structural equation modelling. First, our results indicate that Involvement in Continuous Improvement positively relates to hospital workers' perceptions of several dimensions of hospital performance (quality, service, efficiency, and predictability) and their own wellbeing (burnout and engagement)—a mutual benefit for both employer and employees. However, we also show that the Lean Techniques do not significantly relate to wellbeing. Second, our study reveals that it is essential to distinguish between responsible autonomy and choice autonomy, as we found differing mediating effects. Based on these findings, we recommend HR executives to move away from approaches that focus on happy few and to move away from approaches that focus on techniques.



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**Keywords:** lean; wellbeing; performance; Human Resource Management (HRM); healthcare; autonomy; hospitals; engagement; burnout; continuous improvement

## 1. Introduction

In many countries, the healthcare sector is under pressure and being confronted with huge societal and organisational challenges [1]. As a result, hospitals adopt interventions, particularly improvement practices such as Lean, that aim to improve care quality and control costs. In essence, Lean refers to a system of practices aimed at generating better value through eliminating waste [2]. It focuses on increasing customer value through both tools and techniques, and engaging employees in continuous improvement. Lean originates from the manufacturing context of Toyota's Production System (TPS). However, in our study we use a highly contextualized version of 'Lean' in healthcare, focusing on two components: Involvement in Continuous Improvement (ICI) and Lean Techniques (LT). Continuous improvement, a key component of Lean, is defined as a systematic and continuous approach to challenging and improving existing ways in formulating and revising work standards [3]. Although it could be argued that the body of knowledge on Lean developed separately, it strongly relates to Human Resource Management (HRM) in two ways. First, employee involvement or empowerment is implemented through the concept of Lean [4], by, for instance, providing employees with the opportunity to influence their work processes [5]. Jiang et al., (2012) [6] showed that, amongst others, HRM stimulates performance and wellbeing by empowering employees. Second, Jiang et al., (2012) [6] showed that HRM stimulates performance and wellbeing by boosting motivation and human capital. The latter particularly relates to Lean, as learning processes can

be expected [2], for instance, by providing training courses and on-the-job coaching on problem-solving skills and techniques.

Although some general 'Lean' principles relate to ideas originating from Scientific Management, both the concept itself and the context of application (notably here the hospital context) create opportunities for applying the phenomenon in a fundamentally different way than the application in the manufacturing context—where the concept originated. Regarding the concept itself, Lean's emphasis on human aspects such as employee involvement and organizational leadership (i.e., influencing and facilitating individual and collective efforts to accomplish shared objectives) [7] (p. 66) [8,9], distinguishes Lean from Scientific Management, where less attention is given to such human aspects. Concerning the context, service organizations in the public domain differ fundamentally from those in a manufacturing context. Hospitals have different objectives, are labour intensive, and often largely rely on public funding. Therefore, we posit that, first, the effects of Lean and, second, the ways in which those effects are established, might play out differently in hospitals. This study intends to theorize further and test the ways in which hospital workers' perceptions of Lean impact their perceptions of performance and wellbeing. Such a focused study is in line with contemporary HRM research that is moving away from generic, multisector research to context- and theme-specific studies. Combining academic rigor with relevance (i.e., context) is increasingly pleaded for [10]. Our study is important for at least three reasons.

First, Lean has been promoted extensively as an effective way to improve the efficiency and quality of performance outcomes in the manufacturing context [11]. However, there are relevant differences between a manufacturing context and the public domain, as to what constitutes performance. Private sector organizations primarily have a single bottom line—making a profit—while public service performance, given the presence of different stakeholders with potentially conflicting goals, is multidimensional [12,13]. In this study, we contribute to the literature by adopting a multidimensional view of performance (quality, service, efficiency, and predictability) in investigating Lean. In this way, we address the broad range of public service performance aims for which different stakeholders (e.g., employees, the organization, and patients) expect hospitals to strive. For instance, we include service outcomes because the way in which service is delivered is important to patients [14].

Second, the effects of Lean on employee wellbeing (i.e., the overall quality of experience and functioning at work) [15] are mixed, ranging from negative to positive [16]. We argue that, in human-capital-intensive organizations such as hospitals, workers (medical specialists, nurses, and support staff) are the basis for organizational success, meaning that adverse employee outcomes could ultimately lower organizational performance. Although Lean aims to improve employee morale [17], Cullinane et al., (2014) [18] revealed that while some aspects of Lean are potentially engaging, others (e.g., problem-solving demands) intensify work and can lead to impaired health [19]. Hence, one can ask whether, in a hospital setting, it is even possible to achieve both high performance and a high level of wellbeing. In this study, we contribute to the literature by assessing whether Lean is mutually beneficial for both the employer and employee (the mutual gains perspective) or beneficial for one while harmful for the other (the conflicting outcome perspective) [20]. This is a relevant topic, as the existing literature has mainly focused on one or the other [19,21], thereby failing to provide convincing evidence on the extent to which Lean mutually benefits employer and employee. By researching the effects of Lean on hospital workers' perceptions of their unit's performance and of their own wellbeing, we follow Boxall's (2019) [22] recent call to simultaneously investigate wellbeing and performance. He coined the metaphor "it takes two to tango" to describe the dynamic interplay, or dance, between interventions such as Lean and both performance and wellbeing.

Third, an essential mechanism through which Lean sets out to improve performance and wellbeing is autonomy [8]. Autonomy reflects the extent to which a job allows freedom, independence, and discretion to schedule work, make decisions, and choose the methods

used to perform tasks [23]. There is a potential contradiction regarding the autonomy effects of Lean that is particularly relevant in a hospital context. On the one hand, Lean aims to involve workers in problem-solving and decision-making, thereby increasing perceived autonomy [16]. On the other hand, Lean increases standardization, potentially leading to lower perceived autonomy [24]. It is especially relevant to address this issue, as autonomy in the public domain is seen to be decreasing [1], while hospital workers are known to value their autonomy highly [25]. Therefore, if aspects of Lean negatively affect autonomy, employee wellbeing and performance are also likely to deteriorate. In this study, we distinguish between responsible autonomy and choice autonomy [23], as we expect Lean to affect both dimensions in different ways. By doing so, we can potentially explain past contradictory findings regarding the effects of Lean on wellbeing and performance in hospitals. In this way, we contribute to the literature by providing a more accurate and nuanced view on the classical debate on Lean, i.e., whether and how Lean, through autonomy, improves value in hospitals.

As such, this research aims to address existing gaps in the literature, leading to the following research objectives: first, we want to investigate how Lean (conceptualized as ICI and LT)—which originated in the manufacturing sector—manifests itself in a hospital context. Second, our aim is to simultaneously investigate the effects of Lean on employee outcomes and performance. Third, we aim to investigate what role responsible and choice autonomy play in the relationship between Lean and its outcomes in the hospital context. The central question to be answered in this paper is: *“To what extent are hospital workers’ perceptions of Lean related to perceptions of their performance and their wellbeing, and to what extent are these relationships mediated by perceived autonomy?”*.

## 2. Theoretical Framework and Research Model

Although Lean is nowadays investigated by researchers, it originates in practice [23]: it was founded, developed, and labelled by practitioners. There remains a lack of theories to apply in Lean research, and scholarly attention comes from a plethora of academic fields (e.g., operations management, human resource management, psychology), resulting in a range of scientific perspectives on a practice-based concept [26]. As a way forward, job design theory has been promoted as a way to understand the complex socio-technical nature of Lean [18]. Given that we intend to study Lean’s relationship with performance and wellbeing, through possible changes in perceived job autonomy, job design theory is highly relevant when seeking to further theorize on these relationships. Following the plea of Parker et al., (2017) [27], we use an integrative approach, by including insights on job autonomy that originate in various job design theories (e.g., Job Characteristics Theory and the Job Demands-Resources model) and incorporating multiple outcomes (e.g., organizational, motivational, and health-related), to examine potential trade-offs between Lean outcomes in hospitals.

### 2.1. Lean in Our Study: Involvement in Continuous Improvement and Lean Techniques

There are various Lean interpretations, ranging from simply being smart and efficient, to following the ideas of the Toyota Production System (TPS) on which Lean was based [9] (p. 36). TPS itself emerged from a dynamic learning process, and is a hybrid construction of existing concepts (such as takt time, derived from the German concept ‘Produktionstakt’) and inventions by the Japanese manufacturer (such as jidoka—autonomous machine) [28]. The term “lost in translation” has been used in several ways in Lean research: on the one hand to indicate the importance of tailoring Lean to a specific context [29], and on the other hand to indicate that certain interpretations can lead to misconceptions [9]. Research also shows other interpretation differences, for instance, the Lean principle of “respect for people”—the lack of respect for people is seen as the biggest barrier to successful implementation outside Japan—relates more to developing ‘craftmanship’ than the contemporary interpretation of ‘respect everyone’ [30]. In all, conceptual ambiguity can be detected, leading to the importance of clearly defining and conceptualizing concepts in a

Lean study. With these caveats in mind, we work toward a definition and conceptualization of Lean, placing Involvement in Continuous Improvement (ICI) and the application of Lean Techniques (LT) at the centre of our study.

The most prominent definition of Lean comes from Shah and Ward (2007) [31] (p. 791): “Lean is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability”. Although this definition is useful for our study, it originates from manufacturing, as illustrated by the main objective of eliminating waste. This objective is too narrow, given a hospital’s multiple strategic goals. While private sector organizations primarily have one overriding goal (maximizing profit), public organizations have to produce value for a range of stakeholders and society as a whole [32]. Besides eliminating waste (i.e., efficient care delivery), Lean practices aim for high-quality service delivery in healthcare organizations [33]. In broadening the Lean objective to make it fit the hospital context, it is also important to include Shah and Ward’s (2007) [30] two underlying social and technical dimensions. The social (“socio”) dimension relates to the shared beliefs, norms, and behaviours aimed at continuously improving both quality and efficiency outcomes—an important aspect of Lean in human-capital-intensive organizations such as hospitals [34]. The technical dimension refers to a set of work techniques aimed at reducing variability [11], such as ‘value stream mapping’ that concerns transferring information about an operation system’s key material and information processes (products or services) into a ‘visual map’. As such, we define Lean as a socio-technical system that has the aims of reducing variability and producing value by involving employees in continuous improvement and in implementing Lean techniques. This means that we distinguish two Lean dimensions: (1) Involvement in Continuous Improvement; and (2) the application of Lean techniques.

## 2.2. Lean’s Two Dimensions and Performance

In line with Boyne (2002) [12], we argue that performance in hospitals is inherently multidimensional because of the presence of various stakeholders that may well have diverse views on what constitutes ‘good’ performance. Rainey (2009) [13] emphasized that performance goals in public organizations are often multiple, intangible, and conflicting. In this study, we include four dimensions of performance. First, we include ‘quality’, because professionals in hospitals have the authority to define what good performance is, [14] and they adhere to a professional logic that underlines the importance of care quality [25]. Second, ‘service’ is included, since the way in which service is delivered is important to patients [14]. Third, we include ‘efficiency’, since hospitals need to strive for efficient care delivery because of increasing costs [25]. Fourth, in line with Andersen et al.’s (2016) [14] plea, we include a process aspect of performance, namely, the ‘predictability’ of care processes. The predictability of care processes is relevant, given that Lean aims at reducing unwarranted variation in care processes [21].

Overall, research paints a predominantly positive picture of the effects of Lean on performance in manufacturing [35] and in healthcare [33]. Lean affects performance in two ways. First, Lean can increase performance, and there is general support for the claim that greater worker involvement will stimulate employee learning [2]. Second, implementing Lean techniques reduces non-value-adding activities (‘waste’) [8] and problems in product or service delivery [2], thereby increasing the time and effort available for value-adding activities [8]. D’Andreamatteo et al., (2015) [33] show that Lean is positively related to clinical quality, efficiency, patient and staff safety, and financial results. Overall, we therefore hypothesize a positive relationship between Lean and hospital workers’ perceptions of work unit performance:

**Hypothesis 1 (H1).** *The Lean dimensions (ICI and LT) are positively related to employees’ perceptions of work unit performance (quality, service, efficiency, and predictability).*

### 2.3. Lean's Two Dimensions and Employees' Wellbeing

A widely accepted definition of employee wellbeing is the overall quality of an employee's experience and functioning at work [15], and this can be further divided into motivational and health dimensions [36]. It is important to include both dimensions, as Cullinane et al., (2014) [18] show that some aspects of Lean are potentially engaging for employees, while others (e.g., problem-solving demands) intensify work and can impair health [19]. In this study, we conceptualize the motivational dimension as employee engagement, and the health dimension as burnout. We define engagement as a positive, fulfilling, work-related state of mind that is characterized by vigour, dedication, and absorption [36]. Burnout is regularly used to describe a state of mental tiredness and is often broken down into three dimensions: exhaustion, cynicism, and professional efficacy [36]. In line with earlier work on Lean's effect on burnout [3], we focus on exhaustion in our research, since we expect Lean to influence employee fatigue. Both the engagement and burnout concepts are highly relevant in the hospital context and have been repeatedly used in previous research [37].

The effects of improvement methodologies, such as Lean, on employee outcomes, have been debated and criticized extensively in recent decades. For instance, Anderson-Connolly et al., (2002) [38] argued, under the banner of 'Lean and mean', that Lean has a detrimental effect on employees, for instance through the loss of control and discretion. Further, Bouville and Alis (2014) [19] demonstrated that standardization has a negative impact on employees' attitudes and health at work. Standardization amounts to a reduction in the scope open to a worker in determining working methods, which induces dissatisfaction and increased job-related strain [24]. In other words, Lean does not automatically fulfil the 'promise' of enhanced wellbeing. A classic dilemma in manufacturing is that Lean involves employees, but makes them work harder at the same time [39]. However, the adverse consequences of Lean for employee wellbeing in manufacturing, might not occur in hospitals, and Lean may even be beneficial for hospital employees [34]. For instance, Benders et al., (2017) [37] show that continuous improvement reduces job demands (e.g., task changes) and burnout. In a theoretical paper, De Koeier et al., (2014) [40] hypothesize that Lean, by reducing errors, waste, and rework, might have beneficial effects on wellbeing in hospitals. It is plausible that the distinct task environments, for instance in terms of the extent of variations and differences in cycle time (the time to complete a task), play a role in the different wellbeing effects of Lean in distinct sectors. In manufacturing, the elimination of non-value-added activities ('waste') can be followed by an intensification of the work pace through imposing strict cycle times and just-in-time systems [19]. This might not be so easy in hospitals because of, amongst other things, less routinized tasks. In addition, hospital workers are key decision-makers in the ways in which Lean is implemented in Dutch hospitals: they guide the process, from signalling a problem in their own practices, to the implementation of potential countermeasures. The essence of this approach is that hospital workers raise issues that frustrate them: they define the problem, set goals, conduct a root cause analysis, think of suitable countermeasures, and make a plan for implementation. In the light of the current challenges in the hospital context, such as minimizing waste and budget cuts, we argue that this implementation approach might have beneficial effects on aspects of employee wellbeing such as engagement and burn-out. This could result from employees experiencing more control over these challenges, in contrast to approaches in which other stakeholders, such as managers, initiate change. This reasoning is supported by Noordegraaf et al., (2016) [25] who showed that medical professionals experienced that there were more opportunities to control ways of working and organize things better themselves. Accordingly, we expect that Lean, in a hospital context, can reduce employees' perceptions of burnout risks.

In terms of motivational wellbeing, research shows that, in manufacturing, Lean enhances engagement through increased training and feedback [18], and an increase in problem-solving demands [41]. Benders et al., (2019) [3] demonstrate increased levels of hospital workers' engagement after implementing continuous improvement. Holden



(2011) [42] argues that the increased levels of engagement witnessed with Lean, arise from the direct involvement of employees. As such, we hypothesize that:

**Hypothesis 2 (H2).** *The Lean dimensions (ICI and LT) are negatively related to employees' perceptions of burnout and positively related to employees' perceptions of engagement.*

#### *2.4. The Mediating Role of Autonomy in the Relationships of Lean's Two Dimensions with Performance and Wellbeing*

In this study, we include two types of autonomy, as Lean is likely to increase employees' perceptions of responsible (or responsibility) autonomy (i.e., the extent to which the job grants employees significant autonomy in making decisions), while at the same time potentially decreasing perceived working methods (or choice) autonomy (i.e., the extent to which the job offers considerable opportunity for independence and freedom in how employees do their work) [23]. These different mechanisms could have important consequences for the ultimate impact of Lean on employees' perceptions of performance and wellbeing. We further hypothesize on this below.

##### *2.4.1. Lean's Two Dimensions, Responsible Autonomy, and Performance*

Research shows that Lean leads to employees experiencing higher levels of responsibility, participating more in decision-making, and having more control over their boundaries (i.e., involvement in activities associated with traditional supervisory roles) [24]. The Job Characteristics Model (JCM) posits that autonomy increases the degree to which employees feel personally accountable and responsible for the results of the work, thereby increasing work outcomes such as related work effectiveness [43]. In this study, we expect increased responsible autonomy (enabled by Lean) to positively affect performance, as frontline employees can decide what problems to solve and what countermeasures to implement, which may lead to higher levels of experienced responsibility and psychological ownership, compared to situations where other stakeholders (e.g., team leaders, managers, or consultants) make these decisions. Consequently, we hypothesize that:

**Hypothesis 3 (H3).** *The relationships between the Lean dimensions (ICI and LT) and employees' perceptions of work unit performance are positively mediated by responsible autonomy.*

##### *2.4.2. Lean's Two Dimensions, Choice Autonomy, and Performance*

We expect the relationship between Lean and choice autonomy in hospitals to be ambiguous. Research shows that Lean has adverse consequences for low-skilled employees in manufacturing because of the limited autonomy over working methods due to the use of standardization practices [44]. However, in contrast to Parker's (2003) [44] findings in manufacturing, Benders et al., (2019) [3] have shown that employees in nursing homes where continuous improvement had been implemented, experience higher levels of autonomy than employees in the reference group. The authors used qualitative data to interpret these results and show that employees value the opportunity to resolve issues that they face, and to design working procedures [3] (p. 8).

The core idea of the Job Characteristics Model, is that autonomy over how to carry out the work leads to beneficial outcomes (e.g., effectiveness), through motivational mechanisms such as an increase in experienced responsibility [43]. More specifically, Hackman and Oldham (1975) [43] explain that autonomy leads to the critical psychological state of "experienced responsibility for outcomes of the work", which in turn leads to outcomes such as high work effectiveness and strong internal work motivation [45] (p. 935). Given these contradictory findings on the relationship between Lean and choice autonomy, we opt not to specify a direction in our hypothesis on the mediating role of choice autonomy between Lean and performance:

**Hypothesis 4 (H4).** *The relationships between the Lean dimensions (ICI and LT) and employees' perceptions of work unit performance are mediated by choice autonomy.*

#### 2.4.3. Lean's Two Dimensions, Responsible Autonomy, and Wellbeing

Investigating causal mechanisms that link Lean to wellbeing is important, as the existing literature is inconclusive as to how Lean leads to outcomes [16]. As in previous Lean research [41], we apply the Job Demands-Resources (JD-R) model as a theoretical rationale underlying the relationship between Lean and wellbeing. The model states that job characteristics can be divided into job demands and job resources, which activate two different processes: a health-impairing process and a motivational process. Research shows that job resources such as autonomy can play a dual role: resources can simultaneously increase engagement, and reduce exhaustion [36]. In terms of exhaustion, Hakanen et al., (2006) [46] reveal that a lack of the resources that are important for meeting job demands can be associated with burnout. Since the demands on health professionals are particularly high [47], we anticipate that responsible autonomy will be negatively related to burnout, because employees with higher levels of autonomy are more likely to sense greater competence, which shields them from physical and psychological job strains [23] (p. 111).

Regarding engagement, job resources can stimulate a motivational process that potentially results in a fulfilling, positive work-related state of mind [36]. We would expect an increase in responsible autonomy to help in achieving work goals, because the increased responsibility and psychological ownership will lead to a fulfilling, positive, work-related state of mind. Pulling these arguments together, responsible autonomy (enabled by Lean as hypothesized above) is likely to increase engagement while also reducing burnout risks in a hospital context. Consequently, we hypothesize that:

**Hypothesis 5 (H5).** *The negative relationships between the Lean dimensions (ICI and LT) and employees' perceptions of burnout and the positive relationships between the Lean dimensions and employees' perceptions of engagement are mediated by responsible autonomy.*

#### 2.4.4. Lean's Two Dimensions, Choice Autonomy, and Wellbeing

Research shows that limited autonomy over working methods in a manufacturing context harms employee wellbeing (by, for example, increasing job demands such as job strain) [44]. Hakanen et al., (2006) [46] show that a lack of important resources required to meet job demands can be associated with burnout. Since low levels of autonomy provide individuals with less shielding from physical and psychological job strain [23] (p. 111), we would expect a decrease in choice autonomy to potentially lead to exhaustion.

Reduced choice autonomy might also decrease engagement, since earlier research has shown that employees having less leeway in choosing their way of working feel less vigorous [48]. This is relevant to our study, as vigour constitutes a dimension of engagement. Given the conflicting findings concerning the relationship between Lean and choice autonomy (see Hypothesis 4), we do not specify a direction in our hypothesis on the mediating role of choice autonomy between Lean and wellbeing:

**Hypothesis 6 (H6).** *The relationships between the Lean dimensions (ICI and LT) and employees' perceptions of employee burnout and engagement are mediated by choice autonomy.*

Since other variables such as role clarity and performance feedback have also been found to play a role in the relationships between Lean and employees' perceptions of performance and wellbeing [18], we anticipate partial mediation effects.

### 3. Methods

#### 3.1. Population, Empirical Setting and Sample

In this paper, we use data from a Lean implementation study in a non-academic hospital in the Netherlands. Although hospitals in the Netherlands have some private sector characteristics, in that legally they are private bodies, they are regarded as part of the public sector because of their mission to deliver healthcare services that meet the needs of society. Furthermore, Dutch hospitals have a complex funding system in which the Dutch hospital authority (an autonomous administrative authority that is part of the Dutch Ministry of Health, Welfare and Sports) appraises a budget for each hospital, but the hospitals only receive their funding through negotiating arrangements with health insurers, patients, and other hospital organizations, on how much they will receive for each healthcare activity. Boselie et al., (2021) [49] argue that, as such, Dutch hospitals do not fully match Perry and Rainey's (1988) [50] criteria (i.e., ownership, source of funding, and degree of political control) for distinguishing between public and private organizations but, nevertheless, can be regarded as public based on Rainey's (2009) [13] recommendation to also include organizations that deliver public services, even if they are not fully state-owned or entirely funded by taxpayers.

Since Lean is interpreted and implemented in different ways, we provide information about the Lean implementation in our case. The Lean program at the hospital under study was implemented under the label BetterTogether (translated from the Dutch, 'SamenBeter'). This name was decided upon by employees in several brainstorming meetings. The program was introduced with the goal of increasing patient value and employee job satisfaction. In addition, the following ways to realize these goals were described: reducing waste, creating clarity, and developing problem-solving skills. The program was initiated by the organization's director, a former physician who was also the main ambassador of the program, and in their communication, mainly emphasized aspects that can be characterized as aspects of a professional logic, such as value for the patient and increasing employee wellbeing.

The most important decisions regarding the program—such as which training to offer to workers—were made by a multidisciplinary team that included the director, a delegation of employees, an HRM manager, a care manager, and a team leader. This team had the ability to make decisions outside the organizational structure. The decision-making power in the teams lay with the employees of the team in combination with the team leader. This meant that employees could determine which problems would be addressed and which countermeasures would be implemented. Teams, and not individuals, could apply to the program. The extent to which employees had room to make decisions in daily practice depended on the leadership style of the team leader; this varied among the different teams. The implementation of the program was supported by Lean coaches who completed advanced Lean training (Black Belt). Two of the four coaches have an HRM background, two have an organizational studies background. In addition, other support departments (HR and quality) were trained to contribute to the development of the program.

The hospital voluntarily participated in our study, and invited all of its 2356 participating employees and doctors (doctors are self-employed professionals in this hospital), from a range of departments, such as clinical, nursing units, and support staff, to participate in this study.

The data were collected through a digital employee survey, and we used several strategies to increase the response rate. First, respondents received an invitation by e-mail, in which anonymity and the confidentiality of responses were guaranteed. The invitation also clarified that only the researchers would be gathering and storing the results, and that only aggregated findings would be reported. Second, before distributing the questionnaire, the first author held short, individual conversations with those of the hospital's team leaders who were involved in the Lean implementation, to explain the purposes of the research. Third, departments that participated were promised a report on their department's findings,



benchmarked against the rest of the organization, along with an oral presentation to explain the findings.

After removing responses with missing data, our final sample amounted to 754 respondents (32% response rate). Nursing staff accounted for 31% of this total, assisting employees (e.g., doctors' assistants) for 20%, other medical employees (e.g., physiotherapists) for 16%, support staff for 14%, doctors for 8%, and 6% were managers. The mean age of the respondents was 45.19 years (SD = 11.97). Most of our sample were female (78%), 15% were male, and 7% chose not to reveal their gender. The mean organizational tenure was 12.81 years (SD = 10.32). The sample is a good representation of the overall target population in terms of age (M = 42.47), gender (84% female), and tenure (M = 10.17).

### 3.2. Measures

Our study's variables were measured through employee self-perception scores using five-point Likert scales. To assess our variables' reliability, we calculated Cronbach's alphas with an acceptable level of 0.70 [51]. All of our variables and items are listed in Table 1, to provide further information on the various variables of our study. The reliabilities of all the multi-item variables were good, as can be seen in Table 2.

**Table 1.** Variable measurement.

Independent Variables	
ICI	I am involved in making improvements in my department
	I am involved in determining the targets of my department
	I am concerned with quality improvement
	I am consulted on changes within my department
	I am involved in cross-departmental improvement
Techniques	My department makes processes of the department visible through Value Stream Mapping
	My department uses a structured method (Plan-Do-Check-Act) to solve problems
	My department visualizes the most important performance indicators of the department
Mediators	
Responsible autonomy	The job gives me a chance to use my personal initiative or judgment in carrying out the work
	The job allows me to make a lot of decisions on my own
	The job provides me with significant autonomy in making decisions
Choice autonomy	The job allows me to make decisions about what methods I use to complete my work
	The job gives me considerable opportunity for independence and freedom in how I do the work
	The job allows me to decide on my own how to go about doing my work
Dependent variables	
Quality	How would you rate your work unit on the following aspects: quality of the work
	How would you rate your work unit on the following aspects: safety of the work
Service	How would you rate your work unit on the following aspects: equal treatment
	How would you rate your work unit on the following aspects: responsiveness towards clients
	How would you rate your work unit on the following aspects: contribution to wellbeing of clients
Predictability	How would you rate your work unit on the following aspects: timeliness in finishing the tasks
	How would you rate your work unit on the following aspects: being prepared for unexpected calamities.
	How would you rate your work unit on the following aspects: transparency in work processes
Efficiency	How would you rate your work unit on the following aspects: efficiency
Burnout	I feel empty at the end of a working day
	I feel mentally exhausted because of my work
	I think I put too much effort into my work
	When I wake up in the morning and there is another day of work ahead of me, I feel tired
	Working all day is a heavy burden for me
Engagement	At my work, I feel bursting with energy
	I am enthusiastic about my job
	I am immersed in my work

**Table 2.** Means, standard deviations, reliabilities and correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10
ICI	3.52	0.73	0.81									
Lean Tech.	2.37	0.63	0.54 **	n.a.								
Quality	3.92	0.48	0.36 **	0.41 **	0.72							
Service	4.01	0.49	0.31 **	0.33 **	0.52 **	0.80						
Predic.	3.60	0.57	0.37 **	0.51 **	0.55 **	0.50 **	0.68					
Eff.	3.50	0.72	0.30 **	0.43 **	0.49 **	0.44 **	0.58 **	n.a.				
Burnout	2.31	0.90	−0.26 **	−0.27 **	−0.33 **	−0.32 **	−0.37 **	−0.29 **	0.91			
Engage.	3.81	0.64	0.37 **	0.35 **	0.35 **	0.39 **	0.44 **	0.36 **	−0.49 **	0.74		
RA	3.92	0.66	0.43 **	0.25 **	0.29 **	0.26 **	0.19 **	0.20 **	−0.24 **	0.27 **	0.78	
CA	3.68	0.80	0.29 **	0.13 **	0.17 **	0.15 **	0.13 *	0.08	−0.28 **	0.23 **	0.66 **	0.88

Note: \*\*  $p < 0.01$  \*  $p < 0.05$ . ICI = Involvement in Continuous Improvement, Lean Tech. = Lean Techniques, Predic. = predictability, Eff. = efficiency, Engage. = engagement, RA = responsible autonomy, CA = choice autonomy. n.a. = the reliability coefficient of Lean Techniques is not reported since it was measured as an index, and the reliability coefficient of efficiency is not reported since it was measured with a single item.

*Lean.* In line with our definition based on Shah and Ward's (2007) [31] work, we included a social (Involvement in Continuous Improvement—ICI) and a technical (Lean Techniques) dimension of Lean. The selection process to identify items for the measurement of Lean involved three stages. First, we conducted a literature analysis to distil the different elements of Lean. Second, we conducted 30-min interviews with the hospital's board of directors, managers, and Lean coaches, and 10-min interviews with the team leaders ( $n = 42$ ), to discuss the intended goals and implementation methods. Third, we analysed the hospital's policy documents and other documents of the Dutch Lean knowledge network (called 'Lean in de Zorg'). Based on this, we concluded that some Lean elements seen in a manufacturing context were not present in the studied implementation, as they are less applicable in hospitals.

Our contextualization of Lean might raise the question 'is it still a Lean system?'. Lean in fact lends itself to various interpretations, ranging from simply being slim and efficient, to following the ideas of the Toyota Production System (TPS) on which Lean was based [9] (p. 36). Although we accept there will be some variation in the concept of Lean (which is common to most organizational concepts), we followed the reasoning seen in earlier research, that continuous improvement is often used as the key criterion that distinguishes 'real' Lean from 'fake' Lean implementations [52]. In our studied organization, continuous improvement is a central concept, so we are convinced that we studied a Lean system.

ICI ( $\alpha = 0.81$ ) was measured using a four-item scale, composed of items from the Workplace Employee Relations Survey [53], and MacDuffie's (1995) [54] scale on involvement work systems. An example item is, "I am involved in making improvements in my department". The measure for Lean Techniques, in line with Ramsay et al., (2000) [53], was constructed as a summed score (index) of the prevalence of specific techniques in the department. Based on our analysis, and building on the scale of Shah and Ward (2003) [11], the elements of the technical dimension of Lean that are included in our study are: performance management, structured problem-solving using Plan-Do-Check-Act cycles, and process optimization based on Value Streams.

*Responsible autonomy* ( $\alpha = 0.78$ ). Here, we used the three-item scale of decision-making autonomy of the Work Design Questionnaire (WDQ) from Morgeson and Humprey (2006) [55], with an example item being "The job provides me with significant autonomy in making decisions".

*Choice autonomy* ( $\alpha = 0.88$ ). We used the three-item scale of work-methods autonomy from the Work Design Questionnaire (WDQ) of Morgeson and Humprey (2006) [55], with "The job gives me considerable opportunity for independence and freedom in how I do the work" as an example item.

*Performance.* In line with Rainey (2009) [13], we divided performance into quality (2 items,  $\alpha = 0.72$ ), service (3 items,  $\alpha = 0.80$ ), efficiency (1 item), and predictability (3 items,  $\alpha = 0.68$ ) dimensions, and used items from the Work-Unit Performance scale of Van Loon

(2016) [56] to measure employees' perceptions of the performance of their work unit. As self-rated performance is prone to a positivity bias, we decided to focus on the work unit as a collective, rather than the individual. An example question is "How would you rate your work unit on quality of the work?".

*Employee wellbeing.* In line with Schaufeli and Bakker (2004) [36], we measured both engagement ( $\alpha = 0.74$ ) and burnout ( $\alpha = 0.91$ ). For engagement, we used the three-item Ultra-short Measure for Work Engagement scale developed by Schaufeli et al., (2017) [57], with "At my work, I feel bursting with energy" being a sample item. Burnout (or exhaustion) was measured using a five-item scale based on the Utrecht Burnout Scale developed by Schaufeli and Van Dierendonck (2000) [58]. An example item is "I feel mentally exhausted because of my work".

*Control variables.* In line with previous Lean research in hospitals [40], we included control variables for occupation, gender, age, and organizational tenure.

### 3.3. Data Analysis

We used the two-step approach of Anderson and Gerbing (1988) [59], involving confirmatory factor analysis (CFA) and structural equation modelling, to examine our hypotheses. We used Mplus (v8.4), and assessed model fit based on the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker-Lewis index (TLI). Based on Hu and Bentler (1999) [60], values above 0.90 for CFI and TLI, and below 0.08 for RMSEA, were interpreted as indicating an acceptable fit. We also took two precautionary measures to minimize the risk of common method bias. First, we guaranteed confidentiality to all the participants and, second, we randomized the order of items in the questionnaire.

## 4. Results

### 4.1. Descriptive Statistics

The means, standard deviations, reliabilities, and correlations of this study's variables are presented in Table 2. Respondents were quite optimistic about their wellbeing (engagement  $M = 3.81$ ,  $SD = 0.64$ ; burnout  $M = 2.31$ ,  $SD = 0.90$ ) and their work unit's performance (quality  $M = 3.92$ ,  $SD = 0.48$ ; service  $M = 4.01$ ,  $SD = 0.49$ ; predictability  $M = 3.60$ ,  $SD = 0.57$ ; and efficiency  $M = 3.50$ ,  $SD = 0.72$ ). Respondents generally scored from moderate to high on ICI ( $M = 3.52$ ,  $SD = 0.73$ ), and were positive about their autonomy (responsible autonomy  $M = 3.92$ ,  $SD = 0.66$ ; choice autonomy  $M = 3.68$ ,  $SD = 0.80$ ).

### 4.2. Measurement Model

To check the dimensionality and fit of our hypothesized measurement model, we compared three variations on the model. First, we created a one-factor model, with all items loaded onto a single latent variable. Second, we tested a model where each item was loaded onto the factor for which it was assumed to be an indicator. Finally, we generated a third model by loading the items for both ICI and autonomy onto a single factor, to see whether there is an empirical basis for distinguishing ICI from autonomy. This is a relevant consideration, since ICI and autonomy are moderately correlated ( $r = 0.49$ ) in our main model. Based on theory, we expected our original model (Model 2) to show better fit indices than Models 1 and 3.

The CFA results for the second measurement model include acceptable to good fit indices ( $\chi^2 = 1074.12$ ,  $df = 550$ ,  $p < 0.001$ ,  $CFI = 0.94$ ,  $TLI = 0.93$ ,  $RMSEA = 0.05$ ). The results of the alternative models (Models 1 and 3) were much poorer (model 1:  $\chi^2 = 506.43$ ,  $df = 462$ ,  $p < 0.001$ ,  $CFI = 0.51$ ,  $TLI = 0.46$ ,  $RMSEA = 0.13$ ; model 3:  $\chi^2 = 2722.74$ ,  $df = 441$ ,  $p < 0.001$ ,  $CFI = 0.77$ ,  $TLI = 0.75$ ,  $RMSEA = 0.09$ ), indicating that Model 2 was preferable to Models 1 and 3. As such, the hypotheses were examined based on the original measurement model.

#### 4.3. Structural Model and Hypothesis Testing

First, the hypothesized model with partially mediated paths was tested. The partially mediated model provided acceptable to good fit indices ( $\chi^2 = 1006.11$ ,  $df = 518$ ,  $p < 0.001$ , CFI = 0.94, TLI = 0.93, RMSEA = 0.04). Several direct and indirect paths were found to be significant, and only the significant paths were included in the final model. Next, the fit of the hypothesized structural model was compared to an alternative, fully mediated, model in which the direct paths from ICI and Lean Techniques to both the outcome variables were removed. This resulted in a poorer fit ( $\chi^2 = 1330.62$ ,  $df = 530$ ,  $p < 0.001$ , CFI = 0.90, TLI = 0.89, RMSEA = 0.06). In order to evaluate the two models, we compared the AIC and BIC indices, and found that both the AIC and BIC indices were lower for the partially mediated model (AIC = 28,823, BIC = 29,418) than for the fully mediated model (AIC = 29,122, BIC = 29,664). As such, the partially mediated model with a better fit, and was used to examine the hypotheses. Table 3 provides the significant regression paths of the partially mediated model.

**Table 3.** Regression coefficients.

	RA	CA	Quality	Service	Predictability	Efficiency	Burnout	Engage
ICI	0.521 ***	0.321 ***	0.323 ***	0.305 ***	0.250 **	-	-0.235 ***	0.412 ***
Lean Tech.	-	-	-	-	0.187 **	0.276 ***	-	-
RA	-	-	0.241 **	0.192 **	-	0.181 **	-	-
CA	-	-	-	-	-	-	-0.303 ***	0.200 ***
Gender: man	-0.133 **	-	-	-	-	-	-	-
Age	-	-	-	-	-	-	-	-
Occupation: medical specialist	0.146 ***	-	-	-	-	-	-	-
Tenure	-	-	-	-	-	-	-	-
R2	0.315 ***	0.111 **	0.243 ***	0.197 ***	0.234 ***	0.142 ***	0.193 ***	0.263 ***

Note: \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ . RA = responsible autonomy, CA = choice autonomy.

Testing the hypotheses on the mediating role of autonomy was conducted using bias-corrected bootstrap confidence intervals based on 1,000 samples. Concerning the Lean effects on the four performance dimensions (H1), we found partial support. ICI was positively related to quality ( $\beta = 0.33$ ,  $p < 0.001$ ), service ( $\beta = 0.31$ ,  $p < 0.001$ ), and predictability ( $\beta = 0.24$ ,  $p < 0.01$ ), but not significantly related to efficiency. In contrast, LT was positively related to efficiency and predictability ( $\beta = 0.27$ ,  $p < 0.001$  and  $\beta = 0.19$ ,  $p < 0.01$ , respectively), but not to quality and service. Regarding the effects of Lean on employee wellbeing, we found partial support for H2, as ICI was positively related to engagement ( $\beta = 0.41$ ,  $p < 0.001$ ) and negatively related to burnout ( $\beta = -0.24$ ,  $p < 0.01$ ). However, Lean Techniques were not significantly related to engagement or burnout. H3 was partly supported, in that the relationships between ICI and 3 performance dimensions were positively mediated by responsible autonomy (quality:  $\beta = 0.13$ ,  $p < 0.01$ , service:  $\beta = 0.10$ ,  $p < 0.05$ , and efficiency:  $\beta = 0.94$ ,  $p < 0.01$ ). In contrast, H4 was not supported, as choice autonomy did not mediate any of the four performance dimensions.

Next, we did not find support for a mediating role of responsible autonomy in the relationship between Lean and employee wellbeing (H5). However, we did find support for H6, as the relationships of ICI with engagement and burnout were both mediated by choice autonomy ( $\beta = 0.06$ ,  $p < 0.01$ ; and  $\beta = -0.10$ ,  $p < 0.05$ , respectively).

Finally, several of the control variables had significant effects (see Table 2). For instance, gender (male) and occupation (medical specialist) were both positively related to responsible autonomy ( $\beta = 0.13$ ,  $p < 0.01$ ;  $\beta = 0.15$ ,  $p < 0.001$ , respectively). The structural pathways between the variables in our model are shown in Figure 1 and in Tables 3 and 4.

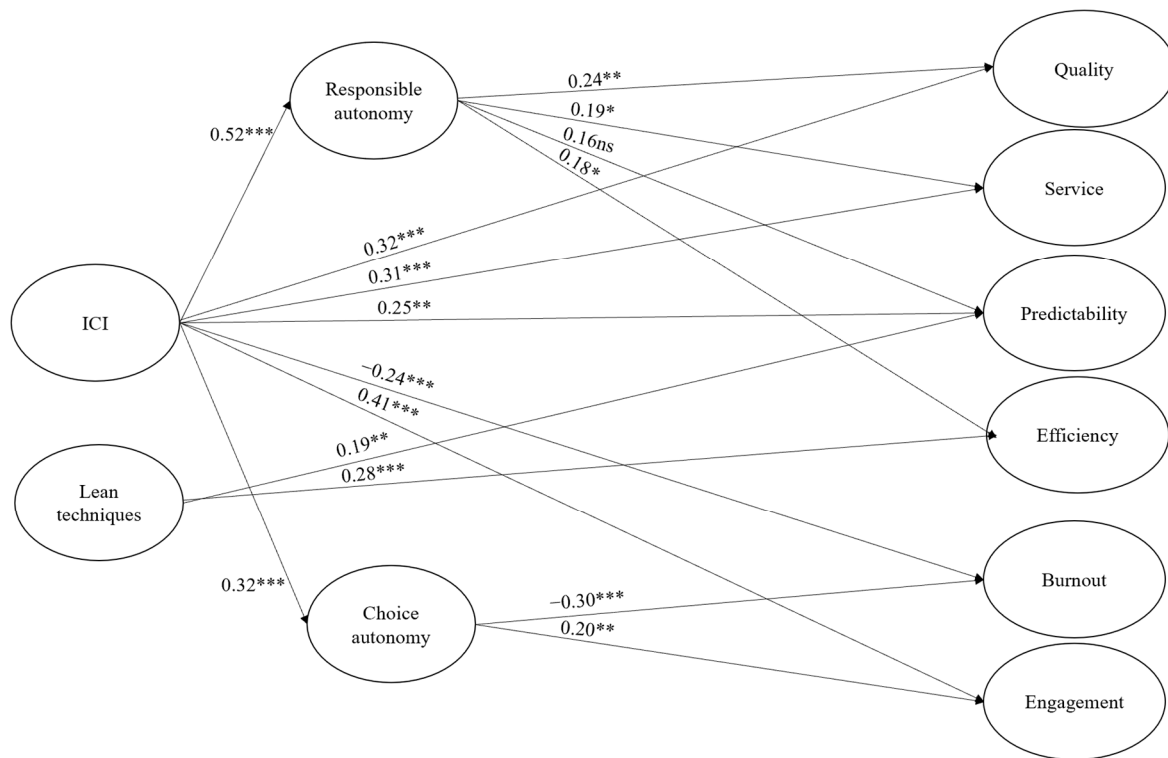


Figure 1. Structural model coefficients. Note: \*\*\*  $p < 0.001$ , \*\*  $p < 0.01$ , \*  $p < 0.05$ .

Table 4. Indirect effects of ICI on performance and wellbeing outcomes via RA and CA.

Predictor	Mediators	Outcomes	Standardized Indirect Effects	Mediation Supported
ICI	RA	Quality	0.125 [0.039, 0.212]	Yes
		Service	0.100 [0.025, 0.175]	Yes
		Predictability	-	No
		Efficiency	0.094 [0.025, 0.164]	Yes
		Burnout	-	No
		Engagement	-	No
ICI	CA	Quality	-	No
		Service	-	No
		Predictability	-	No
		Efficiency	-	No
		Burnout	-0.097 [-0.156, -0.038]	Yes
		Engagement	0.064 [0.021, 0.107]	Yes

Note: RA = responsible autonomy, CA = choice autonomy.

### 5. Discussion

This study set out to contribute to the HRM–performance debate by examining whether hospital workers’ perceptions of Lean—conceptualized as Involvement in Continuous Improvement and Lean Techniques—are associated with their perceptions of unit performance and their own wellbeing, and to what extent this is mediated by perceived responsible and choice autonomy. As such, our study is in line with contemporary HRM research moving from generic, multisector research towards context- and theme-specific studies. We now reflect upon our main findings and consider their academic and practical implications, as well as their limitations.

#### 5.1. ICI and LT Relate in Different Ways to Unit Performance and to Employee Wellbeing

Our results show that Involvement in Continuous Improvement (ICI) and Lean Techniques (LT) have different relationships with hospital workers’ perceptions of unit performance and individual wellbeing. Only ICI results in a mutual gains situation: it has a direct



positive relationship with perceived engagement and a negative relationship with perceived burnout, and it positively contributes to the perceived quality, service, and predictability dimensions of performance. In our study, three aspects might play a role in explaining these effects. First, the program was introduced under the label ‘BetterTogether’, which particularly emphasized human aspects that align with a professional logic. The importance that a label corresponds to the professional logic of healthcare workers is highlighted by Van den Broek et al., (2014) [61]. They show the added value when a label matches the professional logic of healthcare workers, and that the label should reflect the content of the program in order to avoid suspicion among workers. Moreover, the name ‘BetterTogether’ was decided upon by a delegation of employees themselves, so there was involvement from employees right from the start of the program. Secondly, explicit goals—besides increasing patient goals and reducing waste—include increasing employee satisfaction and increasing clarity. In other words, a mutual gains perspective is part of the design of the program. Third, the program’s intended goals were communicated by a former physician who is a member of the board of directors, which may have contributed to acceptance among healthcare staff. This builds on previous research which has posited that change within professional fields, such as healthcare, is most effective when it occurs mainly from within [62]. With our study, we acknowledge that the black-white contrast (proponents’ feel-good literature vs. critics’ references to Lean’s dark side) has been surpassed by a contingency view, and we underline the importance of understanding the question of ‘what content to place in what context?’. We contribute to existing literature by further unravelling this question.

On the other hand, LT only relates positively to the perceived efficiency and predictability dimensions of performance, and does not significantly relate to employees’ perceived wellbeing. As such, Lean Techniques result in a situation in which positive performance effects are established without any gain in employee wellbeing (also referred to as the sceptical view of the conflicting outcomes perspective [20]). A possible explanation for these distinct results could be that Involvement in Continuous Improvement generates performance and wellbeing effects because employees are learning [2], whereas such learning effects do not necessarily occur with the application of Lean Techniques. Lean Techniques tend to have a narrower scope, as they are generally implemented to achieve organizational goals (in particular addressing efficiency and predictability goals).

Overall, this study contributes to the literature by demonstrating that there are trade-offs in the effects of applying Involvement in Continuous Improvement and Lean Techniques in hospitals. Our results stress the importance of investigating both ICI and LT, and simultaneously including hospital workers’ wellbeing and hospital performance. This underscores Boxall’s (2019) [22] recent call to investigate wellbeing and performance simultaneously by referring to the “it takes two to tango” metaphor. Indeed, our research shows that Lean dancing is not a straightforward line dance, but more of a tense tango: depending on the dimension, Lean may partner both performance and wellbeing, or only performance. In this way, we contribute to research on Lean in the hospital sector, which has previously been built mainly of research that examines either performance or wellbeing effects, rather than investigating joint outcomes.

### *5.2. The Complex Mediating Role of Autonomy*

Our study further reveals that it is essential to distinguish between the two dimensions of autonomy, since we found differing mediating effects: responsible autonomy partially mediated the relationships between ICI and hospital workers’ perceived unit performance, whereas choice autonomy partially mediated the relationships between ICI and hospital workers’ perceived wellbeing. These findings are highly relevant because they show that conceptualizing autonomy using just one concept might lead to oversimplified conclusions on how effects are established.

Regarding the relationship between ICI and perceived performance, we witnessed a mediation effect of responsible autonomy, but not of choice autonomy. Before delving further into this finding, it is important to note that ICI was found to increase perceived

choice autonomy. This contrasts with previous research that found a negative linkage, albeit in a manufacturing context [24]. Our finding suggests that the relationship between ICI and choice autonomy may be both context-dependent and the result of an ICI implementation approach. Consistent with the ideas of Benders et al., (2019) [3], one explanation could be that Lean brings structure and clarity to a relatively hectic work environment characterized by high levels of variation and limited standardized work. Seen from this perspective, ICI provides employees with opportunities to control their ways of working. Complementing existing literature, our expectation is that these salient effects depend in part on how ICI was implemented in this hospital: namely, employees themselves could determine which problems would be addressed and which countermeasures would be implemented. ICI makes them ‘agents’ of the change process and leads to a higher form of participation [63]. Our results contrast earlier research on Lean and choice autonomy in manufacturing [23,24]. The choice aspect is something that we would argue is undervalued and understudied in contemporary SHRM research, which tends to focus on HRM, or on employment practices and the role of line management.

However, in contrast to earlier research, we did not find that choice autonomy positively mediates between Lean and perceived performance. It could be that in contexts such as hospitals, which require high interdependence between employees to deliver customer value, that an increase in individuals’ choice autonomy is not a change that contributes to unit performance. Conversely, choice autonomy significantly mediated the relationship between ICI and perceived wellbeing, although we did not find evidence that this relationship could in itself be explained by responsible autonomy. It is possible that while some hospital employees do experience responsible autonomy as a source of wellbeing, others experience it as a form of unwanted pressure that serves to intensify their work [64], thereby leading, overall, to a non-significant relationship. In terms of the JD-R framework, it seems that responsible autonomy, as enabled by ICI, does not on average serve as a resource for wellbeing in a hospital context. Further, the mediating role of choice autonomy in the relationship between ICI and employee wellbeing could be understood as the satisfaction of the basic psychological need for autonomy or feeling in control [65], which would explain feeling vigorous and less exhausted [48]. It could be that in contexts with high demands, such as hospitals [47], increased choice autonomy boosts wellbeing. For instance, the independence of employees to prioritize work and/or take breaks in line with their personal needs might help them deal with high physical and emotional demands. Framed from a JD-R perspective, increased choice autonomy, enabled by ICI, seems to have a dual role in simultaneously stimulating engagement, and reducing the risk of burnout in a hospital context.

Overall, our examination of the mediating role of autonomy contributes to SHRM research in two ways. First, this study makes an important contribution by showing that the effects of Lean in hospitals not only depend on the dimension of Lean applied (ICI or Lean Techniques) but also on the type of autonomy considered (responsible or choice). Second, by using JD-R theory to explain the effects of ICI on wellbeing, our results indicate that responsible autonomy, enabled by ICI, does not serve as a resource in terms of boosting hospital workers’ perceived wellbeing. On the other hand, choice autonomy, enabled by ICI, serves two roles in simultaneously increasing engagement and reducing burnout risk. Expanding the dancing metaphor of Boxall (2019) [22], this means that, in order to reach a more nuanced and hence accurate view of Lean’s effectiveness, multiple dimensions of Lean and autonomy should be invited to “partner” wellbeing and performance. Again, this is an insight that need not only apply to Lean but, potentially, also to the field of SHRM as a whole.

### 5.3. Practical Implications

Our findings reveal that HR professionals and managers improve their employees’ perceptions of wellbeing, alongside their unit’s performance, by implementing Lean. Our study suggests that it is essential for HR executives to explicitly determine the goals they

want to achieve, since the Lean dimensions relate in different ways to wellbeing and performance. On the one hand, managers can boost the quality of performance and service, and also employees' wellbeing, by involving employees in Continuous Improvement activities. This is also highlighted in recent research, for example, by Virmani et al., (2020) [66], who characterize a lack of CI as one of the important barriers to successful implementation, and by Moldovan (2022) [67], in which CI—as part of a self-assessment—is an important vehicle for the purpose of strategy implementation. On the other hand, managers can stimulate the efficiency dimensions of performance by applying Lean Techniques. From an SHRM perspective, this is a relevant finding in the search for optimized performance.

Second, our study shows that it is important to choose a label that matches the logic of the people who have to work with it. This study's hospital used a label ('BetterTogether') that aligns with professional logic. This is in line with previous research that has shown that the label should properly represent the content of the program, otherwise it may lead to employee suspicion [61].

A third implication for managers concerns the question of by whom the change is initiated. In the context of creating support for a Lean program, it is desirable to let the change originate from within as much as possible, in this case from the profession itself. This means that the managers' core business is to encourage and/or support employees to act as change agents, instead of primarily executing the role of change agent themselves.

Fourth, we recommend that managers and HR professionals give employees room to make decisions regarding the program in at least two ways, (a) by involving employees in decision-making with regard to key decisions of the program—for example, about which training to offer for employees, and (b) by allowing employees to make decisions in teams—for example, about which problems to address and which countermeasures to implement.

Taken together, the different effects of the two Lean dimensions should caution managers and HR executives to be aware that employees experience more than just the Lean Techniques, which in practice are usually the most prominent and visible elements in a Lean approach. Therefore, we would recommend that managers and HR executives develop and implement an approach that includes involving as many employees as possible in continuous improvement activities, instead of, as is often the case, involving only a happy few. For instance, organizations could deliberately change the role of Lean ambassador within teams, and provide Lean training opportunities for many more employees, to stimulate both hospital workers' perceptions of unit performance and their own wellbeing.

#### *5.4. Limitations and Future Research*

Our study has several limitations. First, as our data were collected from a single hospital in the Netherlands, the generalizability of our results is limited. In particular, the Lean implementation studied might be influenced by specific organizational aspects, such as the organizational culture. For instance, it seems probable that organizations in which making mistakes is seen as an opportunity for learning, will be more supportive of a Lean implementation, as opposed to defensive cultures in which individuals are blamed for making mistakes. Nevertheless, the hospital in our study is part of a Dutch Lean network ('Lean in de Zorg'), and its Lean approach is largely consistent with commonly used approaches in other Dutch hospitals. Also, our hospital shares important characteristics (e.g., size, organizational structure, medical specialties) with other Dutch non-academic hospitals. Hence, our results and conclusions are likely to apply to other Dutch hospitals. Further research in other countries, for example in ones where healthcare is not privatized (such as the UK), is needed, in order to more comprehensively understand and explain the effects of Lean on performance and employee wellbeing in the hospital sector.

Second, our study was a cross-sectional one, which means that we have to be careful when making claims about causality, and recognize that reversed causality might influence our results. Although we have theoretical grounds for assuming that Lean can result in different outcomes, further research could take this a step further, by using a longitudinal

research design. More specifically, to be able to more confidently measure the impact of a Lean intervention, a pre-post test design would be desirable.

Third, as our data come from a single source, they may be prone to common source bias. As part of our analysis, we compared our hypothesised measurement model with a one-factor model in which all items loaded onto a single factor. The results show that the one-factor model had a poorer fit than that of the multiple-factor model, indicating that common source bias is not very likely [68]. Nevertheless, further research would benefit from measuring performance independently, to allow employee perceptions to be linked to ‘actual’ performance data. On the other hand, employee perceptions drive employee behaviours, and are therefore important.

Our final recommendation concerning future studies is to include behavioural change when researching Lean effects. Our study showed that Involvement in Continuous Improvement is linked to hospital workers’ perceptions of both performance and wellbeing. However, to date, little is known as to how Involvement in Continuous Improvement can be achieved in the day-to-day work when implementing Lean in hospitals. We argue that, first, linking Lean research to behavioral change research and, second, complementing quantitative research with in-depth qualitative research methods, would address this gap.

## 6. Conclusions

This study provides the steps necessary to move Lean dancing forward. We found that the effects of Involvement in Continuous Improvement (ICI) and Lean Techniques (LT) on hospital workers’ perceptions of wellbeing and performance are not unequivocal. Instead, we found that, depending on the Lean dimension, Lean dances in different alignments with wellbeing and performance. That is, while ICI is important for both employees’ wellbeing and performance, LT only relates to certain dimensions of performance, such as efficiency, and has no linkage with employee wellbeing. In addition, we conclude that it is essential to incorporate different dimensions of autonomy in Lean dancing as we saw that *responsible* autonomy partially mediates the relationship between ICI and perceived performance, whereas *choice* autonomy partially mediates the relationship between ICI and perceived wellbeing.

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