

## The Relationship between Workforce Agility and Staff Nurses' Innovative Work Behavior at Critical Care Units

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### Abstract

**Background:** Workforce agility can help health care organizations in dealing with change and it can be started by increasing work innovation and proactive initiatives as staff nurses should make work innovations according to performance demands. **The study aimed to** assess the relationship between workforce agility and staff nurses' innovative work behavior at Critical Care Units. **Research design:** Descriptive correlational design was utilized. **The study setting:** the study was conducted at critical care units in Benha University Hospital. **The study sample:** A convenient sample of (265) staff nurses from the setting mentioned above. **Tools: Two tools were used** for data collection; Workforce agility Scale and Innovative Behavior Inventory. **Results:** Slightly more than half of staff nurses had moderate level of workforce agility and more than two thirds of studied staff nurses had high innovative work behavior. **Conclusion:** There was a highly statistical significant positive correlation between workforce agility and staff nurses' innovative work behavior. **The study recommended:** that nurse manager should give staff nurses the time and resources they need to pursue creative ideas, and support innovation as a job requirement, conduct training program about workforce agility and enable knowledge and new ideas to be shared.

**Key words:** Innovative work behavior, Staff nurses, Workforce agility.

### Introduction

For many years, it becomes a common reality that many organizations from different sizes and sectors facing unexpected and dynamic changes and this make traditional approaches to be useless for fulfilling the organizational goals. For this pressure, organizations need to implement agility for achieving profitability (Sherehiy & Karwowski, 2014). The agility means responding and adapting quickly to volatile market environments. According to the different definitions of agility, it includes different criteria as flexibility, innovation, speed, quality, proactivity, adaptability, productivity, profitability and knowledge (Tamam & Tourabi, 2020).

Workforce agility (WFA) is a characteristic of a broad frame capable of fostering a competitive environment in the face of unexpected environmental change (Muduli, 2013). It can also be viewed as agile employee

behaviors, which is distinct from other similar concepts such predispositions, agile personality, or various traits. WFA also refers to the workforce's ability to behave proactively, adaptively, and generatively. (Muduli, 2016; Sherehiy & Karwowski, 2014). Besides, WFA is simulating this meaning through a composition of two parts "Agility and Workforce" (Zhang, 2011).

Because people are one of the most important contributors to organizational agility, establishing workforce agility can help the organization to develop agility. Workforce with agile qualities is an important part of the organization's overall agility strategy, and it assists firms that operate in highly uncertain contexts. The ability to anticipate change, adapt to change proactively, swiftly recover from change, communicate cross-functionally, and be flexible are all characteristics of an agile workforce (Qin & Nembhard, 2010; Appelbaum et al., 2017; Omidvar et al., 2021).

Based on the models of **Dyer & Shafer, (2003)**, the behaviors of agile workforce are grouped in three dimensions: proactive, adaptive, and resilience. firstly, the proactive behaviors: it refers to anticipation of problems related to change; initiations of activities that lead to a solution of the change related problems and improvements in work; and a solution of the change related problems (**Sherehiy & Karwowski, 2014**).

Secondly, adaptive behaviors: it requires professional flexibility, which is the ability to assume multiple roles, change easily from one role to another, and the ability and competency to work simultaneously on different tasks in different teams. Finally, resilience behaviors: it includes a positive attitude to the changes, new ideas, and technology; tolerance of uncertain and unexpected situations, differences in opinions, and approaches; and tolerance to stressful situations and coping with stress (**Muduli, 2017**).

Workforce agility can help organizations with the agility of their workforce in dealing with change and they need to have agile managers to form work teams that have agility (**Sharrock, 2015**). This is in line with WFA which can affect four strategic objectives including cost, time, quality, and diversity, and can help organizations in achieving agility (**Paul et al., 2020; Tamtam & Tourabi, 2020**). WFA can be started by increasing work innovation and proactive initiatives as staff nurses must make work innovations according to performance demands (**Azmy, 2021; Muduli & Pandya, 2018**).

Innovative work behavior is defined as not only consisting of the initiation and realization of novel approaches, but also of the accumulation of knowledge taking as a basis for the aforementioned activities. To increase job performance, all healthcare workers involved in the care or treatment of patients must engage in innovative work behavior. This can take the shape of incremental adaptations of existing healthcare systems, services, or products, or altogether new practical solutions (**Kessel, Hannemann-Weber & Kratzer, 2012**).

Innovative work behavior has seven dimensions seen as a multi-faceted construct that reflects key aspects of innovation and including; idea generation, idea search, idea communication, implementation starting activities, involving others, overcoming obstacles and innovation outputs. Idea generation: through this stage; staff nurses see problems and come up with inventive methods to solve them. It is frequently stimulated by obvious difficulty or challenging condition. Idea search: Innovative activity may also be promoted by individuals searching for new ideas based on searches of existing knowledge sources in their environment (**Lukes & Stephan, 2017**).

Idea communication: it is an essential stage as the employee cannot implement any innovative behavior without receiving permission from their managers. Implementation starting activities; it requires that novel ideas are acted upon and implemented. Involving others; it includes involving others in the implementation, communicates a vision of what the innovation entails, and displays enthusiasm and confidence about it. Overcoming obstacles: It is a key challenge in the implementation phase to achieve the innovation output that is sometimes confounded with implementation activities (**Lukes & Stephan, 2017; Asurakkody & Shin, 2018**).

Innovative work behavior is the result of environmental changes that require the staff nurses to be able to find new ideas, then implement and promote them. This behavior creates modern competitiveness in organizations. Also, Innovative behavior has an effect on behavior and work results as the innovative behavior did not only benefit the organizations, but also the staff nurses as they could develop competence and mastery of tasks. In addition, the organizations would be more willing to keep the staff nurses with innovative behavior to work with them (**Putri and Suharti, 2021**).

Innovation is necessary for health-care institutions to emerge as competitive and introduce new treatments for patients. Health-

care professionals including nurses with positive attitude toward new ideas can contribute to improve the capability of the existing health-care system or develop a new treatment strategy for patients (Asurakkody & Shin, 2018). Agility can take an effective form if it is accompanied by the ability to use resources to respond to the changes at a convenient and flexible time and also the organization be able to implement the changes. This would be possible by creating “innovation” in their job, developing new ideas, and nurturing and applying them (Omidvar et al., 2021).

### **Significance of the study**

The current work environment becomes volatile and complex. Organizations throughout the world are in an environment that is constantly changing in various aspects including technological developments, customers' preferences, emerging markets, and globalization. Staff nurses who work at critical care units often work in a competitive practice environment, characterized by various difficulties and complex conditions that required special skills for providing excellence care. They must constantly identify solutions that are creative and adapt to change. In this environment, the concept of agility, especially workforce agility, is a valuable tool for organizations and can assist them considerably to cope with these situations.

In addition, it has largely been acknowledged that innovation activities play a critical role for the success organizations. In order to cope with changing circumstances, the organizations are largely reliant on the innovative behavior of their workforce also; workforce agility has become an attribute of sustainable and competitive organizations simultaneously. According to the results of an international study which conducted by Omidvar et al, 2021, who studied the relationship between the organizational agility, innovative work behaviors, and job satisfaction among the second-grade high school teachers and indicated a significant positive correlation between organizational agility, innovative work behaviors, and teachers' job satisfaction, but, till

now the relationship between these variables not conducted in nursing. So, this study aimed was to explore the relationship between the workforce agility and staff nurses' innovative work behavior at critical care units.

### **Aim of the study**

This study aimed to assess the relationship between workforce agility and staff nurses' innovative work behavior at Critical Care Units in Benha University Hospital

### **Research Questions**

To fulfill the aim of the study, the following questions were formulated:

- 1.What is the level of staff nurses' workforce agility?
- 2.What is the level of staff nurses' innovative work behavior?
- 3.Is there a relationship workforce agility and staff nurses' innovative work behavior?

## **2. Subjects and Methods**

### **2.1. Research Design**

A descriptive correlational research design was utilized to attain the aim of the study.

### **2.2. Setting**

The study was carried out in Benha University Hospital at the following eleven critical care units: Intensive Care Unit (ICU), medium ICU, emergency ICU, Hepatic ICU, Coronary Care Unit (CCU), chest ICU, chest and heart ICU, pediatric ICU, pediatric incubator, dialysis unit (adult & pediatric) and Stroke ICU.

### **2.3. Subjects**

#### **2.3.1. Subject Type**

A convenient sample.

### 2.3.2. Subject Size

A convenient sample of 265 staff nurses who are working in the previously mentioned setting were taken according to the following inclusion criteria that included who employed for not less than a year.

### 2.4. Tools of Data Collection

Two tools were utilized for data collection of this study:-

**2.4.1 Workforce agility Scale:** It consisted of two parts; **part one:** Included the personal characteristics of nurses as: (age, sex, marital status, educational level, and years of experience).

**Part two: Workforce agility Scale:** this scale was adopted from (Alavi et al., 2014) to measure staff nurses' level of workforce agility through three dimensions with 21-items was adopted: Proactive (seven items), Adaptive (seven items), and Flexible (seven items).

#### Scoring System:

Subjects' responses were scored on a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. The score was reversed for negative items. Scores of each dimension summed up and converted into percent scores. The level was considered high if the percent score was more than 75%, moderate if the percent score ranged from 60 to 75%, and low if the percent score was less than 60%.

#### 2.4.2. Innovative Behavior Inventory:

It developed by (Llukes & Stephan, 2017) to assess innovative behavior among staff nurses. This tool consisted of 23 work-related innovative behavior items that are organized into seven dimensions: idea generation (3 items), idea search (3 items), idea communication (4 items), implementation starting activities (3 items), involving others (3 items), overcoming obstacles (4 items), and innovation outputs (3 items).

#### Scoring system:

Subjects' responses were scored on a five-point Likert scale that ranged from always (5), often (4), sometimes (3), rarely (2) and never (1). The scores of items were summed-up and the total divided by number of the items. These scores were converted into a percent score. Innovative work behavior was considered low if the total percent score was less than 60% and high if the total score was 60% or more.

### 2.5. Methods

It included preparatory phase, pilot study and field work.

**Preparatory phase;** for data collection, the researchers reviewed the past and current available literature in various aspects concerning the topic of the study using books, articles, periodicals, and magazines to be acquainted with all aspects of the study topic and also to develop relevant tools.

1. After the construction of the tool, translated into Arabic language and back translation to check its accuracy.

2. **The tool's validity:** Data collection tools were submitted to three experts in the field of nursing administration to ascertain clarity, relevance and completeness. The tools were modified in accordance with the expert's assessment of sentence clarity, content appropriateness, and item sequencing. Although the experts agreed on the content, they suggested minor language changes to make the information more clear and accurate. Changes were done as indicated.

**Also, the reliability of the tools** was conducted to determine the internal consistency and homogeneity of the tools used by doing a Cronbach's Alpha test. The Cronbach's alpha for the three subscales of workforce agility scale was as following; proactive (0.78), adaptive (0.84), and flexible (0.80), and it was 0.938 for innovative behavior inventory.

**Administrative Design:** Before embarking on the study, approval was obtained from the hospital manager and head of critical care units in the previously mentioned study settings through submission of an official letters

issued from the dean of Faculty of Nursing, Benha University. Also, the researchers met the head nurse of each department to determine a suitable time to collect data from their staff.

**Pilot study:** was carried out on 10% of the total study subjects (27 staff nurses) over a period of one month (September, 2021) to ascertain the tools' feasibility, clarity and applicability. It also helped to estimate the time needed for filling out the tools. Based on the results of the pilot, no modifications were needed and pilot study subjects were included in the study.

### **Ethical consideration**

Before conducting the study, staff nurses involved in the study were given an explanation of the study's nature and purpose. Also, they were informed that participation in the study was completely optional and that they could withdraw from the study at any time without giving any reason. An informed signed consent was obtained from each nurse in the study. Confidentiality of participants' information was assured and only the researchers involved in the study had access to the data.

**3. Fieldwork:** The actual field work was carried out from the beginning of October, 2021 to the end of December, 2021. The directors of the previously stated settings gave their approval to conduct the study, and the staff nurses agreed to participate. In the beginning, the researchers interviewed the staff nurses in the study setting at different shifts (morning, afternoon and night shifts) to give them a brief idea about the study and its purpose. This was accomplished individually or in groups. After that, the researchers distributed the questionnaire to the participated staff nurses, who were asked to fill in work times that had been pre-determined with the head nurse of each unit based on the type of work and workload. The researchers demonstrated any difficulty that participants might face while answering the questionnaires. Data was collected three days /week in the presence of the researchers. The average weekly number of sheets filled was between 18 and 23. Each

questionnaire took an average of 15 to 20 minutes to complete. The completed forms were gathered on time and double-checked for accuracy to ensure that no data was missing. Finally, the researchers expressed gratitude to the individuals for their participation.

### **2. 6. Statistical Design**

The collected data were coded and verified before data entry. The entered data were revised before conducting the statistical analysis (SPSS) version 21.0 for windows, running on IBM compatible computer. Descriptive statistics were applied (e.g., frequency, percentages, mean, and standard deviation). Qualitative categorical variables were compared using chi-square test. Test of significant correlation coefficient ( $r$ ) was used. Whenever the expected values in one or more of the cells in 2x2 tables was less than 5, Fisher exact test was used instead. The p-value is the degree of significant. A significant level value was considered when  $p\text{-value} \leq 0.05$  and a highly significant level value was considered when  $p\text{-value} \leq 0.001$ , while  $p\text{-value} > 0.05$  indicates non-significant results.

### **Results**

**Table (1):** Displays that more than half of staff nurses (53.2%) had age less than 30 years old. Regarding to sex, most of staff nurses (85.7%) were female. Regarding to marital status, more than two thirds of staff nurses (76.6%) were married. Regarding to educational levels, more than half of staff nurses (56.3%) had Associate degree in nursing. Regarding to years of experience, more than one third of staff nurses (36.6%) were from 5- 15 years of experience with a mean of years of experience  $11.004 \pm 8.78$ .

**Table (2):** Shows that, the total mean score of workforce agility was  $(76.87 \pm 10.21)$ . Also, the highest mean score  $(26.81 \pm 4.15)$  was related to Adaptive dimension followed by proactive and flexible dimensions with mean scores  $(25.03 \pm 3.95)$  &  $(25.03 \pm 3.98)$  respectively.

**Figure (1):** Illustrates that slightly more than half of staff nurses (52.1%) had moderate level of workforce agility. Meanwhile, more than one third (36.6%) of staff nurses had high level of workforce agility.

**Table (3):** Reveals that, the total mean score of innovative work behavior among studied staff nurses was ( $87.43 \pm 17.85$ ). Also, the highest mean percent (80.8% & 80.3%) was related to the dimensions "involving others" and "idea generation" respectively. While, the lowest mean percent (67.7%) was related to implementation starting activities dimension.

**Figure (2):** Portrays that, more than two thirds (76.6%) of studied staff nurses had high innovative work behavior. While, less than one quarter (23.4%) of them had low innovative work behavior.

**Table (5):** Shows that staff nurses who had more than 40 years old and years of

experience more than 15 years reported high workforce agility. There were highly statistically significant relation between level of workforce agility and staff nurses' personal characteristics regarding their age and years of experience ( $P < 0.01$ ).

**Table (5):** Displays that staff nurses who had less than 30 years old, female and with experience between 5 to 15 years reported high innovative work behavior. There were highly statistically significant differences between staff nurses' innovative work behavior and sex and years of experience ( $P < 0.01$ ). Also, there were statistical significant differences between staff nurses' innovative work behavior and age ( $P < 0.05$ ).

**Table (6):** Reveals that there was a highly statistical significant positive correlation between workforce agility and staff nurses' innovative work behavior ( $P < 0.01$ ).

**Table (1): Frequency distribution of studied staff nurses' personnel characteristics (n=265)**

Personal characteristics	No.	%
<b>Age in years</b>		
< 30 year	141	53.2
30-40 years	72	27.2
> 40 years	52	19.6
<b>Mean <math>\pm</math> SD</b>	30.79 $\pm$ 8.19	
<b>Sex</b>		
Female	227	85.7
Male	38	14.3
<b>Marital status</b>		
Married	203	76.6
Unmarried	62	23.4
<b>Educational levels</b>		
Diploma of Nursing	84	31.7
Associate degree of Nursing	130	49.1
Bachelor degree in Nursing Science	51	19.2
<b>Years of experience</b>		
1 < 5 year	89	33.6
5-15 years	97	36.6
>15 years	79	29.8
<b>Mean <math>\pm</math> SD</b>	11.004 $\pm$ 8.78	

Table (2): Mean scores and standard deviation regarding dimensions of workforce agility among staff nurses (n=265)

workforce agility dimensions	Maximum score	Mean ± SD
Proactive	35	25.03±3.95
Adaptive	35	26.81±4.15
Flexible	35	25.03±3.98
<b>Total</b>	<b>105</b>	<b>76.87±10.21</b>

Figure (1): Total levels of workforce agility among studied staff nurses

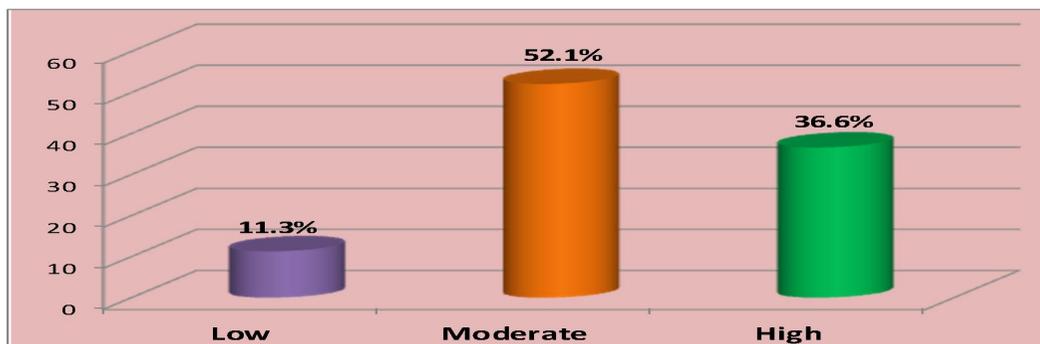


Table (3): Ranking with mean scores and standard deviation of innovative work behavior dimensions among the studied staff nurses (n=265)

Innovative work behavior dimensions	Maximum score	Mean ± SD	Mean %	Ranking
Idea generation	15	12.05±2.38	80.3	2
Idea search	15	11.35±3.37	75.7	5
Idea communication	20	15.30±3.75	76.5	4
Implementation starting activities	15	10.15±3.43	67.7	7
Involving others	15	12.12±2.86	80.8	1
Overcoming obstacles	20	14.95±3.70	74.8	6
Innovation outputs	15	11.51±2.82	76.7	3
<b>Total</b>	<b>115</b>	<b>87.43±17.85</b>		

Figure (2): Total levels of staff nurses' innovative work behavior

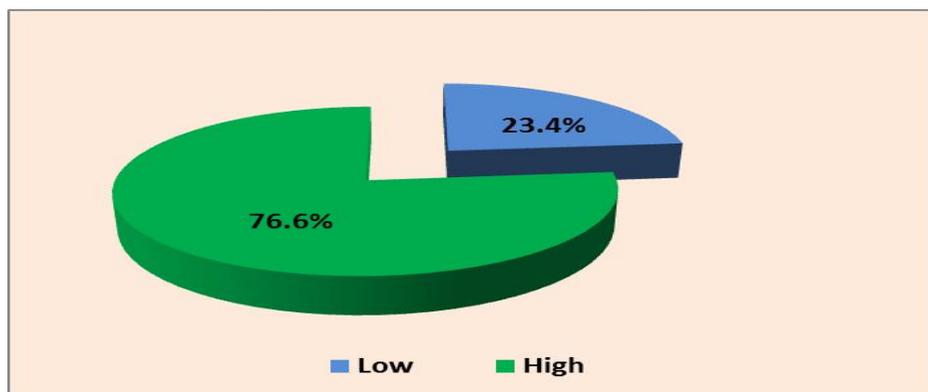


Table (4) Relationship between levels of workforce agility among staff nurses and their personal characteristics (n= 265)

Personal characteristics	Workforce agility among staff nurses						x <sup>2</sup>	p- value
	High n=97		Moderate n=138		Low n=30			
	No	%	No	%	No	%		
<b>Age (years)</b>							FET	0.000**
< 30	28	28.8	90	65.2	23	76.7		
30 – 40	34	35.1	32	23.2	6	20.0		
> 40	35	36.1	16	11.6	1	3.3		
	<b>Sex</b>						FET	0.748
Female	81	83.5	120	87.0	26	86.7		
Male	16	16.5	18	13.0	4	13.3		
<b>Marital status</b>							5.029	0.081
Married	80	82.5	98	71.0	25	83.3		
Unmarried	17	17.5	40	29.0	5	16.7		
<b>Educational level</b>							5.574	0.233
Diploma of Nursing	29	29.9	44	31.9	11	36.7		
Associate degree of Nursing	55	56.7	61	44.2	14	46.6		
Bachelor degree in Nursing Science	13	13.4	33	23.9	5	16.7		
<b>Years of experience</b>							FET	0.000**
1 < 5	23	23.7	54	39.1	12	40.0		
5 – 15	27	27.8	55	39.9	15	50.0		
>15	47	48.5	29	21.0	3	10.0		

\*\* highly significant at (P &lt; 0.01)

FET= Fisher Exact Test

Table (5) Relationship between staff nurses' innovative work behavior and their personal characteristics (n= 265)

Personal characteristics	staff nurses' innovative work behavior				x <sup>2</sup>	p-value
	High n=203		Low n=62			
	No	%	No	%		
<b>Age (years)</b>					6.946	0.031*
< 30	115	56.6	26	41.9		
30 – 40	55	27.1	17	27.4		
> 40	33	16.3	19	30.7		
	<b>Sex</b>				11.273	0.001**
Female	182	89.7	45	72.6		
Male	21	10.3	17	27.4		
<b>Marital status</b>					2.385	0.123
Married	151	74.4	52	83.9		
Unmarried	52	25.6	10	16.1		
<b>Educational level</b>					0.321	0.852
Diploma of Nursing	66	32.5	18	29.0		
Associate degree of Nursing	99	48.8	31	50.0		
Bachelor degree in Nursing Science	38	18.7	13	21.0		
<b>years of experience</b>					11.135	0.004**
1 < 5	73	36.0	16	25.8		
5 – 15	80	39.4	17	27.4		
>15	50	24.6	29	46.8		

\* Significant at (P &lt; 0.05)

\*\* highly significant at (P &lt; 0.01)

**Table (6): Correlation coefficient between workforce agility and staff nurses' innovative work behavior (n=265)**

Variables	Workforce agility	
	r	P
Innovative work behavior	0.642	0.000**

\*\* highly significant at (P < 0.01)

## Discussion

New technology, new models, new ways of dealing with competition, digitalization, market deregulation and fragmentation, economic uncertainty, shifting demographics, and ongoing social and political turbulence have all altered the health care organizations' environment. As a result, health-care organizations face the challenge of consistently and continuously adapting to customer expectations in a timely and exclusive manner (**Junior and Saltorato, 2021**).

Agility can result from being aware of changes in both the internal and external environments. It can take an effective form if it is accompanied with the ability to use resources to respond to changes at a convenient and flexible time and also to the ability of the organization to implement changes (**Omidvar et al., 2021**). Workforce agility management can allow organizations to achieve their goals through Innovative behaviors (**Muduli, 2017**).

The findings of present study revealed that more than half of staff nurses had age less than 30 years old. Regarding to sex, most of staff nurses were female. Regarding to marital status, more than two thirds of staff nurses were married. Regarding to educational levels, more than half of staff nurses had Associate degree in nursing. Regarding to years of experience, more than one third of staff nurses were from 5- 15 years of experience with a mean of years of experience (11.004±8.78).

This result was supported by **Mahgoub et al., (2019)** who conducted a study entitled "Relationship between Work Environment and Innovative Behavior among Staff Nurses" and reported that the majority of staff nurses were female with age ranged from 20-29 years and married. Also, **Saleem et al., (2021)** who conducted a study entitled "Agility and Safety

Performance among Nurses: The Mediating Role of Mindful Organizing" and reported that the majority of the respondents were female and the average working experience was eleven years with a minimum of 5 and a maximum of 22 years.

This result was inconsistent with **Mahgoub et al., (2019)** who found that the highest percentage of staff nurses had nursing diploma and had experience less than five years. Also, **Saleem et al., (2021)** who indicated that the highest percent of the respondents held a bachelor degree.

Concerning workforce agility dimensions, the study results revealed that the highest mean score was related to adaptive dimension followed by proactive and flexible dimensions. From the researchers' point of view, this is due to that adaptive behavior on workforce agility can be reconfigured quickly and easily in response to change conditions. Also, staff nurses need training programs about workforce agility and how to respond to circumstances proactively instead of merely adapting to changes or show resilient behavior. Moreover, work overload and stress could be obstacles facing staff nurses as they have no time to be proactive and plan to changes.

This result was in agreement with **Aladwan, (2017)** who conducted a study entitled " The Impact of Knowledge Management Processes on Workforce Agility: An Empirical Investigation at Pharmaceutical Companies in Jordan" and found that there was a high agreement among study sample on adaptive dimension followed by proactive and flexible dimensions.

On the other hand, this result was in disagreement with **Sherehiy and Karwowski, (2014)** who conducted a study about "The relationship between work organization and workforce agility in small manufacturing

enterprises" and found that the overall regression model for proactivity was high followed by resilience and then adaptability.

Regarding total levels of workforce agility among studied staff nurses, the present study showed that slightly more than half of staff nurses had moderate level of workforce agility. Meanwhile, more than one third of staff nurses had high level of workforce agility. This may be due to the clarity of responsibilities, vision and goals of the hospital.

On the contrast, this result was inconsistent with **Mahmoudi and Talarposhti, (2018)** who conducted a study about "An assessment of agility in selected hospitals of Mazandaran province, Iran" and showed on their results that more than ninety of subjects claimed that organizational agility was less than medium in selected hospitals.

Concerning innovative work behavior dimensions among the studied staff nurses, the present study revealed that the highest mean percent was related to the dimensions "involving others" and "idea generation". While, the lowest mean percent was related to implementation starting activities dimension. This could be explained with that staff nurses can give great innovative ideas but had no plans for implementation of this ideas and don't take the appropriate measures to put this ideas into action. So, they need to learn how to convert ideas into action and projects.

This result was supported by **Mahgoub et al., (2019)** who conducted a study entitled "Relationship between Work Environment and Innovative Behavior among Staff Nurses" and found that the highest dimension of innovative behavior perceived by staff nurses was innovation outputs dimension. Also, they indicated that implementation starting activities dimension came last in ranking between innovative work behavior dimensions. While, **kamel and Aref, (2017)** who conducted a study entitled "Staff Nurses Perception Toward Organizational Culture and Its Relation to Innovative Work Behavior at Critical Care Units" and found that idea championing and

idea implementation was the highest mean score between innovative behavior dimensions.

Regarding the total levels of staff nurses' innovative work behavior, the present study revealed that more than two thirds of studied staff nurses had high innovative work behavior. While, less than one quarter of them had low innovative work behavior. This finding may be related to the personal characteristics of studied staff nurses that support innovative behavior beside the organization's characteristics that give staff nurses the opportunity to show their innovative abilities.

In the same line, **Mahgoub et al., (2019)** who found that more than half of staff nurses had high agreement upon innovative behavior. While, **Jung and Yoon, (2018)** who conducted study about "Improving frontline service employees' innovative behavior using conflict management in the hospitality industry: The mediating role of engagement" and revealed that participants showed a moderate level of innovative behavior.

Regarding relationship between levels of workforce agility among staff nurses and their personal characteristics, there were highly statistically significant relation between level of workforce agility and staff nurses' personal characteristics regarding their age and years of experience as staff nurses who had more than 40 years old and years of experience more than 15 years reported high workforce agility. This may be explained by that staff nurses are likely to be open to learning to upgrade their careers by being flexible, adaptive, and fast to react to changes, whereas they are likely to be inflexible, resistant to changes, and less updated in the latter half of their career.

This result was supported by **Sohrabi et al., (2014)** who conducted study about "Relationship between workforce agility and organizational intelligence (case study; the companies of "Iran High Council of Informatics)" who found a significant relationship between workforce agility and age and years of experience. Also, **Pitafi et al., (2020)** who conducted study entitled "Employee agility and enterprise social media: Role of

information technology proficiency and work expertise" and **Ghodrati and Zargarzadeh, (2013)** who conducted study entitled "A study on the relationship between employee mental health and agility strategic readiness: A case study Esfahan hospitals in Iran" found a significant association between agility and age of the employees.

In the same line, **Zein El Din and El Hessew, (2019)** who conducted study entitled "The Relationship between Psychological Contract Breach, Organizational Identification, and Organizational Agility among Nursing Faculty Members" and found that the highest score for organizational agility was for those aged from 41 to less than 50. Also, **Harvey et al., (1999)** who conducted study entitled "Toward a model of workforce agility" and found that variables such as work experience had a significant positive relationship with workforce agility

On the other hand, this result was in disagreement with **Iowry and Wilson, (2016)** who conducted study entitled "Creating agile organizations through IT: The influence of internal IT service perceptions on IT service quality and IT agility" and **Dries et al., (2012)** who conducted study about "The role of learning agility and career variety in the identification and development of high potential employees" and found that there was no significant influence of work experience and age on workforce agility.

Concerning relationship between staff nurses' innovative work behavior and their personal characteristics, the study indicated that there were highly statistically significant differences between staff nurses' innovative work behavior and sex and years of experience. Also, there were statistical significant differences between staff nurses' innovative work behavior and age as staff nurses who had less than 30 years old, female and with experience between 5 to 15 years reported high innovative work behavior. From the researchers' point of view, innovation is positively related to little age; as the youth are characterized by creativity and innovation and they also have the energy to implement their new ideas.

Additionally, the more the years of experience of the staff nurses, the higher the speed for response to sudden changes in the work environment as they gain the skills over days and years.

This finding was in agreement with **Mahgoub et al., (2019)** who found that there were statistically significant relations between staff nurses' innovative behavior and their age, experience and qualification. On the other hand **Baumann, (2011)** who conducted study about "The relationship between individual and organizational characteristics and nurse innovation behavior" and found that there was no significant correlation between years of experience and nurses' innovation behavior.

Finally, the result of present study revealed that there was a highly statistical significant positive correlation between workforce agility and staff nurses' innovative work behavior. This may be explained by that, the more the power of the person for creativity and innovation, the more the ability to adapt to rapid and sudden changes.

This finding was supported by **Omidvar et al., (2021)** who conducted study entitled "Relationship Between Organizational Agility, Innovative Work Behaviors, and Job Satisfaction Among the Second-grade High School Teachers" and found that there a significant positive correlation between organizational agility and innovative work behaviors among participants. Similarly, **Plonka (1997)** who conducted study entitled "Developing a lean and agile work force Human Factors and Ergonomics in Manufacturing" and observed that agile workers are inclined toward learning and self-development, good problem-solvers, comfortable with change and new concepts and technologies, able to come up with innovative ideas, and ever ready to take on new responsibilities.

## Conclusion

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In the light of the foregoing present study results, it can be concluded that, slightly more than half of staff nurses had moderate

level of workforce agility and more than two thirds of studied staff nurses had high innovative work behavior. Moreover, there was a highly statistical significant positive correlation between workforce agility and staff nurses' innovative work behavior. These findings answer all research questions.

### **Recommendations**

In the light of the findings obtained from the present study, the following recommendations are suggested:

#### **Nurse Managers should:**

1. Determine barriers of innovation among staff nurses and ensure empowering factors in the workplace.

2. Give staff nurses the time and resources they need to pursue creative ideas, and support innovation as a job requirement.

3. Encourage teamwork among staff nurses.

4. Create a good work atmosphere to encourage nursing staff innovation.

5. Encourage creativity and new ideas among staff nurses by holding a competition among them to choose the best nurse who demonstrates innovative behavior.

6. Provide opportunities for training and skill development to enhance the levels of innovation and involvement of those skills at the performance appraisals for all nursing staff.

7. Encourage staff nurses to be proactive in the workplace.

8. Conduct training program about workforce agility

9. Enable knowledge and new ideas to be shared

#### **Future researches are suggested**

1. Explore factors affecting nurses, workforce agility.

2. Explore the relationship between management strategies focused on agility development and workforce agility among nursing staff.

3. Explore the relationship between work characteristics and workforce agility among nursing staff.

4. Identify strategies that enhance innovative work behavior among nurses

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