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The effects of hierarchical relationship on well-being of surgical team members in operating theaters

Prospective cohort study

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Abstract

Although there are many studies about wellbeing on healthcare professionals, the relationship between hierarchy and well-being has not been studied much. In this study, we focused on surgical branch professionals (anesthesiologists, surgeons, nurses) as organized in a strict hierarchy. We explored the association between the position within the organizational hierarchy in operating theaters and well-being. Data were collected in 2 parts as cross-sectional (baseline) and daily surveys (for 15 days). A total of 226 participants participated in the baseline study and 156 participants in the daily surveys. How hierarchical positions, in-group identification and personality traits were related to the well-being and experiences of surgical team members were investigated. System justification, social dominance orientation, and personality theories were used to investigate personality traits. Emotional stability and identification with other healthcare professionals were positively associated with positive experience and well-being. Daily hierarchical relationship when the team members were in a superior position was positively associated with that day's well-being, positive experience, enjoying working, and motivation to work on the following day. Conversely, the negative effects of daily hierarchical relationships on outcomes were not seen when the participants were in a subordinate position. Our findings were parallel to the literature that perceived autonomy in the workplace has positive impacts on the well-being. Furthermore, we found that in-group identification can protect surgical branch professionals from the adverse effects of the organizational hierarchy. We suppose our findings can contribute to the literature to evaluate organizational structure of operating theaters.

Abbreviations: COVID-19 = coronavirus disease, OT = operating theatres, STM = surgical team members, WCQ = Work Climate Questionnaire, WHO-5 = World Health Organization-5 Well-Being Index.

Keywords: anesthesiologists, health care team, hierarchy, operating rooms, social, surgeons

1. Introduction

Hierarchy is one of the most important features of social life that deeply shapes the human psychology.[1] Studies show significant relationships between happiness, health, and longevity, and being at the bottom or top of the hierarchy.[2] A sense of power and rank in a social group is associated with well-being.[3] However, most of these research focus on the subjective or objective socioeconomic status or social class as a measure of power and rank in the hierarchy, and to our knowledge, there is little evidence for the link between wellbeing and rank of individuals in a small group (in group).[3] To investigate the association between individuals' rank in a hierarchy and their wellbeing, we thought it would be best to observe a group that has a natural hierarchical organization. Healthcare providers are governed by formal rules and hierarchies, often with separate offices and departments dedicated to various tasks. Operating theatres (OT), which are a good example of this definition, have a natural hierarchical organizational structure. Surgical team members (STM) in OT are large groups of mostly anesthetists, surgeons, and nurses.

There is a growing body of literature that recognizes the importance of the well-being of healthcare professionals. Stress, burnout, depression and work satisfaction are the

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The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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main reasons that negatively affect the well-being of healthcare workers.[4] Although there are many studies on the well-being of healthcare professionals in literature,[5] there is a lack of data on the effect of relationship models and especially hierarchy on this well-being. Therefore, it is important to ask questions about how the hierarchy affects the well-being of health professionals working with a hierarchical relationship structure.

In this study, we explored how the hierarchical organization of the OT and how the different positions of STM were related to well-being and workplace experiences. We suspected that identification, personality traits, justification of the system, and social dominance orientation would contribute to this relationship.

2. Materials and methods

After having the ethical approval, the study was performed in 2 online surveys (a baseline survey and daily diaries) via the Qualtrics Survey Tool between May and June 2020. The first survey (cross-sectional baseline) was distributed to 288 healthcare professionals on social media and professional communication listservs (e.g., Facebook groups, mail groups, etc). A total of 226 participants were completed the baseline survey. One week after the baseline survey, the second survey (daily diaries) link was sent to these 226 participants every day at 16.50 for 15 days. A total of 156 participants who completed (at least) the half of the 15 days included in the daily diaries dataset. According to Bolger and colleagues, 1650 observations (by N*time) would achieve 90% power to detect a small effect size (Cohen d = 0.28) in daily diary designs.[6] To project this simulation to our study design, we need 118 participants for daily diaries. This study was conducted in accordance with the Declaration of Helsinki. Ethical approval for this study was provided by the Baskent University, Social Science and Humanities Scientific Research and Publication Ethics Committee, Ankara, Turkey (Chairperson Prof M.A. Varoğlu) on April 27, 2020. This study is open to public access in accordance with Open Science principles. The preregistration link of the study is https://osf.io/fs35d.

2.1. Measures

The primary outcome variables of the study were the baseline well-being, positive and negative experiences scores of the participants. In addition to these, enjoyment working in the workplace, and the motivation to go working the next day after were the primary outcomes of the daily diaries.

2.1.1. Baseline surveys. In baseline data, we explored global associations of how healthcare professionals evaluate the organization and hierarchy of their workplace (measured by their social dominance orientation, justification of their workplace system, evaluation of their superordinate, and their perceived status in the workplace hierarchy), how they identified themselves with other healthcare professionals and their personality traits with their well-being and positive and negative experience in the workplace. The first wave of baseline surveys included demographics, *Work Climate Questionnaire*,[7] *Social Dominance Orientation Scale*,[8] *Economic System Justification Scale*,[9] *Workplace System Justification Scale* (*adapted from*[10]), *one item subjective hierarchy question*, *5-item identification scale*,[11] *Ten – Item Personality Inventory Scale*,[12] *Scale of Positive and Negative Experience*,[13] and *World Health Organization-5 Well-Being Index*.[14]

2.1.2. Daily diaries. In the daily diary data, we explored the association between daily implementation of authority ranking rules in the workplace relationships and daily fluctuations in well-being, positive and negative experience, enjoyment working in the workplace, and the motivation to go working the next day after controlling their daily health status. The daily diaries included *Scale of Positive and Negative Experience*, *World Health Organization-5 Well-Being Index*, *one question on subjective health*, *one question on motivation to go to work the next day*, *one question on enjoying work that day*, and *2 questions for daily experiences of hierarchical relationships in the workplace*.

2.2. Statistical analyses

We explored the baseline dataset to investigate how subjected hierarchy levels, participants' evaluations about the workplace organizational system, and personality traits were related to well-being and affective states. First, we used Pearson Chi-Square, Kruskal–wallis and ANOVA tests to compare the demographic and study variables of the baseline data according to the STM subgroups. After that, we used bivariate correlations between study variables and multiple regression analyses to test these associations. In regression models, well-being and affective state were the outcome variables whereas the personality traits, participants' scores on social dominance orientation, workplace system justification, position in the workplace, Work Climate Questionnaire (WCQ), and identity were the independent variables.

Multilevel modeling (mixed-effects models with random intercepts) was performed to analyze the daily diary dataset for testing the thesis hypotheses. The daily responses of participants were level 1 units which were nested to the individuals. The daily experiences of hierarchy in the workplace and daily health scores were used as the level 1 independent variables and daily well-being, daily enjoyment from the work, and daily motivation to go work the next day were the level 1 dependent variable in separate models. To analyze the models, we adapted the SPSS syntax recommended by Bolger et al[15]

3. Results

3.1. Results of baseline survey

A total of 226 participants consisted of nurses–technicians (N = 49, 21.7%), anesthesiologists (N = 108, 47.8%), and surgeons (N = 69, 30.5%) were included in the study. Sixty-three percent of the participants were women (N = 144) and 36% were men (N = 82). The mean age was 37.35 (SD = 8.39) years. Nurses–technicians has more work year [(F(2223) = 10.990, $P < .001$], conscientiousness personality [(F(2223) = 7.566, $P = .001$], and more female participants [X^2(2,N = 226) = 60.841, $P < .001$)] compared to anesthesiologist and surgeons. There is no statistically significant difference in subjective hierarchy, well-being, positive experiences, and negative experience scores between groups. Descriptive statistics of variables and scales of are summarized in Table 1.

The bivariate correlation results between variables in baseline study are summarized in Table 2. Subjective hierarchy was positively correlated socio-economic status ($R = 0.77$), identification ($R = 0.40$), WCQ ($R = 0.33$), well-being ($R = 0.27$), extraversion ($R = 0.26$), workplace system justification ($R = 0.19$), and openness to experience ($R = 0.17$) ($P < .01$). Subjective hierarchy was negatively correlated with negative experiences (r = -0.16, $P < .05$). Well-being was positively correlated with positive experiences ($R = 0.70$), subjective heath status ($R = 0.46$), emotional stability ($R = 0.31$), identification ($R = 0.30$), extraversion ($R = 0.30$), subjective hierarchy ($R = 0.27$), socio-economic status ($R = 0.26$) openness to experience ($R = 0.20$), workplace system justification ($R = 0.19$), conscientiousness ($R = 0.18$) ($P < .01$). Well-being was negatively correlated with negative experiences (r = -0.63, $P < .01$). Positive experience was

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Table 1

Descriptive statistics of the baseline study variables.

Variables	Mean	*SD*	Minimum	Maximum	Skewness	Kurtosis
Age	37.35	8.39	23.00	67.00	.72	.53
Year	10.34	8.53	.50	43.00	1.22	1.47
Socio economic status	6.11	2.12	1.00	10.00	–.35	–.41
Well-being	3.47	.92	1.00	6.00	–.15	–.11
Positive experience	4.41	1.15	1.00	7.00	–.31	–.31
Negative experience	3.28	1.25	1.00	7.00	.58	–.45
Health	8.32	2.15	1.00	11.00	–.91	.60
Identity	5.03	1.36	1.00	7.00	–.65	.01
Subjective hierarchy	6.10	2.01	1.00	10.00	–.67	.01
Social dominance orientation	2.66	.99	1.00	5.80	.33	–.30
Work Climate Questionnaire	3.78	1.70	1.00	7.00	.13	–.99
Workplace system justify	2.90	1.29	1.00	6.50	.59	–.34
Openness	5.11	1.20	2.50	7.00	–.19	–.90
Agreeableness	5.30	1.11	2.00	7.00	–.34	–.52
Emotional stability	4.52	1.22	1.50	7.00	–.50	–.10
Conscientiousness	5.56	1.18	2.00	7.00	–.69	–.30
Extraversion	5.01	1.44	1.00	7.00	–.50	–.30

Table 2

Correlations for baseline study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Sex	1																
2. Age	–.06	1															
3. Year	–.09	.86**	1														
4. WHO	.02	.12	.18**	1													
5. PE	.02	.14*	.20**	.70**	1												
6. NE	–.04	–.16*	–.21**	–.62**	–.74**	1											
7. Heath	.04	.04	.06	.47**	.44**	–.43**	1										
8. Identity	.01	.28**	.26**	.30**	.28**	–.21**	.11	1									
9. SH	–.06	.45**	.42**	.27**	.15*	–.15*	.11	.40**	1								
10. SDO	.20**	–.19**	–.18**	–.00	.01	.00	.05	–.09	–.06	1							
11.WCQ	–.03	.28**	.28**	.16*	.26**	–.21**	.17*	.28**	.32**	.01	1						
12.WJS	–.01	.13*	.17*	.18**	.28**	–.20**	.19**	.20**	.18**	.20**	.53**	1					
13. Openness	–.10	.14*	.19**	.20**	.21**	–.20**	.07	.10	.18**	–.18**	.08	–.10	1				
14. Agreeableness	–.15*	.08	.10	.13	.25**	–.22**	.07	.19**	.13*	–.11	.10	.06	.30**	1			
15. ES	.09	.09	.10	.31**	.32**	–.42**	.21**	.19**	.17*	.03	.06	.09	.21**	.29**	1		
16. Conscientiousness	–.26**	.21**	.27**	.19**	.18**	–.18**	.04	.10	.12	–.18**	.10	–.03	.31**	.29**	.21**	1	
17. Extraversion	–.06	.18**	.23**	.30**	.31**	–.25**	.25**	.30**	.27**	–.10	.11	.06	.42**	.38**	.23**	.31**	1

ES = emotional stability, NE = negative experience, PE = positive experience, SDO = social dominance orientation, SH = subjective hierarchy, WCQ = Work Climate Questionnaire, WHO-5 = World Health Organization-5 Well Being Scale, WSJ = workplace system justification.

* $P < .05$.

** $P < .01$.

positively correlated with well-being ($R = 0.70$), subjective heath status ($R = 0.42$), emotional stability ($R = 0.32$), extraversion ($R = 0.31$), workplace system justification ($R = 0.30$), identification with other STM ($R = 0.29$), WCQ ($R = 0.28$), agreeableness ($R = 0.23$), openness to experiences ($R = 0.21$), socio-economic status ($R = 0.21$), and conscientiousness ($R = 0.17$) ($P < .01$). Negative experience was negatively correlated with subjective health (r = –0.43), emotional stability (r = –0.43), extraversion (r = –0.25), identity (r = –0.23), WCQ (r = –0.23), openness to experience (r = –0.23), workplace system justification (r = –0.21), agreeableness (r = –0.20), and conscientiousness (r = –0.19) ($P < .01$).

Three separate linear multiple regression analyses were conducted to test whether the independent variables were associated with well-being, positive and negative experiences at work (Table 3A–C). The results of regression analyses indicated that identification with healthcare professionals ($\beta = .158$, $P = .02$) and emotional stability as a personality trait ($\beta = .207$, $P = .002$) were significant indicators associated with the general well-being in the workplace. The results also revealed that positive experiences in the workplace positively related to the justification of the workplace system ($\beta = .197$, $P = .007$) as well as identification ($\beta = .141$, $P = .04$), emotional stability ($\beta = .202$, $P = .002$), and being extraverted ($\beta = .146$, $P = .04$). At last, higher emotional stability was associated with lower negative experiences in the workplace ($\beta = –.346$, $P = .007$).

3.2. Results of daily diaries

The daily diary dataset included 2340 observations collected from 156 participants (female = 104[67%], male = 52[33%]) in 15 successive days. The mean age of the participants was 37.58 (SD = 7.87). The work year was 10.61 (SD = 8.10). The results of the multilevel models with random intercepts and slopes analyses were summarized in Table 4A–E.

Participants reported 3.669 well-being scores on average in a typical day (the range was between 1 to 6). The association of implementing hierarchy on the relationships when the participants were in the superordinate situation with well-being was significant, ($\gamma 10 = 0.009$, $SE = 0.003$, $P = .01$, 95% *CI* [0.002,

Table 3

Linear regression of baseline variables.

A: Summary of linear regression of variables on well being

	Model						
Variable	***B***	***SE***	***ß***	**% 95 CI**		***P***	**Partial correlation**
Subjective hierarchy	.047	.032	.102	−.016	.109	.143	.100
WSJ	.085	.053	.119	−.019	.189	.111	.109
WCQ (admevo)	−.009	.041	.016	−.089	.072	.833	−.014
SDO	.021	.059	.023	−.096	.138	.723	.024
Identity	.107	.047	.158	.014	.199	.024	.153
Openness	.066	.054	.086	−.041	.172	.225	.083
Agreeableness	−.068	.057	−.082	−.180	.044	.231	−.082
Emotional stability	.156	.049	.207	.059	.253	.002	.211
Conscientiousness	.061	.052	.079	−.042	.164	.242	.080
Extraversion	.090	.047	.140	−.003	.182	.057	.129
R^2	.220						
Adjusted R^2	.184						
F	6.057						

B: Summary of linear regression of variables on positive experience

	Model						
Variable	***B***	***SE***	***ß***	**% 95 CI**		***P***	**Partial correlation**
Subjective hierarchy	−.040	.039	−.070	−.117	.036	.302	−.070
WSJ	.176	.065	.197	.048	.303	.007	.182
WCQ (admevo)	.061	.050	.090	−.037	.160	.223	.083
SDO	−.004	.073	−.004	−.148	.139	.951	−.004
Identity	.120	.058	.141	.006	.233	.039	.140
Openness	.086	.066	.089	−.045	.216	.198	.088
Agreeableness	.055	.070	.053	−.082	.192	.428	.054
Emotional stability	.192	.060	.202	.072	.311	.002	.211
Conscientiousness	.039	.064	.040	−.087	.165	.544	.041
Extraversion	.117	.057	.146	.004	.231	.043	.138
R^2	.256						
Adjusted R^2	.221						
F	7.383						

C: Summary of linear regression of variables on negative experience

	Model						
Variable	***B***	***SE***	***ß***	**% 95 CI**		***P***	**Partial correlation**
Subjective hierarchy	.015	.042	.025	-.068	.099	.719	.025
WSJ	−.100	.071	−.104	−.239	.039	.158	−.096
WCQ (admevo)	−.076	.055	−.104	−.184	.031	.164	−.095
SDO	4.632E − 5	.079	.000	−.156	.157	1.000	.000
Identity	−.053	.063	−.058	−.177	.070	.397	−.058
Openness	−.074	.072	−.071	−.216	.069	.309	−.069
Agreeableness	−.027	.076	−.024	−.176	.123	.725	−.024
Emotional stability	−.354	.066	−.346	−.484	−.224	.000	−.344
Conscientiousness	−.047	.070	−.044	−.184	.090	.502	−.046
Extraversion	−.072	.063	−.083	−.196	.051	.249	−.079
R^2	.242						
Adjusted R^2	.207						
F	6.878						

SDO = social dominance orientation, WCQ = Work Climate Questionnaire, WSJ = workplace system justification.

0.016]). However, the association of implementing hierarchy on the relationships when the participants were in the subordinate situation was nonsignificant, ($\gamma 10$ = 0.002, *SE* = 0.004, *P* = .528, *95% CI* [−0.005, 0.010]). Daily health status was positively associated with well-being, ($\gamma 10$ = 0.220, *SE* = 0.032, *P* <.001, *95% CI* [0.157, 0.282]).

Participants in a typical day reported a 4.508 positive and a 2.497 negative experience scores on average (between 1 to 7). Daily health status was positively associated with daily positive experience ($\gamma 10$ = 0.282, *SE* = 0.040, *P* < .001, *95% CI* [0.202, 0.362]) and negatively associated with daily negative experience ($\gamma 10$ = −0.240, *SE* = 0.033, *P* <.001, *95% CI* [−0.306, −0.173]).

The mean enjoyment from the work in a typical day was 53.01 (between 1 to 100). There was a positive association between implementing hierarchy as a superordinate and enjoyment from the work on average ($\gamma 10$ = 0.538, SE = 0.787, *P* <.001, 95% CI [0.378, 0.697]). The daily health status was positively related with the enjoyment from the work ($\gamma 10$ = 4.72, SE = 0.753, *P* <.001, 95% CI [2.683, 5.662]).

Mean motivation to go work the next day in a typical day was 44.84 (between 1 to 100). There was a positive association between implementing hierarchy as a superordinate and motivation to go work the next day on average ($\gamma 10$ = 0.550, SE = 0.101, *P* < .001, 95% CI [0.345, 0.755]). The daily reported health status was positively associated with the motivation to go work next day ($\gamma 10$ = 3.730, SE = 1.023, *P* < .001, 95% CI [1.707, 5.755]).

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Table 4

Multilevel model of daily associated with daily superordinate position, subordinate position, and health status.

A: Multilevel models with random intercepts and slopes to predict daily well-being

						CI_{95}	
Fixed effects		**Estimate**	***(SE)***	***t***	***P***	**Lower**	**Upper**
Intercept		3.669	.053	68.016	<.001	3563	3.776
Time		.072	.062	1.170	.243	−.049	.195
wCup		.009	.003	2.660	.010	.002	.016
bCup		.000	.000	.999	.318	−.000	.002
wCsub		.002	.003	.639	.528	−.005	.009
bCsub		−.005	.001	−5.403	<.001	−.007	−.003
wChealth		.219	.031	6.917	<.001	.156	.282
bChealth		.258	.011	23.320	<.001	.236	.280
						CI_{95}	
Random effects ([co-]variances)		**Estimate**	***(SE)***	***z***	***P***	**Lower**	**Upper**
Repeated measures	AR1 diagonal	.399	.016	24.530	<.001	.369	.433
	AR1 rho	.279	.030	9.227	<.001	.219	.337
Intercept + wCup + wCsub [subject = Pid]	UN (1,1)	.334	.068	4.883	<.001	.223	.449
	UN (2,1)	−.001	.001	−.949	.343	−.005	.001
	UN (2,2)	.000	.000				
	UN (3,1)	−.001	.001	−.879	.379	−.005	.002
	UN (3,2)	.000	.000	1.279	.201	−7.529	.000
	UN (3,3)	.000	.000	.948	.343	2.962	.001

B: Multilevel models with random intercepts and slopes to predict daily positive experience

						CI_{95}	
Fixed effects		**Estimate**	***(SE)***	***t***	***p***	**Lower**	**Upper**
Intercept		4.508	.068	65.828	<.001	4372	4.643
Time		.080	.083	.972	.332	−.0	.244
wCup		.007	.004	1.850	.087	−.001	.016
bCup		.005	.001	3.887	<.001	−.002	.007
wCsub		.001	.004	.426	.674	−.006	.010
bCsub		−.006	.001	−5.084	<.001	.009	−.004
wChealth		.282	.040	6.988	<.001	.202	.361
bChealth		.340	.015	22.465	<.001	.310	.370
						CI_{95}	
Random effects ([co-]variances)		**Estimate**	***(SE)***	***z***	***P***	**Lower**	**Upper**
Repeated measures	AR1 diagonal	.724	.029	24.734	<.001	.669	.784
	AR1 rho	.265	.030	8.610	<.001	.204	.324
Intercept + wCup + wCsub [subject = Pid]	UN (1,1)	.558	.147	3.715	<.001	.323	.928
	UN (2,1)	−.002	.004	−.559	.576	−.010	.005
	UN (2,2)	5.292E − 5	.000	.075	.940	2.426E	11545147.65
	UN (3,1)	−.000	.005	−.035	.972	−.010	.010
	UN (3,2)	7.042	.000	.301	.763	−.000	.000
	UN (3,3)	.000	.000	.529	.597	5.79E − 5	.009

C: Multilevel models with random intercepts and slopes to predict daily negative experience

					CI_{95}	
Fixed effects	**Estimate**	***(SE)***	***t***	***p***	**Lower**	**Upper**
Intercept	2.496	.058	42.655	<.001	2.381	2.612
Time	−.481	.081	−5.918	<.001	−.641	−.321
wCup	.001	.003	.395	.695	−.005	.008
bCup	−.004	.001	−3.763	<.001	−.007	−.002
wCsub	.007	.003	2.041	.052	−5.29E−5	.014
bCsub	.004	.001	3.631	<.001	.002	.007
wChealth	−.239	.033	−7.160	<.001	−.305	−.173
bChealth	−.266	.014	−18.623	<.001	−.295	−.238

(*Continued*)

Table 4

(*Continued*)

Random effects ([co-]variances)		Estimate	(SE)	z	P	CI_{95} Lower	CI_{95} Upper
Repeated mesures	AR1 diagonal	.665	.027	24.256	<.001	.613	.721
	AR1 rho	.301	.029	10.142	<.001	.242	.358
intercept + wCup + wCsub [subject = Pid]	UN (1,1)	.379	.084	4.485	<.001	.244	.586
	UN (2,1)	−.001	.002	−.422	.673	−.006	.004
	UN (2,2)	.000	.000	.505	.614	2.43E − 6	.005
	UN (3,1)	.003	.002	1.387	.165	−.001	.008
	UN (3,2)	1.80E − 5	.000	.167	.868	−.000	.000
	UN (3,3)	4.51E − 5	.000	.216	.829	5.22E − 9	.389

D: The multilevel models with random intercepts and slopes revealed that the mean enjoyment from the work in a typical day

Fixed effects	Estimate	(SE)	t	p	CI_{95} Lower	CI_{95} Upper
Intercept	53.007	1.285	41.240	<.001	50.466	55.548
Time	−4.362	1.582	−2.757	.006	−7.470	−1.254
wCup	.537	.078	6.830	<.001	.378	.696
bCup	.357	.027	12.928	<.001	.303	.412
wCsub	.170	.084	2.015	.052	−.001	.341
bCsub	.124	.028	4.364	<.001	.068	.180
wChealth	4.172	.752	5.542	<.001	2682	5.661
bChealth	4.224	.310	13.608	<.001	3.615	4.833

Random effects ([co-]variances)		Estimate	(SE)	z	P	CI_{95} Lower	CI_{95} Upper
Repeated measures	AR1 diagonal	288.380	11.086	26.011	<.001	267.449	310.949
	AR1 rho	.164	.031	5.196	<.001	.101	.225
Intercept + wCup + wCsub [subject = Pid]	UN (1,1)	159.049	41.567	3.826	<.001	95.295	265.455
	UN (2,1)	−.694	1.099	−.632	.528	−2.850	1.460
	UN (2,2)	.040	0.101	.401	.689	.000	5.425
	UN (3,1)	−1.496	1.289	−1.160	.246	−4.023	1.03
	UN (3,2)	.038	.071	.545	.586	−.100	.178
	UN (3,3)	.195	.130	1.495	.135	.052	.725

E: The multilevel models with random intercepts and slopes indicated that the estimated mean motivation to go work the next day in a typical day

Fixed effects	Estimate	(SE)	t	p	CI_{95} Lower	CI_{95} Upper
Intercept	44.845	1.767	25.379	<.001	41.352	48.337
Time	−2.630	1.758	−1.496	.135	−6.086	0.825
wCup	.549	.101	5.425	<.001	.345	.754
bCup	.094	.283	3.334	.001	.038	.150
wCsub	.194	.107	1.812	.079	−.023	.413
bCsub	−.022	.028	−.774	.439	−.078	.034
wChealth	3.730	1.022	3.647	<.001	1.706	5.754
bChealth	3.573	.317	11.266	<.001	2.951	4.195

Random effects ([co-]variances)		Estimate	(SE)	z	P	CI_{95} Lower	CI_{95} Upper
Repeated measures	AR1 diagonal	319.227	13.094	24.379	<.001	294.567	354.952
	AR1 rho	.270	.031	8.517	<.001	.207	.332
Intercept + wCup + wCsub [subject = Pid]	UN (1,1)	347.216	83.472	4.160	<.001	216.754	556.203
	UN (2,1)	−.387	1.736	−.223	.823	−3.790	3.014
	UN (2,2)	.039	.173	.226	.821	6.74E − 6	228.582
	UN (3,1)	−2.618	2.284	−1.146	.252	−7.094	1.858
	UN (3,2)	.014	.089	.160	.873	−.161	.190
	UN (3,3)	.249	.195	1.274	.203	.053	1.159

b = between, Chealth = health status, Csub = subordinate position, Cup = superordinate position, w = within.

4. Discussion

4.1. Baseline study

All societies are organized in some kind of hierarchy starting from their smaller units. Certain norms, rules, and motives have emerged to regulate the relationships between superordinates and subordinates in a hierarchy. In this study, we focused on STM to observe participants in their natural hierarchical work settings. We explored how the hierarchical organization of the OT and how the positions of STM were related to their

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well-being and workplace experiences. We took baseline and daily measurements from STM. In baseline study, there was no significant difference in subjective hierarchy, wellbeing, positive experience, and negative experience scores between anesthesiologists, surgeons, and nurse–technician subgroups. For this reason, we discussed wellbeing of the participants as a whole, regardless of their subgroups.

Justification of the workplace system was an independent factor for the positive experience scores of participants. This correlation between positive experience scores and higher justification for the way of the workplace is in line with the literature on system justification theory.[16] According to system justification theory, the legitimizing of the system has a psychological palliative effect on individuals.[17] Thus, disadvantaged people may tend to evaluate their system as fair, even if it conflicts with their financial interests.[18] We also found that social dominance orientation was not correlated with well-being, positive experience, and negative experience, but was positively associated with workplace system justification. This positive association was confirming the basic ideas of the social dominance theory.[19] That is, participants with high social dominance orientation scores more easily justify their workplace hierarchies.

WCQ measures participants' positive and negative evaluations about superiors and expectations of their superiors. Our analyses showed that the participants with a high level of well-being and positive experience scores also have relatively higher WCQ scores as in the literature.[20] Perceived autonomy support from supervisors is an indicator of a higher score in the WCQ.[7] Autonomous work motivation is positively associated with positive work behaviors and well-being.[21]

Emotional stability (as a personality trait) was an independent factor for well-being and lower negative experience in our baseline survey. Participants with higher traits in stabilizing their emotions had higher scores of well-being and lower scores of negative experiences. As personality is an important predictor for human attitudes and behavior, it is also a known predictor of well-being. In this regard, our findings were similar to previous studies.[22]

Finally, in baseline study, identification with healthcare professionals was an independent factor for positive experience and well-being. Surgical team members work together for long hours, share the same space during the day and wear the same type of uniform. All these help to create a sense of "us" by accelerating the identification among team members. We believe that the coronavirus disease (COVID-19) pandemic also brought healthcare professionals together in hospitals and created a salient sense of "us." When a group member internalizes the roles and membership, other members become the part of the self. This strengthens social bonds and connectedness. Because social connectedness has a buffering effect on negative experiences and stress in the work environment, belonging in a group and group identity positively affects people's well-being.[23] Therefore, the results of the study supported the previous studies about identification and well-being.[24] Highlighted identification among STM should have reduced the effects of workplace hierarchy by increasing unity motivations in ingroup relationships.[11] Therefore, we propose that participants' assessments of their well-being and positive experience scores regarding their position in the workplace hierarchy are influenced by high identification scores (mean 5.03 as the range is between 1 and 7). Experimental or longitudinal studies should be conducted to provide more comprehensive explanations for the moderator role of identification in the association between hierarchy and well-being in the workplace.

4.2. Daily diaries

We also investigated the association between hierarchy and well-being indicators on a daily basis in addition to participants' baseline evaluations. By collecting daily data for 15 successive days, we aimed to observe our participants with their real-world behaviors and emotions, in real relationships in their daily environments, and to make cause-effect comments as in other longitudinal studies.

In daily diaries, we found that when participants had a greater number of relationships in a superior position, they also reported higher well-being, higher positive experiences, more enjoyment of work that day, and higher motivation to get to work the next day. Higher levels of well-being and job satisfaction are associated with higher levels of freedom and control over the work provided by being superior in a workplace.[25] In addition, being in a superior position in the workplace provides protections against maltreatment, harassment, mobbing, and aggression which negatively affect well-being and health.[26] Studies show that employees in superior positions have lower stress levels and lead healthier lives.[27] Our study findings are in line with the literature that individuals have the advantage of being superior when they enter relationships as superiors.

Contrary to being superior, being subordinate in hierarchical relationships did not relate to any of the outcomes. We attribute the non-significant associations of being a subordinate to the participants' high level of identification with health professionals. Because the previous researches show that the status and positions in the workplace are related to how people identify with the workplace and that being in a significant group creates a positive identity.[28] While collecting the data, there was a positive perception towards healthcare workers due to the COVID-19 outbreak. In this atmosphere, STM may have seen themselves as belonging to an important group. In short, the high level of identification and a sense of belonging to an important group caused participants to be less affected by the disadvantages of being subordinate in the workplace hierarchy.

4.3. Limitations

There are some limitations of our study due to the COVID-19 pandemic. First limitation is the differentiation in working conditions at COVID-19. During the coronavirus pandemic in Turkey, healthcare workers switched to flexible working hours. Also, some of them were temporarily employed in coronavirus outpatient clinic and intensive care units. This change may have temporarily disrupted the hierarchical relationship structures of the participants during the day. The second limitation is the well-being and emotional changes in healthcare professionals due to the COVID-19 pandemic. Healthcare providers has a significant level of stress, burnout, anxiety, and depression due to coronavirus outbreak.[29] For these reasons, we may not have been able to obtain the usual well-being results of the participants. The third limitation is the generalizability of the findings. Study data were obtained at the beginning of the pandemic. There may have been a temporary increase in identification with one's team at the beginning of the pandemic. Because, for some groups of healthcare professionals (e.g., women/ethnic minority physicians), COVID-19 made things a lot worse. Future research should reevaluate these limitations in the post-pandemic period.

4.4. Implications

Besides the limitations, there are 2 implications of our study. First, although there are many studies about the well-being of healthcare professionals in the literature, there is a lack of studies about the effects of the hierarchical organization of healthcare institutions on the well-being of healthcare professionals. Our study is important in terms of showing the effect of hierarchy, which is the basic structure of health institutions, on the well-being of health workers. The other implication is that our study showed the causal relationship between different positions

of hierarchical and the well-being of the STM. It was a success to be able to conduct a survey lasting approximately 1 month to a participant group consisting of STM and to complete all the surveys with 156 participants under the pandemic conditions.

4.5. Conclusion

In conclusion, there are 3 major message of our study. First, there was a positive correlation between system justification and perceived autonomy support in STM. Second, daily experiences of superior position in OT were positively related to this day's well-being, positive experience, and enjoying the OT can protect healthcare professionals from the negative effects of hierarchy. Although our study shows that those who are lower in the hierarchy are not negatively affected, this may not always be true. Therefore, well-being measurements should be repeated at certain time intervals in heath institutions. Hierarchical organizational structure is indispensable for OT. We think that our findings may contribute to the literature to evaluate the effect of hierarchical organizational structure on the STM.

Author contributions

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