The Impact of Leadership Autonomy Support, Psychological Capital and Creativity on Hospital Employees’ Innovative Behaviour

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Abstract

**Background:** There is growing interest in and focus on healthcare services research to identify factors associated with innovation in healthcare organizations. However, previous innovation research has concentrated primarily on the organizational level. In contrast, this study focuses on innovation by individual employees. The specific aim is to examine factors with potential impact on individual employee innovation in hospital organizations. Thus, the study significantly deepens and broadens previous research on innovation in the domain of health services.

**Methods:** A conceptual model was developed and tested on a sample of hospital employees. Partial least-squares structural equation modelling (PLS-SEM) was used to analyse the data with Stata software. Mediation analysis was used to test the proposed indirect effects.

**Results:** Hospital employees’ individual innovative behaviour is directly and positively associated with individual creativity (b = 0.440), psychological capital (b = 0.34) and leadership autonomy support (b = 0.07). The relationships between leadership autonomy support, psychological capital and individual innovative behaviour are all mediated by employees’ creativity. Psychological capital mediates the relationship between leadership autonomy support and individual innovative behaviour. Overall, the proposed model explains 50% of the variance in hospital employees’ innovative behaviour.

**Conclusions:** This study reveals a complex pattern of links between innovative behaviour and leadership autonomy support, employees’ creativity and employees’ psychological capital. However, the findings indicate that leadership autonomy support has a dominant and multifaceted impact on hospital employees’ innovative behaviour.

Background

Innovation is a desirable objective for successful modern companies. Because innovation is relatively difficult to achieve but considered to be of high value, in many ways it can be said to represent a modern version of the Greek word ‘Eureka’ (which means, ‘I have found it’). Most companies realize the need to be proactive in their approach to ‘finding it’ or being innovative. Healthcare organizations, whether public or private, are no exception in their desire for innovation. To attain their goals such as organizational efficiency or effective responses to healthcare needs, these organizations consider innovations to play a pivotal role [1]. A current example of this, illustrating the need for innovation, is the Coronavirus disease 2019 (COVID-19) pandemic. Facing this extreme health crisis, health organizations around the world are forced to be innovative for at least two reasons. First, and most obviously, there is an urgent need for a vaccine that hinders or stops the spread of COVID-19. Second, pending a vaccine, health organizations are searching for innovative effective and safe solutions to the ongoing health threat. This latter point is well illustrated in Norway. The Norwegian Institute of Public Health recently introduced an innovative electronic app, named Smittestopp, to fight the pandemic. According to the institute, the Smittestopp app ‘will help the health authorities to limit the transmission of coronavirus. Anonymized data about
movement patterns in society from the app are used to develop effective infection control measures’ (for more about this app, see [2]). This example demonstrates the need for innovation in healthcare organizations.

Like most organizations, health organizations face constant change and unpredictable challenges [3]. Specifically, healthcare organizations are under continuous pressure to find novel ways to reduce costs and increase the effectiveness of their healthcare services. Because there are various alternative health services to choose from, patients have become more demanding in their expectations for health service quality [5]. These aspects highlight the importance of seeking incremental or radical innovations in almost every area of healthcare. There it is an urgent need for healthcare organizations to identify and cultivate factors that have a positive impact on innovative behaviour. As Länsisalmi et al. noted, ‘innovation has become a critical capability of all healthcare organizations’ ([5], p. 66).

Although there is a growing body of literature on innovative behaviour in general, very few studies seem to have been undertaken in healthcare organizations. Moreover, in a review of healthcare innovation, Länsisalmi et al. [5] found a large proportion of previous studies (45%) limited their focus to the organizational level of innovations. In their review, the authors found that ‘only 13% of the studies focused on individual level innovations’ ([5], p. 68). The very few previous studies undertaken have focused on employees’ innovative behaviour in relation to aspects such as employee empowerment and job productivity [8], structural and psychological empowerment [9], motivation and perceived stress [10]. This limited research on innovation by individuals in healthcare research is surprising because it is reasonable to assume that (individual) employees in organizations are primary and fundamental drivers of the implementation of new ideas, and they are the first to practise innovative behaviour in their work. Xeri and Brunetto, referring to the lack of research on innovative behaviours in hospital organizations, noted, ‘it is clear that hospitals stand to gain from innovative employees’ ([4], p. 3164). In a similar vein, Kim and Park noted ‘innovative behavior among members of an organization is important ... because these individuals are the primary agents to develop and execute innovative ideas’ ([6], p. 615). Although the literature strongly emphasizes the role of innovation, there is a lack of research on individual innovation in healthcare [5]. Consequently, more research is needed on the potential factors associated with innovative behaviour from an employee perspective in health services research.

For the reasons above, this paper has three aims. First, an overall aim and contribution is to study innovative behaviour from an employee perspective using hospital organizations as an empirical setting. Second, according to the literature ‘innovative behaviour [is] influenced by personal characteristics’ ([6], p. 616). This study addresses two personal characteristics: (i) employee creativity and (ii) psychological capital (PsyCap). To authors’ knowledge no previous study in healthcare service research has linked employee creativity and PsyCap to employees’ innovative behaviour. Furthermore, according to Yu ‘only a few studies have attempted to determine the impact of PsyCap on employee creativity in the workplace context’ ([7], p. 2). Third, ‘innovative behaviour is also influenced by ... organizational characteristics’ ([6], p. 616). This study limits its focus to one aspect of leadership. Specifically, it examines whether and how leadership autonomy support is associated with employee PsyCap, creativity and innovative behaviour.
By focusing on these three constructs, the study contributes to a relatively neglected domain of health services research.

The paper is structured as follows. First, the conceptual model is briefly described. Second, the content and links between the concepts are discussed. Third, the methods, statistical analysis and results of the empirical hypothesis tests are presented. The paper concludes with a discussion of findings and recommendations for further research. The final part also includes an overall conclusion from this study.

**Conceptual Model Of The Study**

Figure 1 illustrates the conceptual model. As noted in the introduction, the overall aim of this study is to contribute to research on employees’ individual innovative behaviour (IIB).

Figure 1 indicates two distinct types of factors that have an impact on IIB: (i) personal characteristics and (ii) organizational characteristics. Two personal characteristics are represented in Figure 1: (i) individual creativity (IC) and (ii) PsyCap. PsyCap is assumed to be linked directly to both IIB and IC as well as indirectly to IIB through IC. The organizational characteristics represented in Figure 1 of the concept are labelled ‘leadership autonomy support’ (LAS). LAS is expected to have multiple effects. Specifically, it is assumed that LAS has a direct impact on IIB, IC and PsyCap. Moreover, the linkage between LAS and IIB is expected to be mediated through IC and PsyCap. In addition, the link between LAS and IC is expected to be mediated through PsyCap. In the following sections, the concepts and linkages between them in Figure 1 are explained in more detail.

**Individual innovative behaviour**

According to Fuglsang, innovation is ‘a difficult phenomenon to define and study, and there is no consensus about how to define innovation’ ([14], p. 67). One of the earliest definitions of innovation was that of Schumpeter. Schumpeter refers to innovation as a ‘new combination’ of services, work processes, products and markets [18]. In the literature, an innovation can refer to a ‘new product or service, a new production process, or a new structure or administrative system’ ([13], p. 430). These exemplify the potential variety of and huge differences between types of innovations for organizations. Simply stated, innovation could be manifested everywhere in an organization. However, this study limits its focus to innovations relevant to individual employees. The type of innovation in an organization in this study is IIB. IIB concerns the implementation of innovations of potential benefit to employee performance. IIB relates to the behaviour of employees and their ability to adopt and use new and useful ideas in their work [11]. As such, IIB is doing something new that represents a behavioural change or discontinuity relative to the ordinary pattern of behaviour in the past. Consequently, the domain of IIB is related to everyday employee practices, and such innovations are implicitly ‘a function of learning and knowledge creation, integrated into daily work practices’ ([12], p. 2). It is notable that this study makes no distinction between the degree of newness of the innovation, whether the IIB is incremental (e.g. minor improvements of service quality) or radical (e.g. the introduction of an entirely new way of providing
quality service). Furthermore, there is no explicit focus on the timing of implementation. Innovation may be implemented either as a one-time change (e.g. for a specific patient or situation) or more permanently (e.g. a new procedure that is extended to all future patients). Innovation in a one-time situation is analogous to what the literature terms an *ad hoc innovation* [15]. Similar to ad hoc innovation, IIB may include some temporary innovations. However, the concept of IIB can include ‘some element that can be repeated in new situations’ ([16], p. 369), to be implemented and generalized more permanently. Consequently, the concept of IIB in this study is open to a wide range of changes relevant to employee performance. Thus, IIB embraces and reflects a ‘… specific form of change-oriented activity’ ([17], p. 27) that is explicitly manifested in employees’ ‘implementation of new and useful ideas within a work-role’ ([17], p. 27). Below, several factors suggested to have an impact on IIB are addressed.

**Individual creativity**

As shown in the conceptual model in Fig. 1, IC is one of two personal characteristics suggested to have an impact on IIB. IC as a personal characteristic reflects the idea that creativity is heterogeneous and distributed across individuals in organizations. Creativity is not fixed and equal, but dynamic; it varies from one employee to another. Therefore, IC is an individual resource or capability to be creative. Based on this, and specifically for this study, IC is defined as the individual employee's ‘production of novel, useful ideas or problem solutions. [IC] refers to both the process of idea generation or problem solving and the actual idea or solution’ ([19], p. 368). Creativity is sometimes used synonymously with innovation. However, in this study, we separate the concept of IC from that of IIB. Shalley et al. support this distinction, stating: ‘it important to distinguish creativity from innovation. Creativity refers to the development of novel, potentially useful ideas. Although employees might share these ideas with others, only when the ideas are successfully implemented at the organization or unit level would they be considered innovation’ ([47], p. 934). As the above definition suggests, IC refers to the production and development of potentially useful and novel ideas. Consequently, IC describes processes and individual cognitive thoughts (referring to creative thinking) and potential associated activities such as (1) defining the problem to be solved, (2) collecting information, (3) generating ideas and (4) evaluating ideas [20]. In contrast to IC, the concept of IIB relates to behaviour, specifically referring to the behavioural implementation of creative ideas. Consequently, there is a natural distinction between IC and IIB, although the two concepts are closely linked or interdependent.

Creativity is most often described as a necessary ‘input’ to innovation. Slåtten and Mehmetoğlu, emphasizing the importance of creativity, characterized it as a ‘primary source’ ([21], p. 198) of innovative behaviour. Gilmartin illustrates the criticality of creativity by describing it as ‘the fuel of innovation’ ([30], p. 1). Similarly, Shalley et al. state ‘creativity might best be conceptualized as a first step that is necessary for subsequent innovation’ ([47], p. 934). The ‘foundation of innovation ideas is creativity’ ([22], p. 592). Previous research has found a positive link between creativity and innovation at the individual level [21]. In line with previous research, this study sought a positive association between IC and IIB. This leads to the following hypothesis:

**Hypothesis 1** IC is positively related to IIB.
Psychological capital

PsyCap in Fig. 1 is the second personal characteristic that may influence IIB. The PsyCap construct is drawn from positive psychology, and concerns ‘who you are’ as a person ([24], p. 46). More precisely, PsyCap focuses on the positive aspects and strengths of individuals and labels them collectively as positive psychological resources [23]. PsyCap is a higher-order construct and encompasses four first-order positive psychological resources: (i) hope, (ii) self-efficacy, (iii) resilience and (iv) optimism [23]. PsyCap is a higher-order construct because it assumes the existence of a synergistic association between these four resources. All four resources included in PsyCap are state-like resources [24]. The hope dimension in PsyCap is a motivational state that describes the extent to which one can progress when facing obstacles. Self-efficacy is individual confidence in one’s ability to perform tasks successfully. Resilience refers to the capability to manage setbacks, pursue objectives and achieve good results. Optimism is a person’s positive assessment of the future [25]. This defines PsyCap consistent with previous research as an individual’s positive psychological state of development characterized by (1) having confidence (self-efficacy) to take on challenging tasks and put in the necessary effort to succeed at them; (2) having a positive feeling (optimism) about future success; (3) persevering towards goals, and when necessary redirecting paths to goals (hope) to succeed; and (4) when beset by problems and adversity, bouncing back, sustaining or increasing one’s efforts (resilience) to attain success ([25], p. 3).

Previous research has associated individual PsyCap with work tasks, including IIB. For example, Slåtten et al. found that PsyCap among service sales employees was positively associated with innovative behaviour [26]. In another study, Abbas and Usman [27] found a positive link between PsyCap and supervisor-rated innovative performance among employees employed in a range of firms such as private banks, local offices, textile firms, government ministry offices and customer service offices [27]. Research has also found that the individual components and resources of PsyCap are linked to innovative behaviour. For example, research has linked the single PsyCap component of self-efficacy to innovative activities [28] and creative performance [29]. Although this study focuses on the collective impact of all (four) resources of PsyCap and does not examine the impact of single components, it supports the assumption of a link between PsyCap and IIB. To the authors’ knowledge, no previous research has examined the impact of PsyCap and IIB in healthcare settings. However, in line with most previous research, it is expected that PsyCap in such settings will ‘provide a necessary repository of psychological resources that help effectively innovative work-related ideas’ ([27], p. 129). Based on this, the following hypothesis is proposed:

**Hypothesis 2a:** PsyCap is positively related to employees’ IIB.

Although it has been suggested that PsyCap has a direct impact on IIB, it is also reasonable to assume that PsyCap has an additional direct impact on IC. Previous research has revealed that IC is linked to personal factors [34]. In this study, PsyCap reflects these individual factors. Specifically, it is expected that PsyCap is not limited to its positive impact on an individual employee’s adoption of an innovation (referring to IIB) but also of triggering creativity (referring to IC). It is important to remember that IC in the
previous discussion was described in terms such as ‘primary source’ ([21], ‘the fuel of innovation’ ([30], p. 1), p. 198) and ‘foundation of innovation’ ([22], p. 592). Simply and directly stated, without creative thoughts, no innovative behaviour will occur. Gilmartin supports this assumption, stating, ‘creativity is the basic building block of invention and thus innovation’ ([30], p. 2).

PsyCap is characterized by four personal resources: hope, self-efficacy, resilience and optimism. Each is a potential enabler and helps to trigger IC. Creative thinking is not a quick fix but often involves extensive and intensive cognitive and mental work. It is reasonable to assume that the mental work of IC entails some form of learning process of at least four steps. First, a person must be aware of a problem or challenge that needs to be solved. Second, a person must be interested and motivated to explore the nature of the problem (‘What is the real problem to be solved here?’). Third, potential solutions are identified. In this part, there may be several and sometimes even competing solutions, each with its specific obstacles. Fourth, among the list of alternative solutions, one must finally evaluate and identify the most appropriate and practical solution. Based on this four-step IC process, it is easy to imagine that IC is a relatively demanding mental/cognitive process that can be frustrating, time-consuming and stressful. However, a person’s PsyCap resources can boost IC. PsyCap is a core resource to achieve IC because it represents ‘one’s positive appraisal of circumstances and probability for success based on motivated effort and perseverance’ ([23], p. 550).

Previous research has revealed that the four resources or ‘ingredients’ of PsyCap, both individually and collectively, are associated with IC [35, 36]. For example, previous research has linked the hope resource of PsyCap to a person’s will to perform creative exploration [31]. Luthans et al. explicitly stated that hopeful employees ‘tend to be creative’ ([31], p. 74). Similarly, the optimism resource of PsyCap is also linked to IC. For example, a study by Rego et al. found that optimistic people tend to be more creative than their less optimistic counterparts [32]. Research on the other two resources of PsyCap, self-efficacy and resilience, has also found them to be positively linked to the aspect of creativity (see e.g. [28, 29, 33]. Consequently, the four resources of PsyCap are all potentially associated with IC. To the authors’ knowledge, no previous study has specifically examined the impact of PsyCap on employees’ IC in a healthcare setting, which makes this study a unique contribution to health services research. However, based on previous research, it is expected that the ‘combined motivational effects of the four dimensions’ ([35], p. 431) of PsyCap will be positively associated with employees’ IC. The assumption about this relationship can be summarized in the following hypothesis:

Hypothesis 2b: PsyCap is positively related to employees’ IC.

The two aforementioned hypotheses propose that PsyCap has a direct impact on employees’ IIB and IC. However, as shown in Fig. 1, it is also expected that the relationship between PsyCap and IIB is mediated by IC. This assumption represents a third alternative way in which PsyCap may be linked to IIB. The main argument for this third route of impact is in the core role IC seems to have in IIB. As emphasized above, IC in the literature is described as a ‘primary source’ ([21], ‘the fuel of innovation’ ([30], p. 1), p. 198) and the ‘foundation of innovation’ ([22] (p. 592). This implies that from an individual employee perspective IC is a
necessary precondition for IIB. Based on this core role of IC, an increase in employee IC because of a positive shift or change in their PsyCap (as suggested in hypothesis 2b) may encourage employees to experiment with and apply creative ideas if they see a benefit to their work. Consequently, IC is expected to mediate between PsyCap and IIB. This leads to the following hypothesis:

**Hypothesis 2c:** *The relationship between PsyCap and IIB is mediated by IC.*

### Leadership autonomy support

In the conceptual model in Fig. 1, LAS represents *organizational characteristics.* In general, leadership is an essential organizational variable because it influences employees’ psychological attributes (e.g. PsyCap) and their creative performance [37] in constructs such as IC and IIB. LAS may affect motivation in work contexts [38]. This motivation is interesting for two reasons. First, as mentioned above, IC and IIB are relatively stressful. Second, IC and IIB can both be described as ‘extra-role behaviour’ because they are normally not a direct obligation, nor are they explicitly stated in formal contracts or job descriptions. Therefore, creative performance in terms of IC and IIB can be described as voluntary hard work that employees want to do but do not have to. Consequently, employees need a certain level of interest, or more precisely, motivation to be creative and innovative. This latter aspect of employee motivation is interesting and especially relevant to the concept of LAS. The ideas in this concept originally come from self-determination theory (SDT) [39]. SDT focuses on factors that facilitate motivation in humans. In SDT, the inner or self-determined driven type of motivation is emphasized as the ideal type. In SDT, it is labelled ‘autonomous motivation’, which describes a person who ‘behaves with a full sense of volition and choice’ ([40], p. 450). In the literature, autonomous motivation is described as the ‘highest quality of regulation’ ([40], p. 450).

In the literature, the concept of LAS is closely linked to autonomous human motivation [40, 41], so it is of special interest to the overall aim of this study. In this study, LAS refers to employees’ perceptions of the quality of their interpersonal relationship with their leader. The domain and focus of LAS is the interpersonal work context and whether employees perceive their leader as one who stimulates, motivates and encourages them to work autonomously. Leaders that are autonomy-supportive provide ‘a meaningful rationale for doing the task, emphasise choice ... and acknowledge employees’ feelings and perspective’ ([40], p. 451). The ‘goodness’ and ‘well-being’ of autonomy-supportive leaders become very clear if it is contrasted with the opposite—non-autonomy-supportive leaders. In an organization with non-autonomy-supportive leaders, employees have zero freedom, are controlled at every step of the way, and their leaders give orders and provide detailed recipes of how the work should be done. Not surprisingly, employees most often feel that non-autonomy-supportive leaders decrease their inner motivation while autonomy-supportive leaders increase it. Therefore, because autonomy at work and autonomy-supportive leaders are closely associated with employees’ inner motivation, they are most often appreciated and sought by employees. Individuals who seek autonomy at work ‘are often searching for inner motivational environments and situations that provide them the opportunity of self-determination, initiative and choice’ ([42], p. 160).
There are several interconnected reasons that LAS should have an impact on employees’ IC. First, LAS potentially ‘fuels’ employees with an inner motivation that increases their interest and leads them to focus on their work performance. Previous research supports the view that autonomy support is linked to employee motivation in work contexts. Second, because LAS is associated with positive motivation, it is reasonable to assume that employees also become more engaged and dedicated, which increases their IC. Consequently, by this reasoning, employees’ perceptions of LAS function in tandem with their motivation by promoting IC. The importance of motivation for creativity is supported in the componential theory of creativity. By this theory, the motivation of an individual is suggested to be a primary mechanism that affects the creativity of an individual [43]. As noted by Hocine and Zhang, ‘people are most creative when they feel motivated’ ([44], p. 2). Previous research suggests that autonomy-supportive leaders have an impact on employee performance [43, 44]. Frese and Zapf, for example, found that the more leaders encouraged and supported employees in organizations, the more it promoted new ideas and creativity [45]. In an empirical study by Slåtten of 345 hospital employees, the author found that their perceived autonomy influenced both their creative self-efficacy and innovative behaviour [28]. In this paper, the authors suggest that autonomy is a ‘... “key factor” and is critical for developing a person’s creative self-efficacy’ ([28], p. 341). Previous research has also revealed that when employees experience the opposite of autonomy at work—controlling behaviour from their leader—this has a detrimental impact on creativity [46]. Consequently, based on previous research, there are good reasons to assume that when employees perceive LAS in a positive way it will have a positive impact on IC. This reasoning leads to the following hypothesis:

**Hypothesis 3a:** LAS is positively related to IC.

Shalley et al. state ‘the presence of ... creative ideas increases the likelihood that other employees will apply the ideas in their own work’ ([47], p. 933). This statement—like the present study—stresses the importance of IC in achieving IIB. Consequently, creative thinking (or IC) is a precursor for creative acting (or IIB). On the other hand, there are studies revealing that autonomy is positively associated with innovative behaviour [48] and creative work involvement [49]. However, in these studies, the impact of autonomy is limited because they do not include both IC and IIB in the same study. Therefore, considering the core role of IC, the true pattern of linkages in the impact of autonomy on IC and IIB has not been fully investigated. In contrast, this study separates IC (as a cognitive concept) from IIB (as a behavioural concept), thus providing a more comprehensive test for mechanisms operating between LAS, IC and IIB. To the authors’ knowledge, this is the very first study of the linkages between these three concepts. Being creative is demanding for employees and it entails abilities such as ‘deep processing of information, and information integration’ ([50], p. 474). Thus, being creative is a complex task. Such a ‘complex task ... [as creativity] ... requires a higher degree of ... autonomy’ ([50], p. 469). LAS is, therefore, a leadership tool that may increase employees’ IC. Based on this, when employees perceive the LAS to be good it should encourage them and stimulate their IC. However, LAS is not limited to raising employees’ creative thinking skills. It is also reasonable to assume that LAS, in the next round can fuel employees with the necessary authority and freedom to transform their creative thoughts (IC) into real action and behaviour (IIB). This is because implementing creative thoughts may benefit work performance. This reasoning assumes that IC
acts as the common denominator between LAS and IIB. Specifically, IC is expected to mediate the relationship between LAS and IIB. This leads to the following hypothesis on the pattern of linkages:

**Hypothesis 3b**: The relationship between LAS and employees’ IIB is mediated by their IC.

Because of leaders’ and managers’ formal roles in organizations, they significantly influence their subordinates [51]. Slåtten et al. describe this influence as ‘among the most dominant factors’ ([52], p. 162). Leadership is a significant or ‘impactful’ part of an organizational work environment and ‘resource theorists view the work environment as a key management resource that interacts with other resources’ ([53], p. 5) such as the resources that comprise PsyCap. As discussed in relation to hypotheses 3a and 3b, leadership is expected to affect employees’ IC and IIB. Below, it is suggested that this relationship also works through the impact of LAS (an organizational characteristic) on PsyCap (a personal characteristic) as shown in Fig. 1. Consequently, this represents an alternative and complementary route in the pattern of linkages associated with CI and IIB.

Above, PsyCap was described as an individual personal resource. The literature defines the concept of PsyCap as ‘an individual’s positive psychological state’ ([25]). The definition of it as a ‘psychological state’ implies that PsyCap is not static or fixed but dynamic. Consequently, the individual resources that comprise PsyCap change according to certain factors. Luthans et al. support this idea by stating that PsyCap is ‘open to development and can be managed for effective work performance’ ([24], p. 46–47). By this line of reasoning, it is expected that LAS can positively ‘develop’ or ‘manage’ employees’ PsyCap. To the authors’ knowledge, no previous study has examined this specific relationship in a healthcare setting. Although very little research has been undertaken, previous research indicates a relationship between LAS and PsyCap. First, when employees perceive the LAS in their organization to be positive it reflects a perception of an autonomous work environment. As discussed above, an autonomous work environment (of which LAS is a part) is positively associated with PsyCap. For example, in a study by Choi of 331 employees in a Korean automotive parts manufacturing company, the author found a significant and strong link between autonomous work environments and employees’ PsyCap (β = 0.586). Interestingly, in this article the author describes an autonomous work environment as partly a place that ‘gives employees choices and encourages employees to take personal initiative’ ([53], p. 4). Moreover, to capture employees’ perceptions of autonomy the author’s questionnaire used items that assessed ‘a subordinate’s perceptions of the degree of autonomy supportiveness provided by their supervisors’ ([53], p. 7). This way of describing and capturing autonomous work environments is to a large extent similar to how the concept of LAS is used in this study. Stated in another way: Choi [53] provided support for this study’s expectation of a positive association between LAS and PsyCap. Second, although the impact of LAS has not been specifically considered, previous research has found that positive leadership (e.g. authentic leadership) and supportive organizational climate are positively associated with PsyCap [26, 54]. Consequently, based on the highly relevant research of Choi [53], it is expected in this study that LAS, as a positive environmental resource in organizations, has a positive impact on employees’ PsyCap. Therefore, the following hypothesis is proposed:
Hypothesis 3c: LAS is positively related to employees’ PsyCap.

Innovative behaviour is influenced by both ‘personal and external determinants’ ([55], p. 177). As argued throughout the discussion of the previous hypothesis, both PsyCap and CI—two personal determinants (or personal characteristics)—are assumed to be positively associated with IIB. Moreover, in the discussion of hypothesis 3c, it was argued that LAS, as an external determinant (or organizational characteristic) develops and increases the ‘reservoir’ of employee PsyCap resources. Based on this reasoning and assumption, it is reasonable to assume that PsyCap plays a mediating role in the relationship between LAS and IIB. Specifically, when employees’ reservoirs of PsyCap increase because of a positive development stemming from LAS, this should increase their IIB. The authors are not aware of any previous study that has specifically tested the interplay between these variables in healthcare settings. However, a previous study has found that PsyCap mediates the relationship between positive leadership and innovative behaviour. For example, in a study of sales-people, it was found that employees’ PsyCap mediated the relationship between positive perceptions of the authentic leadership style and innovative behaviour [26]. Furthermore, Choi [53] found that PsyCap fully mediates the relationship between an autonomous work environment (of which LAS is a part) and employees’ self-directed behaviour (a concept from Choi [53] that is strongly related to the concept of IIB in this study). Thus, given its prominent role reported in the literature, PsyCap is expected to mediate the relationship between LAS and IIB. This prompts the following hypothesis:

Hypothesis 3d: The relationship between LAS and IIB is mediated by PsyCap.

A similar mediating pattern of linkages with PsyCap is predicted between LAS and IC. In this study, IC is defined as a cognitive concept. As noted several times in this paper, creativity is fundamental as the first step to innovation [21, 30, 47]. The logic of this is simply stated: If an individual has no creative thoughts (IC) no innovation will occur (IIB). However, as stated in hypothesis 2b, PsyCap can fuel IC. Similarly, as argued in hypothesis 3c, LAS can fuel PsyCap. In combination, these relationships indicate mediation or what can be described as a ‘domino effect’ that starts with perceptions of LAS, works through PsyCap and has an impact on IC. No previous research has examined this assumption in a healthcare setting. However, support for the hypothesized mediating relationship can be found in published studies. Gupta and Singh found in their study that PsyCap fully mediates the relationship between leadership and creativity [56]. Similarly, Zubair and Kamal found that PsyCap mediates the relationship between the authentic leadership style and creativeness [57]. In line with previous research, it is assumed that PsyCap mediates the relationship between LAS and IC. The leads to the following and final hypothesis in this study:

Hypothesis 3e: The relationship between LAS and employees’ IC is mediated by PsyCap.

Methods

The focus of this paper is the IIB of hospital employees. One of the authors initiated contact with the Director of Research at a hospital located inland in Norway to request permission to survey its
employees. After acceding to the request, the Director of Research informed managers about the project. Managers undertook to inform the employees in their divisions.

A survey was developed through several workshops and a meeting with experts from academia and the site of the study. This process included several pretests of the questionnaire. The final questionnaire was distributed to a sample of 2000 hospital employees. It was the Director of Research who first disseminated the survey through emails to managers. Then, in the next round, the managers distributed the questionnaire to the employees in their division. All invitations included information about the aim and focus of the study, confidentiality of data and the time required to complete the questionnaire. A total of 1008 hospital employees participated, which gave a response rate of 50.4%. Table 1 provides information on the personal characteristics of the participants.

| Table 1                                               |     |
|-------------------------------------------------------|-----|
| Personal characteristics of the participants \(N=1008\) |     |

| Sex:         | %   |
|--------------|-----|
| Female       | 73.0|
| Male         | 27.0|

| Position:    | %   |
|--------------|-----|
| Nurse        | 33.0|
| Doctor       | 8.7 |
| Others (e.g. admin. staff, other health professionals) | 58.3%

| Duration of employment: | %   |
|-------------------------|-----|
| Less than 5 years       | 26.9|
| Between 6 and 10 years  | 18.0|
| Between 11 and 20 years | 30.3|
| More than 20 years      | 24.8|

| Part-time or full time: | %   |
|-------------------------|-----|
| Part-time               | 22.5|
| Full time               | 77.5|

| Age:                    | %   |
|-------------------------|-----|
| Younger than 45 years   | 37.3|
| Between 46 and 55 years | 32.2|
| Older than 55 years     | 30.5|

**Instruments**

This study covered four constructs: LAS, PsyCap, IC and IIB. All items used for the constructs are based on previous research. However, because none of the instruments has specifically been used in a healthcare context before, there was a need to adapt items to the study context. The items used to
capture the concept of LAS were adopted from Amundsen [42]. The items used to capture the concept of PsyCap were adopted from Luthans et al. [25]. Those for IC items were adopted from Zhou and George [68]. Finally, the IIB were adopted from Janssen [66] and Scott and Bruce [67]. A Likert scale from (1) strongly disagree to (7) strongly agree was used for all items. Table 2 shows the items included in this study. The survey used in this study is a part of a larger survey research project focusing on various aspects of employee-relations in health organizations. As such, claims used in this study are appended accordingly (see appendix 1).

Table 2
Constructs (LAS, PsyCap, IC and IIB) and items used in this study

| Construct | Claims label | Claims |
|-----------|--------------|--------|
| LAS       | LAS1         | My leader gives me authority over issues within my area. |
|           | LAS2         | My leader listens to me. |
|           | LAS3         | My leader encourages me to take initiative. |
|           | LAS4         | My leader is concerned that my work is goal-oriented. |
|           | LAS5         | My leader instils motivation. |
| PsyCap    | PsyCap1      | I feel confident that I can set goals for myself in my work area. |
|           | PsyCap2      | I am optimistic when it comes to my future at this organization. |
|           | PsyCap3      | When faced with challenges in my job, I can find alternative solutions to them. |
|           | PsyCap4      | I can find alternative ways to achieve my goals. |
| IC        | IC1          | I contribute creative ideas to solve challenges in my job. |
|           | IC2          | I contribute creative ideas to improve the quality of my job. |
| IIB       | IIB1         | I create new ideas to solve problems in my job. |
|           | IIB2         | I search out new working methods or techniques to complete my work. |
|           | IIB3         | I investigate and find ways to implement my ideas. |
|           | IIB4         | I promote my ideas so others might use them in their work. |
|           | IIB5         | I try out new ideas in my work. |

**Data analysis**

Partial least-squares structural equation modelling (PLS-SEM) was used to test the conceptual models and hypothesized relationships, using SmartPLS 3 software [58]. The first step in evaluating the PLS-SEM results involved examining a set of criteria for the reflective measurement model; the second step involved assessing the structural model. Based on the PLS-SEM results, mediating effects were also
estimated and analysed. We followed ‘the rules of thumb’ of Hair et al. [59, 60] to assess the quality of the measurement and structural model results.

As a robustness check of the PLS-SEM results, we also tested whether the following socio-demographic control variables influenced IIB: age, gender, education level and type of employment (part-time or full time). No significant differences were found for the socio-demographic variables, so the control variables were excluded from further analysis.

### Results

#### Measurement model

To assess the reflective measurement model, we examined convergent validity, internal consistency reliability and discriminant validity. Convergent validity is the extent to which a claim correlates positively with alternative measures based on the same construct, and this was evaluated with loadings of the measures and average variance extracted (AVE). All loadings were above the lower ‘rules of thumb’ at 0.7. All the constructs in this study showed an AVE value above 0.5, also indicating a satisfactory degree of convergent validity (Table 3). Internal consistency reliability is an estimate of the construct reliability based on the size of the correlations of the observed measures, and was evaluated using composite reliability and Cronbach’s alpha. Both Cronbach’s alpha and composite reliability for all constructs were above the suggested value of 0.7, thereby indicating good internal consistency in the constructs.

Discriminant validity is the extent to which a construct is distinct from other constructs; in this study, as recommended by Hair and colleagues [59, 61], it is assessed using the heterotrait–monotrait (HTMT) ratio of correlation between constructs. The test is whether the 95% confidence interval of the HTMT statistic does not include the value of 1, as was the case for all constructs in this study. Overall, the tests support the view that this is a reliable and valid measurement model.
| Construct | Claims label | Indicator reliability | AVE* | Composite reliability | Cronbach's alpha | HTMT criterion* |
|-----------|--------------|-----------------------|------|-----------------------|------------------|-----------------|
| **'Rule of thumb'** | | Loading > 0.7 | >0.5 | 0.7–0.95 | 0.7–0.95 | HTMT interval does not include 1 |
| LAS | LAS1 | 0.84 | 0.80 | 0.95 | 0.94 | Yes |
| | LAS2 | 0.92 | | | | |
| | LAS3 | 0.93 | | | | |
| | LAS4 | 0.86 | | | | |
| | LAS5 | 0.91 | | | | |
| PsyCap | PsyCap1 | 0.81 | 0.74 | 0.92 | 0.88 | Yes |
| | PsyCap2 | 0.82 | | | | |
| | PsyCap3 | 0.89 | | | | |
| | PsyCap4 | 0.90 | | | | |
| IC | IC1 | 0.96 | 0.93 | 0.96 | 0.92 | Yes |
| | IC2 | 0.96 | | | | |
| IIB | IIB1 | 0.85 | 0.77 | 0.94 | 0.93 | Yes |
| | IIB2 | 0.88 | | | | |
| | IIB3 | 0.90 | | | | |
| | IIB4 | 0.88 | | | | |
| | IIB5 | 0.88 | | | | |

* AVE = Average variance extracted, HTMT = Heterotrait–monotrait ratio of correlations.

**Structural model**

Before the structural model was assessed, multicollinearity between the latent constructs was examined by looking at the variance inflation factor (VIF) values, where VIF values above 5 indicate multicollinearity issues [61]. All VIF values were lower than 2, indicating no multicollinearity problems. The direct effects in the structural model are shown in Fig. 2. For the endogenous constructs, the model’s in-sample predictive power was examined using . Based on ‘the rules of thumb’ [59, 61], the values for IIB (0.50), PsyCap (0.27)
and IC (0.25) were moderate. All the standardized direct-path coefficients were statistically significant at the 1 per cent significance level (the coefficient between LAS and IIB at the 5 per cent level). The relationship between IC and IIB was positive (b = 0.44), supporting H₁. H₂a and H₂b were also supported because the relationships between PsyCap and IIB and between PsyCap and IC were positive (b = 0.34 and b = 0.32, respectively). Finally, there was a positive relationship between LAS and PsyCap (b = 0.52) and between LAS and IC (b = 0.26), supporting H₃a and H₃c.

The test of the mediator effects shows that IC complementarily mediates the relationship between PsyCap and IIB, with an indirect effect of 0.14 (Table 4), supporting H₂c. Furthermore, IC intervenes between LAS and IIB (indirect effect of 0.11), supporting H₃b, and PsyCap also complementarily mediates the relationship between LAS and IIB (indirect effect of 0.18), supporting H₃d. Note the ‘domino effect’ that PsyCap and IC have on the relationship between LAS and IIB, with an overall indirect effect of 0.36. The mediating effect of PsyCap between LAS and IC was 0.17, also indicating a complementary mediator effect, supporting H₃e.

Table 4
Test of mediation effect of IC and PsyCap

| Hypothesis | Effect | Mediator | Indirect effect | Total effect | Mediator effect |
|------------|--------|----------|----------------|--------------|----------------|
| H₂c        | PsyCap → IIB | IC       | 0.138***       | 0.477***     | Complementary  |
| H₃b        | LAS → IIB    | IC       | 0.114***       | 0.436***     | Complementary  |
| H₃d        | LAS → IIB    | PsyCap   | 0.176***       | 0.436***     | Complementary  |
| H₃e        | LAS → IC     | PsyCap   | 0.165***       | 0.427***     | Complementary  |
| c          | LAS → IIB    | IC, PsyCap | 0.362***       | 0.436***     | Complementary  |

a ** p < 0.05, *** p < 0.01 are significance levels.

b The effect between LAS and IIB is influenced by two mediators, IC (twice) and PsyCap, and we have a triple mediation analysis ([59] pp. 236–238). The total indirect effect is then the sum of the specific indirect effects.

c We used the bootstrapping test of Zhao et al. [62] to test mediation. Briefly, this test uses bootstrapping to assess whether the direct and indirect effects are statistically significant, and the combination of these two tests determines whether there exist direct effects only—without mediation, no-effect non-mediation, complementary mediation, competitive mediation or indirect-only mediation.

Discussion

Innovation is a ‘critical capability of all healthcare organizations’ ([5], p. 66). This study aims to increase our understanding of the foundations of innovation in healthcare organizations. The contributions can be summarized in three parts. First, in contrast to most previous research at the organizational level of
innovation, this study focuses on innovation from an individual employee perspective. As such, it deepens our insight into employees in organizations that the literature sometimes describes as ‘primary agents’ ([6], p. 615) of innovative ideas. Second, previous health services research has been limited to the behavioural manifestations of innovation or what this study labels IIB. Although IIB is an interesting aspect, this study extends previous research as it increases our knowledge regarding factors that have an impact on employees’ cognitive processes associated with IIB. By including the concept of IC, this study offers insight into the links between the fundamental premises of IC and IIB. Third, this study also examines whether and how IIB is manageable. Specifically, it reveals how organizational factors (or LAS) combine with personal factors (PsyCap and IC) to influence IIB. Consequently, in summary, the study unpacks the apparent ‘black box’ by revealing a multifaceted pattern of linkages that make up employees’ IIB.

In line with previous research, IIB in this study was defined as ‘implementation of new and useful ideas within a work role’ ([17], p. 27). As mentioned above, IIB embraces a variety of behavioural manifestations of ‘newness’ at work. Specifically, ‘newness’ ranges from incremental (minor) innovations on one hand to radical (major) innovation on the other. Similarly, the aspect referred to as ‘within’ a work role in the definition of IIB embraces a great variety of ‘time and places’ where ‘newness’ or innovation take place. Specifically, ‘within’ a work role could include innovation by frontline employees (e.g. finding a new way to manage patients) as well as ‘within’ backstage work (e.g. a new administrative routine or internal work process). Thus, the definition of IIB in this study touches on one the earliest definitions of innovation, provided of Schumpeter [63], describing innovation in broad terms as the implementation of new combinations of service, processes at work, products and markets. Based on this broad definition, innovation could be manifested in all types of hospital work. Consequently, a practical managerial implication for hospital organizations is to not narrow their focus simply to motivating those with a single job (e.g. frontline employees) to perform IIB. In contrast, one should take a broad approach and stimulate all employees’ IIB no matter what their role in the organization. This suggests a need to take a ‘top-down’ perspective on IIB in hospital organizations. This entails that senior managers of hospital organizations should try their best to stimulate middle managers’ IIB at work. In the next round, middle managers should do the same for their subordinates, and so forth. This creates a positive and self-reinforcing IIB spiral that could potentially involve the whole organization and lay the foundation of what Mesfin et al. label ‘innovative culture’ ([64], p. 7). Mesfin et al. found that employees’ perceptions of ‘innovative culture’, regardless of their job, ‘the most preferred culture type’ ([64], p. 7).

An organization with a strong focus on innovation is characterized by ‘creativity, professional freedom and transformational leadership’ ([64], p. 7). The findings from this study support this idea. As noted above, CI was found to have the greatest impact on IIB, followed by PsyCap and perceived LAS. To the authors’ knowledge, this is the very first study in health services research to examine the impact of these three factors collectively. In total, the three factors (LAS, PsyCap and CI) explain 50% of the variance of hospital employees’ IIB, which can be characterized as substantial. Similar to other studies, CI was found to ‘fuel … innovation’ ([30], p. 1) represented by IIB. These findings indicate that if the other two factors
(LAS and PsyCap) are present, employees who (cognitively) produce novel and useful ideas are both willing and motivated to (behaviourally) implement them at work.

By including PsyCap and LAS, this study also provides new insight into how personal and organizational factors, individually and collectively, can affect employees' CI and IIB. To the authors' knowledge, this is the first study in health services research to examine the impact of LAS and PsyCap on IC and IIB. Although both PsyCap and LAS are associated with CI and IIB, there are differences in their impact on the two variables. First, PsyCap shows a significantly greater direct impact on IIB than LAS ($\beta = 0.34$ versus $\beta = 0.07$). This does not mean that LAS is unimportant for IIB. LAS provides employees with a necessary autonomy and freedom to take the initiative to perform IIB. LAS can thus be characterized as a precondition for IIB. However, autonomy in itself is insufficient to trigger IIB. Employees must also have a personal inner drive to make use their freedom to perform IIB. The findings from this study indicate that PsyCap is the motivational factor. Consequently, the comparison of the individual impact of LAS and PsyCap highlights that the potential to release employees' IIB works through their PsyCap. PsyCap consists of four resources (hope, self-efficacy, resilience and optimism). Together they have a synergistic impact on IIB. This motivational aspect of PsyCap to perform IIB is needed for at least two reasons. First, IIB goes beyond employees' typical in-role responsibility and accordingly constitutes an extra-role effort. Second, there is always a risk of failure in IIB. Most probably there are also obstacles that one must overcome. However, provided that employees have a satisfactory level of PsyCap. It 'fuels' them with energy and goal-directed IIB. The impact of PsyCap on IIB found in this study is supported by previous research [28, 29, 35, 36].

Although LAS has a less direct influence on employees' IIB than PsyCap, this study found a different pattern in their links to IC. In this situation, LAS and PsyCap have an almost identical impact on IIB ($\beta = 0.26$ for LAS and $\beta = 0.32$ for PsyCap). IC is a cognitive concept that describes employees' 'production of ... ideas' ([19], p. 368). The findings reveal that LAS significantly promotes employees' IC. Thinking creatively can be considered a relatively complex task. The literature states that 'complex tasks ... require a higher degree of ... autonomy' [50, p. 469]. This study supports this statement by empirically illustrating how LAS in hospital organizations can directly stimulate employees' IC.

However, PsyCap is also found to be an important driver of IC. This illustrates the multiple roles of PsyCap, which influences both IC and IIB. PsyCap is characterized as openness to change to achieve 'effective work performance' ([24], p. 46–47). As this study reveals, LAS can influence employees' PsyCap. Specifically, LAS explains about 30% ($R^2 = 0.27$) of the variance of PsyCap. Moreover, through the mediation of PsyCap, LAS also simultaneously influences employees' IC.

Although there are differences in the magnitude of LAS and PsyCap, both are directly linked to IC. On the other hand, the findings reveal how personal factors (IC and PsyCap) and an organizational factor (LAS) functioning in tandem, both directly and indirectly, have a complex symbiotic relationship in promoting IIB. To the authors' knowledge, this is the very first study in health services research that reveals the multifaceted relationship between these factors. The important roles of LAS and PsyCap can be seen
through the lens of broaden-and-build theory [65]. Both LAS and PsyCap focus on conditions that stimulate employees’ personal growth, thriving and positive emotions. As this study reveals, when employees view LAS positively, and their level of PsyCap is satisfactory, these two factors work both individually and collectively to increase IC and IIB. However, LAS seems to have a managing role over employees’ PsyCap, IC and IIB. This finding suggests that it is of fundamental importance for hospital organizations to have co-ordinated and pragmatic leadership. This is expressed well by Hocine and Zhang [44]: ‘Today leaders are more like employee supporters than employee supervisors. Creating intentionally supportive and motivating environment ... in the workplace for employees to be creative and innovative is part of modern leadership’ ([44], p. 1).

**Limitations And Future Research**

Like most studies, this study has its limitations. However, these limitations offer several opportunities for future research. Below are two specific suggestions for future research.

First, leadership is among the most important precursors of innovation. However, more work is needed to identify what leadership style most effectively produces innovation in healthcare organizations. This study limited its focus to a single leadership style as the antecedent to IIB. Although LAS has a significant impact, future research should include other leadership styles. One relatively new leadership style is ambidextrous leadership. Ambidextrous leaders are highly relevant to innovation. According to Zacher and Rosing [55], a ‘central idea of ambidextrous leadership is that the complexity of innovation activities needs to be matched by an equally complex leadership approach’ ([69], p. 55). Ambidextrous leadership theory suggests two leadership styles that should be combined to promote innovation in organizations: opening and closing. Ambidextrous leadership theory states that ‘the interaction of these complementary leadership behaviours should be more effective with regard to promoting individual ... innovation than a single leadership style’ ([69], p. 55). To the authors’ knowledge, no study in health services research has examined the impact of ambidextrous leadership on IIB, IC, PsyCap or other factors potentially associated with innovation. Consequently, more research is needed to reveal the effectiveness of the ambidextrous leadership style and its capability to promote innovative behaviour in healthcare organizations.

Second, employees’ PsyCap was found to have a significant impact on both IC and IIB in this study. Consequently, it is important to capitalize on employees’ PsyCap to strengthen an organization’s ability to innovate. This stresses the continuous need to cultivate and manage PsyCap resources. In this study, LAS was found to be one way to do this. However, future research should include other factors such as organizational culture (e.g. an innovative culture or hierarchical culture), leadership style (e.g. ambidextrous or authentic leadership), organizational climate (e.g. co-operative or competitive), learning (e.g. team learning or relationship learning) and organizational attractiveness. Recently, the concept of ‘thriveing’ [72] has been proposed as a promising and important aspect for organizations. Thriving at work is associated with employees’ feelings of progress, and it is defined as a ‘Psychological state in which individuals experience both a sense of vitality and learning at work’ ([70], p. 537). To the authors’
knowledge no previous health services research has explored the connection of employees’ perceptions of thriving to PsyCap.

Interestingly, thriving has also been directly linked to IIB. Riaz et al. state that, ‘employees who experience more gratification regarding sense of thriving at work may feel that they are in a more advantageous position to reciprocate in terms of displaying innovative behaviour’. In their study of the employees of textile manufacturers, Riaz et al. [71] found a strong linkage between employees thriving at work and their innovative work behaviour. However, to the authors’ knowledge, no study has examined this in a healthcare context. This indicates great potential and opportunities for future research.

Conclusions

This study contributes to our understanding of innovation in hospital organizations from the perspective of individual employees. Specifically, it reveals a multifaceted association between IIB, LAS, PsyCap and IC. From a leadership perspective, the findings highlight the core role of LAS in managing employees’ innovative behaviour in hospital organizations.

Abbreviations

IIB: Individual innovative behaviour; IC: Individual creativity; LAS: Leadership autonomy support; PsyCap: Psychological capital; SEM: Structural equation modelling; AVE: Average variance extracted; NSD: Norwegian Social Science Data Services

Declarations

Ethics and consent to participate

This study was approved by the Norwegian Social Science Data Services (NSD) (project number 239029). The NSD is a resource centre and ethics committee for academic research in Norway. In accordance with the Personal Data Act §§2–7 and 8 no. 1, the participants were given written information about the project and gave their consent by choosing to participate in the study and completing the online questionnaire.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.
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Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors’ contributions

TS led the development and mainly drafted this manuscript. GL contributed to the development of the questionnaire, statistical analysis, interpretation of data and general input into the manuscript. BRM contributed to the development of the questionnaire, data collection and general input into the manuscript. All three authors approved the final draft.

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**Figures**
Figure 1

Conceptual model to analyse impacts on hospital employees’ individual innovative behaviour.
Figure 2

Results of the structural model of the effect of leadership autonomy support, PsyCap and creativity on hospital employees' IIB. Standardized coefficients (** <0.05, *** <0.01)

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