Perception of nursing personnel about virtual team leadership

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Abstract

Background: Virtual team leadership plays a significant role in the nursing profession, especially in today's technologically advanced healthcare landscape. With the increasing adoption of telemedicine and digital health platforms, nurses are frequently collaborating and working together in virtual teams **Aim of the study:** To assess the perception of nursing personnel about virtual team leadership. **Research Design:** A descriptive research design was used to conduct this study. **Setting:** The study was conducted at um Al-Masryeen Hospital located in Giza District, Giza Governorate**. Subjects**: A convenience sample of all avaliable nursing personnel (100) working at the previously mentioned setting. **Tools of Data Collection:** One tool was used for data collection included; virtual team leadership scale. **Results:** The study results revealed that more than four-fifths (88%) of studied nurses have a higher perception about virtual team leadership. But they have the highest perception percentage (93%) about interactivity dimension with a total $\bar{x}$ + SD= **26.38** + **3.20** and the lowest perception percentage (69%) about human relations with a total $\bar{x}$ + SD= **24.57** + **3.73 Conclusion**: Almost of studied nurses had high level of perception about virtual team leadership. And with a highly statistically significant difference p=0.000[**] **Recommendations:** Provide resources for establishing virtual environments such as digital communication tools in supporting nursing personnel, train nursing personnel about how to deal with advanced technology and virtuality and implement remote work outside traditional offices.

Keywords: Nursing personnel, Virtual leadership,Virtual team.

Introduction

The recent trend is more work moving to a virtual environment, with people working together as teams while globally dispersed. Virtual leadership arises from the need to use technology to communicate internally and externally, during the working day and in real-time, with collaborators as pertaining to different organizations. Many organizations already carry out virtual transactions from anywhere through the Internet, which generates a capable global communications network to promote virtual leadership. (*Lordan & Jaffe, 2020).*

Virtual leadership, also called e-leadership or distance leadership, can replace traditional leadership due to advancements in technology. For instance, a virtual leader directs their virtual team from a distance to achieve the set goal and objectives of the organization *(Kohntopp, 2019)*. Virtual leadership is a form of leadership in which teams are managed from a remote working environment. Furthermore, virtual leadership is a process that aims to guide behaviors towards fixed shared goals but simultaneously uses information and communication technology *(Ayalew & Ayenew, 2022).*

In virtual leadership, work teams exchange information and are monitored by a leader through the screen. For this type of work, advanced technology tools are used to involve the Internet, videoconferences, teleconferences, emails, information search engines, text messages, smart apps, blogs, shared documents, and social networks, among others. E-leadership represents the emergence of leadership in the e-environment context where the work is mediated by information technologies *(Cordova et al.,2022).*

Virtual team leadership has been defined as leading remotely working teams. In addition to these terms, expressions such as nurse leadership in eHealth have been used. The existence of several inconsistently defined concepts and meanings relating to leadership in digital health services makes it difficult to hold dialogs about the phenomenon. It is essential to understand the informatics competencies of nurse leaders because nurse leaders play key roles in all issues relating to technology in health services*(Cordova-Buiza, et al., 2022).* E-Leadership is a modern leadership style that uses digital technologies to manage members of an organization to achieve goals *(Even, 2021).*

Effective virtual team leadership also requires the ability to build trust and manage conflict in a virtual setting. Leaders must be able to establish a sense of trust among team members who may never meet face-to-face, and proactively manage conflicts that can arise from differences in communication styles or cultural norms. E-leadership is defined as a "social influence process mediated by Advanced Information Technology (AIT) to produce a change in feelings, thinking, behavior, and/or performance with individuals, groups, and/or organizations." *(Garcia, 2020)*

Virtual team leadership plays a significant role in the nursing profession, especially in today's technologically advanced healthcare landscape. With the increasing adoption of telemedicine and digital health platforms, nurses are frequently collaborating and working together in virtual teams. Effective virtual team leadership is crucial for nurses' managers. *(Bagga., et al 2023)*. Virtual team leaders in nursing facilitate communication and coordination among team members who may be geographically dispersed. They use various online tools and platforms to ensure that vital patient information, updates, and care plans are easily accessible to all team members, promoting efficiency and timely decision-making. In addition to that, virtual team leaders play a pivotal role in fostering a sense of camaraderie and collaboration among remote nursing professionals. They encourage team members to share ideas, knowledge, and best practices, leading to improved patient outcomes and the delivery of high-quality care across diverse settings. *(Laukka et al., 2023)*

Significance of the study:

It was observed in study setting hospital the team leadership activity consuming time and effect on leaders and staff nurses' performance, so the remote working is well documented in terms of efficiency, cost-effectiveness, and flexibility. E-leadership is important to well-developed understanding to adapt new framework conditions in a digitalized, globalized and highly flexible working environment. The leaders manage their teams across spatial distance, either within time zones or across different time zones. E-Leadership is a combined framework that encompasses both leadership and technology *(Kiljunen, 2022)*

According to the study in the United States. Seventy percent of leaders were working remotely from home or co-working spaces across the globe *(Meluso, 2020)* .64% of organizations say that the shift to virtual team work will likely be a permanent one, 75% of virtual team leadership worldwide say that remote collaboration allowed them to be more effective in their jobs , 80% of work policies had shifted to virtual forms, Remote working according to employees are better work-life balance, reduced stress, reduced absences, improved morale, and fewer sick days, 88% of corporate employees say that virtual team leadership are critical to their productivity *(Hyde, 2021)*.

The awareness of virtual team leadership is essential for building a well-developed understanding of this modern style of leadership. The team members must have a clear understanding of what is expected of them. So, the researcher was interested in conducting this study to assess nurses' perceptions about virtual.

Aim of the current study:

This study aims to assess the perception of nursing personnel about virtual team leadership.

Research Question:

What is the perception of nurses about virtual team leadership?

Operational definition as a title (Nursing personnel) means that all nursing work at the hospital at any position (nursing leaders, supervisors, head nurses and staff nurses)

I- Technical Item:

The technical item includes research design, setting, subject, and tools for data collection.

Research Design:

A descriptive research design was utilized to conduct the study.

Research Setting:

The study was conducted in all departments at um Al-Masryeen Hospital which is located in Giza District, Giza Governorate. The um Al-Masryeen Hospital, with a capacity of 185 beds, the hospital is providing its services for many patients in Giza Governorate. And considered the main hospital to receive road accident victims in Giza Governorate and its suburbs.
The hospital consists of three buildings, the first building and consider the biggest building or called the public building consisting of 5 floors (1st floor includes obstetric emergency+2nd floor consisting of burns and plastic surgery +3rd floor consisting of surgical department and accidents department +4th floor consisting of urological department + 5th floor and last one there is economic inpatient department).
The second building called (pediatric building) there is one floor consisting of pediatric inpatient department + pediatric intensive care unit finally in other side premature department.
The third building consists of four floors (the 1st floor consists of emergency and in other side adult intensive care unit+2nd floor includes medical department+3rd floor there is orthopedic operation+4th floor inpatient orthopedic department).
The additional services (dialysis department, radiology department, catheterization unit, sterilization unit, and finally 24 outpatient clinics)

Research Subjects

A convenience sample of nurses who were available in the previously mentioned hospital at the time of data collection. the total number of nurses who were available and agreed to participate in the study were (n=100) And who have at least one year of experience in the workplace.

The tool is virtual team leadership scale which is consist of two parts:

Part 1: Personal characteristics:

This scale included personal data of nurses (Age, Gender, Experience, Marital status, educational level, position, Hospital department ...etc.).

Part 2: Virtual Team Leadership Scale:

It was adapted from **(Gencer, and Akkucuk, 2017... etc)** and be used to assess virtual leadership team perception, it includes (29) items verified on:6 dimensions as: Managerial Qualities (8 items), Interactivity (6 items), Human Relations (6 items), Personal Traits (3 items), Rewards (3 items), Flexibility (3 items).

Scoring system

1) Perception regarding Virtual team leadership scale.

This tool consisted of (29 items) with a total grade (145). This instrument uses a 5-point Likert scale from 1 (strongly disagree) to 5 strongly agree. while in negative item was from 5 (strongly disagree) to 1 strongly agree. The grades for each item were summed up and then converted into a percent score**.**

level of **perception regarding Virtual team leadership** was classified in to three levels.

- The first one is **poor level** that's computed if total score is equal or less than **50%.**
- The second level is **a moderate level** that's computed if the total score is more than **51 %** to equal or less than **75%.**
- The third one is **good level** that is computed if total score is more than **75 %** *(Selvaraj. K, 2021)*.

Validity of the tools:

Reliability of the tools:

Cronbach's alpha is commonly used as a measure of the internal consistency (reliability). The coefficients normally range between 0 and 1. The closer it is to 1.0, the greater internal consistency of the items in the scale. Total Cronbach's alpha of virtual team leadership scale =(0.915).

Ethical Considerations:

The research approval was obtained from the scientific research ethical committee in faculty of nursing, Helwan University before starting the study. In addition, an approval was obtained from the nursing director of um Al-Masryeen Hospital. Informed consent will be sought and obtained from each participating subject prior to data collection, they were informed about the purpose and expected outcomes of the study and they should be assured that, the study is harmless, and their participation is voluntary, and they had the right to withdrawal from the study at time without any reason. They also were assured that anonymity and confidentiality were guaranteed, and the gathered data were used for research purposes only. Ethics, values, cultures, and beliefs were respected.

II. Operational Design:

It includes the preparatory phase, pilot study and fieldwork.

Preparatory phase:

It included reviewing the most current national, and international related literature and theoretical knowledge from various aspects of the study through using books, articles, the internet, periodicals, and journals to develop tools for data collection.

Pilot study:

After reviewing of the tools by the experts, the researcher conducted a pilot study to ascertain the clarity, relevance, and applicability of the study tools and to determine obstacles that may be encountered during data collection. It also helped to estimate the time needed to fill out questionnaire tools. The pilot study was carried out on (10%) of the total sample size equal (10) nurses, rephrasing of some questions was done to ensure clarity of the questions and to be easily understood by nurses. However, it helps in estimation of the time needed to collect data and determine the obstacles. Accordingly, the tools were modified, and the nurses participating in it were included in the study sample.

Field work:

Data collected within 2 months started at the end of January 2023 and completed by the end of March 2023. After obtaining all official permissions the researcher met nursing director to explain the aim of the study to gain the approval of data collection, the researcher determined the suitable time to collect the data and confirmed the days and times to assess the perception of nursing personnel toward virtual team leadership. Before data collection, the researcher introduced herself to the nurses, explained aim of the study and informed them their information will be treated confidentially, so, the researcher used codes in the scale sheets because of their worry about their answers. Then, the investigator obtained verbal consent to participate in the study.

The researcher assessed the perception of nursing personnel toward virtual team leadership using the study tools (virtual team leadership scale), The researcher visited the setting 2 days per week for 3-4 hours /day in the morning and afternoon shifts to collect the data. The nurses filled in the scale in presence of the researcher to explain all unclear questions and the time required for each nurse to fill the scale is about 10 to 15 minutes. The researcher checked the completion of each filled sheet to ensure the absence of any missing data.

III. Administrative design:

To carry out the study, official letters issued from the faculty of nursing - Helwan University explaining the aim of the study to the director of um Al-Masryeen Hospital either medical or nursing for obtaining the permission for data collection. Individual oral consent was also obtained from each nurse who participated in the study.

IV-Statistical design:

Data entry and analysis were performed using SPSS statistical package version 26. Categorical variables were expressed as number and percentage while continuous variables were expressed as (mean ±SD). For comparison of categorical data, the χ^2 -test was performed. The fisher exact test was used with small, expected numbers. Comparison of quantitative variables between the study groups was carried out using the

student t-test for independent samples to compare two groups when normally distributed. Pearson correlation was done to measure correlation between quantitative variables.

For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value> 0.05 was considered not significant.

Results

**Table (1): Frequency distribution of personal characteristics among the studied nursing personnel (n= 100)**

Items		No.	%
Gender	▪ Female	91	**91.0**
	▪ Male	9	9.0
	▪ **Male to Female Ratio**	**0.1:1**	
Age (year)	▪ 20 - < 30	64	**64.0**
	▪ 30 - < 40	36	36.0
	▪ **Mean ± SD**	**29.60 ± 5.31**	
Marital status	▪ Single	7	7.0
	▪ Married	83	**83.0**
	▪ Divorced	5	5.0
	▪ Widow	5	5.0
Position	▪ Staff nurse	64	**64.0**
	▪ Head nurse	30	30.0
	▪ Supervisor of nursing	5	5.0
	▪ Director	1	1.0
Educational level	▪ Secondary school	58	**58.0**
	▪ Technical institute of nursing	27	27.0
	▪ Bachelor's degree of nursing	15	15.0
Years of Experience	▪ 1< 5	21	21.0
	▪ 5 < 10	22	22.0
	▪ ≥ 10	57	**57.0**
	▪ **Mean ± SD**	**10.53 ± 4.76**	
Department	▪ Inpatient	50	**50.0**
	▪ Outpatient	7	7.0
	▪ ICU	21	21.0
	▪ OR	6	6.0
	▪ ER	11	11.0
	▪ Dialysis	5	5.0

Table (1) shows in related to gender it was (91%) of them were female with a male to female ratio is 0.1:1. Considering age, (64%) of the nurses of the studied nursing personal age was ranged 20 - < 30 years old with Mean ± SD = 29.60 ± 5.31. Regarding marital status, 83% of them were married. Regarding the position of the nursing personnel (64%) of them were staff nurses. Concerning educational level, (58%) of

them holding a certificate of Secondary school. Considering their experience, (57%) of them have been working in the nursing field for ≥ 10 years with Mean $\pm$ SD= 10.53 ± 4.76. Finally, regarding the departments, 50%) of the studied nursing personnel were working in the in-patient department while only (5% & 6%) worked in the dialysis and OR department.

Figure (1): Percentage distribution of the departments among the studied nursing personnel (n= 100)

Figure (1): shows that **(50%)** of the studied nursing personnel were working in the in-patient department while only **(5% & 6%)** worked in the dialysis and OR department.

	In-patients	Out-patient	ICU	OR	ER	Dialysis
Department	50	7	21	6	11	5
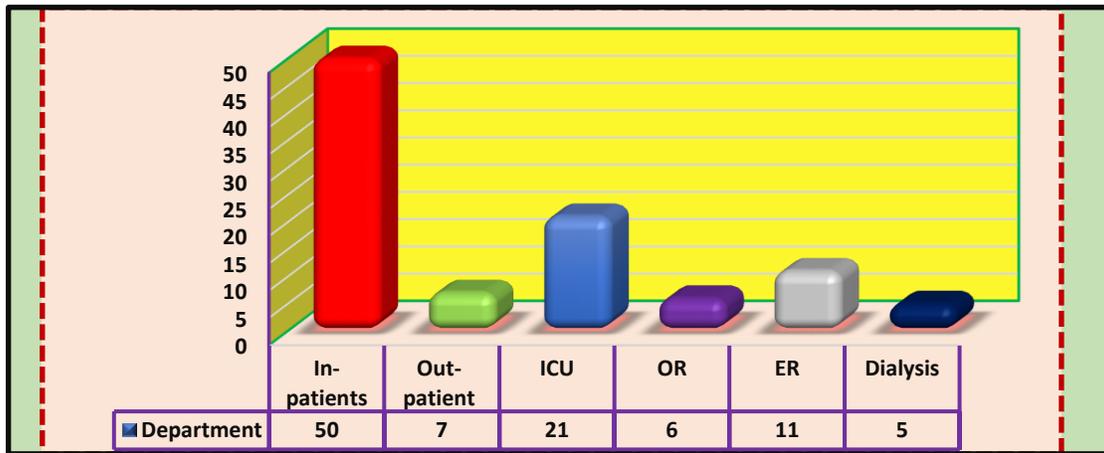
Table (2): Total mean score of perception regarding virtual team leadership dimension among the studied nursing personnel (n= 100)

Virtual Team Leadership Dimension		N	%	Min	Max	$\overline{x}$	SD	F test	P value
▪ Managerial qualities	Low	2	2.0	14	16	15.0	1.41		
	Moderate	16	16.0	23	30	28.31	2.33		
	High	82	82.0	31	40	36.29	2.95		
	Total	**100**	**100.0**	**14**	**40**	**34.59**	**4.95**	**100.1**	**0.000****
▪ Interactivity	Low	1	1.0	14	14	14.0	0.0		
	Moderate	6	6.0	18	22	19.50	1.37		
	High	93	93.0	23	30	26.96	2.41		
	Total	**100**	**100.0**	**14**	**30**	**26.38**	**3.20**	**41.4**	**0.000****
▪ Human relations	Low	1	1.0	15	15	15.0	0.0		
	Moderate	30	30.0	16	22	20.53	1.47		

	High	69	69.0	23	30	26.46	2.68		
	Total	**100**	**100.0**	**15**	**30**	**24.57**	**3.73**	**72.65**	**0.000****
▪ Personal traits	Low	0	0.0	0	0	0	0		
	Moderate	15	15.0	9	11	10.40	0.828		
	High	85	85.0	12	15	13.65	1.16		
	Total	**100**	**100.0**	**9**	**15**	**13.16**	**1.61**	**107.0**	**0.000****
▪ Rewards	Low	0	0.0	0	0	0	0		
	Moderate	27	27.0	8	11	10.19	1.14		
	High	73	73.0	12	15	13.63	1.12		
	Total	**100**	**100.0**	**8**	**15**	**12.70**	**1.90**	**183.2**	**0.000****
▪ Flexibility	Low	1	1.0	7	7	7.0	0.0		
	Moderate	24	24.0	8	11	10.17	0.816		
	High	75	75.0	12	15	13.61	1.24		
	Total	**100**	**100.0**	**7**	**15**	**12.72**	**1.95**	**93.5**	**0.000****
▪ **Total**	Low	0	0.0	0	0	0	0		
	Moderate	12	12.0	81	108	100.9	7.25		
	High	88	88.0	110	145	127.2	10.78		
	Total	**100**	**100.0**	**81**	**145**	**124.1**	**13.49**	**67.26**	**0.000****

*Significant $p \leq 0.05$ F Test: ANOVA test   **Highly significant $p \leq 0.01$

Table (2) Shows that all studied nurses have a higher perception about virtual team leadership. But they have the highest perception percentage (93%) about interactivity dimension with a total $\bar{x}$ + SD= **26.38 + 3.20** followed by (85%) about personal traits dimension with a total $\bar{x}$ + SD= **13.16 + 1.61** and the lowest perception percentage (69%) about human relations with a total $\bar{x}$ + SD= **24.57 + 3.73.** So, **according to the total perception regarding virtual team leadership (88%) of studied nursing personnel** with a total $\bar{x}$ + SD= 124.1 + 13.49 (total score is = 145) with a highly statistically significant difference p=0.000**

Table (3): Relation between total level of perception regarding virtual team leadership and personal characteristics among the studied nursing personnel (n= 100)

Items		Z	Level of virtual team leadership				χ^2	P-Value
			Moderate		Good			
			12	12.0	88	88.0		
			N	%	N	%		
Gender	▪ Female	91	10	10.0	81	81.0	0.979	0.297

							F	
	▪ Male	9	2	2.0	7	7.0		
Age (year)	▪ 20 - < 30	64	12	12.0	52	52.0	7.67	0.004**
	▪ 30 - < 40	36	0	0.0	36	36.0	F	
Marital status	▪ Single	7	1	1.0	6	6.0	4.53	0.209
	▪ Married	83	9	9.0	74	74.0		
	▪ Divorced	5	2	2.0	3	3.0		
	▪ Widow	5	0	0.0	5	5.0		
Position	▪ Staff nurse	64	12	12.0	52	52.0	7.67	0.053*
	▪ Head nurse	30	0	0.0	30	30.0		
	▪ Supervisor	5	0	0.0	5	5.0		
	▪ Director	1	0	0.0	1	1.0		
Educational level	▪ Secondary	58	11	11.0	47	47.0	6.47	0.039*
	▪ Technical	27	1	1.0	26	26.0		
	▪ Bachelor	15	0	0.0	15	15.0		
Years of Experience	▪ 1< 5	21	9	9.0	12	12.0	24.7	0.000**
	▪ 5 < 10	22	2	2.0	20	20.0		
	▪ ≥ 10	57	1	1.0	56	56.0		
Department	▪ Inpatient	50	11	11.0	39	39.0	10.63	0.059*
	▪ Outpatient	7	1	1.0	6	6.0		
	▪ ICU	21	0	0.0	21	21.0		
	▪ OR	6	0	0.0	6	6.0		
	▪ ER	11	0	0.0	11	11.0		
	▪ Dialysis	5	0	0.0	5	5.0		

*Significant $p \leq 0.05$ **Highly significant $p \leq 0.01$ F: Fisher Exact Test

Table (3): Represents that, there was a statistically significant relation between **personal characteristics** (age, position, educational level, years of experience and department) and total level of **perception regarding virtual team leadership** among the studied nursing personnel.

Table (4): Relation between total level of perception regarding virtual team leadership and personal characteristics among the studied nursing personnel (n= 100)

Items	N	level of virtual team leadership						χ^2	P-Value
		Low		Moderate		High			
		0	0.0	12	12.0	88	88.0		

|			N	%	N	%	N	%		
Gender	▪ Female	91	0	0.0	10	10.0	81	81.0	0.979 **F**	0.297
	▪ Male	9	0	0.0	2	2.0	7	7.0		
Age (year)	▪ 20 - < 30	64	0	0.0	12	12.0	52	52.0	7.67 **F**	0.004**
	▪ 30 - < 40	36	0	0.0	0	0.0	36	36.0		
Marital status	▪ Single	7	0	0.0	1	1.0	6	6.0	4.53	0.209
	▪ Married	83	0	0.0	9	9.0	74	74.0		
	▪ Divorced	5	0	0.0	2	2.0	3	3.0		
	▪ Widow	5	0	0.0	0	0.0	5	5.0		
Position	▪ Staff nurse	64	0	0.0	12	12.0	52	52.0	7.67	0.053*
	▪ Head nurse	30	0	0.0	0	0.0	30	30.0		
	▪ Supervisor	5	0	0.0	0	0.0	5	5.0		
	▪ Director	1	0	0.0	0	0.0	1	1.0		
Educational level	▪ Secondary	58	0	0.0	11	11.0	47	47.0	6.47	0.039*
	▪ Technical	27	0	0.0	1	1.0	26	26.0		
	▪ Bachelor	15	0	0.0	0	0.0	15	15.0		
Years of Experience	▪ 1< 5	21	0	0.0	9	9.0	12	12.0	24.7	0.000**
	▪ 5 < 10	22	0	0.0	2	2.0	20	20.0		
	▪ ≥ 10	57	0	0.0	1	1.0	56	56.0		
Department	▪ Inpatient	50	0	0.0	11	11.0	39	39.0	10.63	0.059*
	▪ Outpatient	7	0	0.0	1	1.0	6	6.0		
	▪ ICU	21	0	0.0	0	0.0	21	21.0		
	▪ OR	6	0	0.0	0	0.0	6	6.0		
	▪ ER	11	0	0.0	0	0.0	11	11.0		
	▪ Dialysis	5	0	0.0	0	0.0	5	5.0		

*Significant $p \leq 0.05$ **Highly significant $p \leq 0.01$ F: Fisher Exact Test

Table (4): Represents that, there was a statistically significant relation between **personal characteristics** (age, position, educational level, years of experience and department) and total level of **perception regarding virtual team leadership** among the studied nursing personnel.

Figure (2): Percentage distribution of level of perception regarding virtual team leadership among the studied nursing personnel (n= 100)

Figure (2) Illustrates that more than four-fifths (**88%**) of the studied nursing personnel have a high level of perception regarding virtual team leadership. In addition to the presence of a highly statistically significant difference, at P = 0.000.
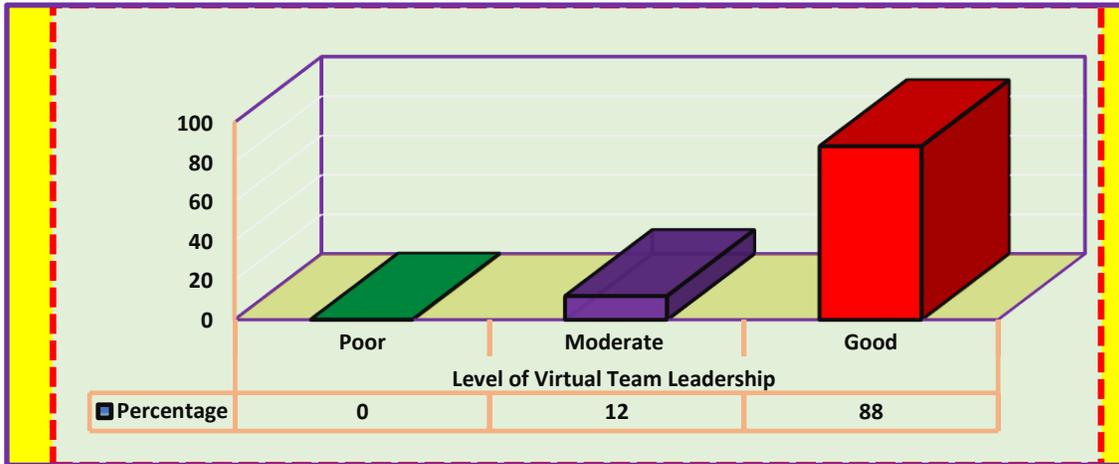
$\chi 2=57.\ 7,\ P=0.000**$

Figure (3): Scatter dot correlation between total score of perception regarding virtual team leadership and   it's dimension among the studied nursing personal (n= 100)

Figure (3) scatter dot correlation represents that, there was a highly statistically significant positive strong correlation among total perception regarding **Virtual team leadership and its dimension** (Managerial qualities, interactivity, human relations, personal traits, reward, flexibility) **among the studied nursing personal**, at r ranged from 0.941 to 0.986 and **P = 0.00.**
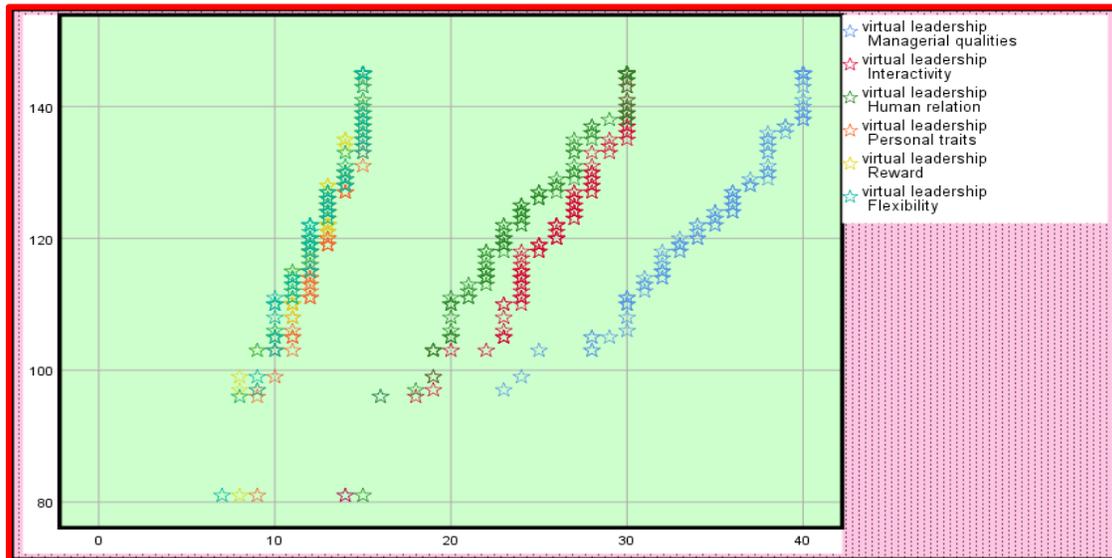
Discussion

Regarding perception of virtual team leadership dimension among the studied nursing personnel, the finding of the present study Shows that all studied nurses have a higher perception about virtual team leadership. But almost all of studied nurses have a higher perception about interactivity dimension, followed by more than four-fifth of studied nurses have a higher perception about personal traits dimension.

This result was supported by (*Mahmoud and Shaheen, 2022)* indicated that more than two thirds of the studied nursing personnel were high level Staff communication. And these results at the same line with study that conducted by *(Newman et al., 2020).* entitled "Virtual Team Leader Communication: Employee Perception and Organizational Reality "indicated that most of the studied nursing personnel have higher perception about communication and interactivity.

These results were in the same line with (*Saleh and Eldeep, 2022)* entitled "Effect of Talent Management Training Program for Nursing Managers on Nurses Work Effectiveness "revealed that more than two third of studied nurses were communicate effectively. On the other hand, these results were similar with *(Dinh et al., 2021).* They studied " Developing team trust: Leader insights for virtual settings". Indicated that more than half of studied virtual leader that emphasized that virtual work on professional and human relationships cannot be understated, particularly in terms of our engagement with remote collaboration.

Relating to Level of perception regarding virtual team leadership, the finding of the present study revealed that more than four-fifths of the studied nursing personnel have a higher level of perception regarding virtual team leadership.

This result was the same line with *(Mahmoud and Shaheen, 2022)* who studied "Influence of Head Nurses' Paternalistic Leadership on Hospital Cynicism and Job Performance among Intensive Care Nurses"and clarified that half of the studied nursing personal had a high level of perception regarding virtual team leadership. On the other hand, the finding was in the same line with *(Bizilj et al., 2021)* entitled **"** Perceived Efficacy of Virtual Leadership in the Crisis of the COVID-19 Pandemic"they reported that most of the studied employees have a higher perception regarding virtual leadership.

These results were similar with *(Elyousfi et al., 2021).* They studied **"** Impact of e-leadership and team dynamics on virtual team performance in a public organization. " They reported that presence of a highly statistically significant regarding perception of virtual leadership. Conversely, this result was dissimilar with *(Efimov et al., 2022).* They studied " Virtual leadership in relation to employees' mental health, job satisfaction and perceptions of isolation: A scoping review." They reported that a third of studied employees have perception regarding virtual team leadership. Conversely, these results were dissimilar *(Kuang and Sumara, 2021).* They studied "Perception of Leadership in Virtual Teams. " They found less than half of studied personnel the leaders need to be aware and vigilant about virtual teams and leadership.

Regarding to relation between total level of perception with and personal characteristics, there was a statistically significant relation between personal characteristics (age, position, educational level, years of experience and department) and total level of perception regarding virtual team leadership among the studied nursing personnel.

This result may be due to that males behave in competitive and accomplishment-oriented manner, whereas females behave in a developmental and socially oriented manner, and supervisors who have more experience easily adapt to work conditions. This finding was in the same line with (*Mahran et al., 2022)* "reveals that there were highly statistically significant differences between ethical leadership and sex, years of experience in nursing, experience in the current working place, and working place (P=0.001).

On the contrary, this result was incompatible with the study by (*Wibawa and Takahashi, 2021),* titled "The effect of ethical leadership on work engagement and workaholism: examining self-efficacy as a moderator" which found that sex, marital status, and workplace experience showed insignificant results.

Conclusion

On the light of the findings of the current study, it can be concluded that:

The majority of the studied nursing personnel have a high level of perception regarding virtual team leadership. In addition to the presence of a highly statistically significant difference, at P = 0.000. there was a highly statistically significant positive strong correlation among total perception regarding **Virtual team leadership and its dimension** (Managerial qualities, interactivity, human relations, personal traits, reward, flexibility) **among the studied nursing personal**, at ranged from 0.941 to 0.986 and **P = 0.000.**

Acknowledgment

Recommendations

Based on the current study the following recommendations suggested that:

At the organizational level.

- Train nursing personnel about how to deal with advanced technology and virtuality.
- Provide resources for establishing virtual environments such as digital communication tools in supporting nursing personnel.
- Conduct in-depth case studies of healthcare organizations that have implemented virtual team leadership in nursing units.
- Hold concept of flexibility in almost of managerial activities.
- Design training programs for virtual team leaders' competencies.
- Implement remote work outside traditional offices.
- Reflect individual achievement in their salary.

At personal level

- Conduct self-learning continuously to improve staff performance, skills, and creative thinking for using technology.
- Build team Cohesion and conflict resolution practice.
- Train on good division of work into small groups.
- Advocate for virtual nursing team and support them.
- Provide complementary human relations between staff nurses and leaders.

At further research

- Replicate the study on many of hospitals with large sample sizes for generalize the study findings.
- Conduct this study on bachelor's degree nurses as. much as possible.
- Investigate the relation between leadership styles and virtual leadership.
- Examine challenges of virtual team leadership practices in nursing field
- Determine the relationship between virtual leadership and job satisfaction.
- Assess the relationship between virtual leadership and turnover.
- Clarify the effect of virtual leadership in reducing job stress.
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