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The relationship between autonomy, optimism, work engagement, and organizational citizenship behavior among nurses fighting COVID-19 in Wuhan: A Serial Multiple Mediation

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5 **The relationship between autonomy, optimism, work engagement, and**
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8 **organizational citizenship behavior among nurses fighting COVID-19 in**
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11 **Wuhan: A Serial Multiple Mediation**
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13 Authors' information

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15
16 **Hui Zhang**, Department of cardiology, Guizhou Provincial People's Hospital, Guiyang, China;

17
18 **Yi Zhao****, Department of nursing, The Third People's Hospital of Hubei Province, Wuhan,
19
20 China;

21
22
23 **Ping Zou**, School of Nursing, Nipissing University, Toronto, Ontario, Canada;

24
25 **Yang Liu**, Wuhan Jinyintan Hospital, Wuhan, China;

26
27 **Shuanghong Lin** Department of nursing, Third People's Hospital of Hubei Province, Wuhan,
28
29 China;

30
31
32 **(Correspondence Author) Zhihong Ye** Sir Run Run Shaw Hospital, School of Medicine,
33
34 Zhejiang University, Zhejiang, China; **Email Address: ; 3192005@zju.edu.cn**
35

36
37 **Leiwen Tang** Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University, Zhejiang,
38
39 China;

40
41 **Jing Shao** Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University, Zhejiang,
42
43 China;

44
45
46 **Dandan Chen** Sir Run Run Shaw Hospital, School of Medicine, Zhejiang University, Zhejiang,
47
48 China;

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50 **** Co-first author**
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Abstract

Objectives: High levels of organizational citizenship behavior can enable nurses to cooperate with co-workers effectively to provide a high quality of nursing care during the outbreak of COVID-19. However, the association between autonomy, optimism, work engagement, and organizational citizenship behavior remains largely unexplored. This study aimed to test if the effect of autonomy on organizational citizenship behavior through mediating effect of optimism and work engagement.

Study design: This was a cross-sectional study.

Setting: The study was conducted in the Wuhan jinyingtang hospitals in China.

Participants: In total, 242 nurses who came across China to work in Wuhan Jinyintan hospital during the COVID-19 epidemic participated in this study.

Methods: A serial mediation model (model 6) of PROCESS macro was adapted to test the hypotheses, and a 95% confidence interval for the indirect effects was constructed by using Bootstrapping.

Results: The autonomy–organizational citizenship behavior relationship was mediated by optimism and work engagement, respectively. In addition, optimism and work engagement mediated this relationship serially.

Conclusions: The findings of this study may have implications for improving organizational citizenship behavior. The effects of optimism and work engagement suggest a potential mechanism of action for the autonomy-organizational citizenship behavior linkage. A

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5 multi-faceted intervention targeting organizational citizenship behavior through optimism and
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7 work engagement may help improve the quality of nursing care among nurses supporting
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9 patients with COVID 19.
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11
12 Keywords: The Job Demands-Resources model; Autonomy; Optimism; Organizational
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14 citizenship behavior; Nurses; COVID-19
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16 17 **Strengths and limitations of this study**

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19 ● This is the first study to test a serial mediation model among autonomy, optimism,
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21 work engagement, and organizational citizenship behavior.
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- 24 ● The findings of this study have provided a better understanding for policy makers and
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26 nursing management about improving nurses' organizational citizenship behavior.
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- 29 ● The measures used in this study were internationally recognized and appropriately
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31 standardized for the Chinese population.
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- 34 ● The results cannot be allow to confirm the causal directionality.
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38 Word count: 3763.
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1 Introduction

2 The coronavirus disease 2019 (COVID-19) began in Wuhan, in December 2019, and it
3 rapidly spread in China and the globe, causing a worldwide pandemic. One of the first
4 designated hospitals to treat the COVID-19 epidemic was the Wuhan Jinyintan Hospital. Due to
5 Wuhan's shortage of health providers, the Chinese government mobilized qualified personnel
6 from across China to aid local medical staff in the city to treat the health crisis ¹. As front line of
7 health care providers, nurses play an important role as they spend the longest time caring for and
8 have the most frequent interactions with patients. With a large number of nurses from across
9 China coming to work with local medical staff in Wuhan Jinyintan Hospital, it is a necessity that
10 they cooperate effectively with each other in order to deliver high quality medical care to
11 patients with COVID-19. Cooperative behavior is important as it can increase the efficiency of
12 an organization as a whole. However, some challenges and difficulties, such as diverse
13 backgrounds, different work standards, and different level of hospital, may pose a threat to
14 enacting cooperative behavior for nurses.

15 Organizational citizenship behavior is one type of cooperative behavior, which increases
16 a person's tendency towards helping and sharing information, demonstrating integrity, and
17 championing the institution ². Nurses with high levels of organizational citizenship behavior can
18 cooperate with other medical staff effectively to deliver more efficient nursing care and increase
19 organizational effectiveness ³. Therefore, it is necessary to focus on nurses' organizational
20 citizenship behavior during the COVID-19 epidemic in Wuhan Jinyintan Hospital.

21 Work engagement among nurses continues to attract considerable research attention due
22 to its relationship with organizational citizenship behavior. For example, the study conducted by

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5 23 Sulea et al. (2012) showed that nurses with a high level of work engagement are more likely
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7 24 have organizational citizenship behaviors ⁴. Researchers and practitioners are increasingly
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9 25 recognizing that a clear understanding of antecedents for work engagement is in needed to
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11 26 inform intervention efforts to maximize organizational citizenship behaviors.

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14 27 One of the antecedents to work engagement is autonomy. Mauno et al. (2010) in their
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16 28 longitudinal study demonstrated that autonomy can lead to work engagement ⁵. Moreover,
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18 29 Bargagliotti (2012) found that autonomy can positively impact work engagement among
19
20 30 professional nurses ⁶. Studies also showed that optimism is positively associated with work
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22 31 engagement. For example, Nordin et al. (2019) found that optimism positively related to work
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24 32 engagement ⁷. The positive relationship between optimism and work engagement could also be
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26 33 found among Chinese medical professionals⁸.

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30 34 Although previous studies have made valuable contributions to the topic of work
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32 35 engagement, the mechanism (e.g., how autonomy relates to organizational citizenship behavior)
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34 36 underlying the association between optimism and work engagement remains largely unexplored.
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36 37 The contributions of the present study are two-fold. First, it is the first time to examine the
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38 38 association between autonomy, optimism, work engagement, and organizational citizenship
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40 39 behavior, thus generating new insights on the mechanisms underlying the effect of autonomy on
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42 40 organizational citizenship behavior. Second, by utilizing a nurse sample, this study can help
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44 41 inform effective interventions to improve organizational citizenship behavior among nurses
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46 42 caring for patients with COVID-19.

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45 **Theory and hypotheses**

46 The Job Demands-Resources (JD-R) model presents an understanding of organizational
47 citizenship behavior within an occupational health psychiatry context. Job demands, such as
48 workload or time pressure, can initiate a health impairment process, where emotional exhaustion
49 can be predicted leading to job performance concerns. In contrast, job resources, such as
50 autonomy or performance feedback, can initiate a motivational process, where work engagement
51 can be predicted, resulting in positive employee behavior and job performance, including
52 organizational citizenship behavior and creativity^{9 10}.

53 Autonomy is one type of job resources, and the extent to which the job provides discretion,
54 freedom, and independence can be reflected by autonomy¹¹. Autonomy can help individuals
55 maintain positive learning through an intimate knowledge of their work, and during this process,
56 employees become engaged¹². Work engagement refers to, “a positive, fulfilling, work-related
57 state of mind that is characterized by vigor, dedication, and absorption,”¹³. When engaged
58 individuals feel a high level of significance for their job, they are more likely to take pride in
59 being assigned challenging tasks. Evidence has shown that the positive relationship between
60 work engagement and important organizational outcomes and employee behavior¹⁴.

61 In line with the JD-R model, the relationship between autonomy and employee behavior can
62 be mediated by work engagement, which is supported in the literature. Surveys such as that
63 conducted by Kwon et al. (2019) have shown that work engagement plays a mediating role in the
64 relationship between autonomy and employee behavior¹⁵. Keyko et al. (2016) found that
65 autonomy can predict work engagement, leading to positive outcomes among professional nurses
66¹⁶. Although extensive research has been carried out on work engagement, no single study exists

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5 67 which test the mediating effect of work engagement in the relationship between autonomy and
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7 68 organizational citizenship behavior. Thus, this study proposes:

9 69 **Hypothesis 1.** Work engagement will mediate the association between autonomy and
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12 70 organizational citizenship behavior.

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14 71 The aspects of the work environment were only considered in the early and revised versions of
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16 72 the JD-R model. However, personal resources should be integrated into the JD-R model, as
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18 73 human behavior can be explained by an interaction between personal and environmental factors
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21 74 based on psychological approaches¹⁷. Personal resources can be defined as, “the psychological
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23 75 characteristics or aspects of the self that are generally associated with resiliency and that refer to
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25 76 the ability to control and impact one’s environment successfully”¹⁷.

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28 77 Personal resources have a similar function as job resources to improve personal growth and
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30 78 development. Optimism is an example of a personal resource. Seligman (2006) suggest that
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32 79 optimistic individuals consider that personal, permanent, and pervasive factors result in positive
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35 80 events, and negative outcomes can be interpreted in terms of temporary, external, and
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37 81 situation-specific factors¹⁸. Optimistic people often view an event positively and internalize the
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39 82 good aspects of their lives in the past, present, and future, thereby increasing their sense of
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42 83 self-esteem and morale¹⁹.

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44 84 Schaufeli (2017) suggested that though personal resources can be integrated and play an
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46 85 important role in the JD-R model, it is unclear where they act in the model²⁰. Schaufeli and Taris
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48 86 (2014) stated that there were five places when considering personal resources in the JD-R model,
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51 87 and encouraged future research to collect more evidence to identify where and how personal
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53 88 resources act¹⁷. One possible place for personal resources is that the relationship between job

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5 89 resources and work engagement can be mediated by personal resources¹⁷. For example,
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7 90 optimism plays a mediating role in the positive relationship between job resources and work
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9 91 engagement, which is suggested by cross-sectional studies^{21 22}. Additionally, in a longitudinal
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11 92 study, Llorens (2007) found the association between job resources and work engagement can be
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13 93 mediated by personal resources²³. In line with the JD-R model and the suggested place for
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15 94 optimism, optimism can be regarded as a mediator in the JD-R model. Thus, this study proposes:
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18 95 **Hypothesis 2.** The relationship between autonomy and organizational citizenship behavior will
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21 96 be serially mediated by optimism and work engagement.

22 23 97 **METHODS**

24 25 98 **Study units and participants**

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28 99 A convenience sample was used with nurses caring for patients with COVID-19 from the
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30 100 Wuhan Jinyintan Hospital, in March 2020. This study was conducted online via Wenjuanxing,
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32 101 which is the Chinese professional survey website (www.sojump.com). A two-dimensional code
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34 102 was sent to all potential participants, who can scan two-dimensional codes having access to the
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36 103 questionnaires through WeChat.

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39 104 After obtaining agreement from head nurses, research team sent the two-dimensional
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41 105 code of the electronic questionnaire to head nurses through Wechat. The head nurses then
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43 106 assisted with recruitment by sending the two-dimensional code to their nurses through Wechat.
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45 107 The first page of electronic questionnaire provided information about this study and information
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47 108 to allow participants to provide informed consent. Participation was voluntary and participants
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49 109 decided on an individualized basis whether to take part in this study. The first page of electronic
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51 110 questionnaire also told participants that all data would be protected and the survey was

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5 111 anonymous. A total of 305 nurses were invited and 242 nurses agreed to participate and
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7 112 completed the electronic questionnaire.
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9 113 **Measures**

11 114 **Autonomy**

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14 115 The autonomy subscale of the Job Diagnostic Survey was used to measure autonomy ²⁴. It
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16 116 comprises three items, and the Chinese version of this scale is widely used ¹¹. One example of an
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18 117 item on the questionnaire is: “My job gives me the chance to use my personal initiative and
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20 118 judgement in carrying out the work” ²⁴. A seven-point scale ranging from “very little” to “very
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22 119 much” was rated by participants.
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25 120 **Optimism**

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28 121 Optimism was assessed with a subscale of the Life Orientation Test ²⁵. The subscale
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30 122 comprised four items, and the Chinese version of this scale was used in this study ²⁶. One sample
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32 123 item in the short scale was, “In uncertain times, I usually expect the best”. A five-point scale
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34 124 ranging from “strongly disagree” to “strongly agree” was rated by participants.
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37 125 **Work engagement**

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39 126 Work engagement was measured with the Utrecht Work Engagement Scale-9 ²⁷. There are
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41 127 three dimensions in this scale: three items for vigor, three items for dedication, and three items
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43 128 for absorption. This scale has been widely used in China ²⁸. The items are “to my job, I feel
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45 129 strong and vigorous”, and “in the morning, I feel like going to work”. A seven-point scale
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47 130 ranging from “never” to “always” was rated by participants.
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52 53 132 **Organizational citizenship behavior**

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5 133 Organizational citizenship behavior was measured with organizational citizenship behavior
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7 134 scale ²⁹. There are two dimensions and ten items in this scale: seven items for helping and three
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9 135 items for civic virtue. Examples of the items are “attend and actively participate in team
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11 136 meetings” and “willingly share expertise with other members of the unit”. A five-point scale
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14 137 ranging from “completely not true” to “completely true” was rated by participants.
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16 138 **Statistical analysis**

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19 139 This study used IBM® SPSS® Statistics, (Version 24, IBM Corporation, New York, NY) to
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21 140 calculate descriptive information and correlation matrix. A serial mediation model (model 6) of
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23 141 PROCESS macro was adapted to test the hypotheses ³⁰. Bootstrapping is used in the mediation
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25 142 analysis, because it is a non-parametric resampling technique involving random and repeated
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27 143 sub-sampling of data, and it does not need to satisfy the assumption of normally distributed data
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29 144 ³⁰. A 95% confidence interval for the indirect effects is constructed by using Bootstrapping. If
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31 145 the 95% confidence interval does not contain zero, it is considered to be significant for the
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33 146 indirect effects. In this study, the mediating results were based on 5,000 bootstrap samples.
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37 147 A total effect, direct effect, and a total indirect effect can be provided in a serial mediation
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39 148 model. For a serial mediation model with two mediators (e.g., optimism and work engagement),
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41 149 there are three specific indirect effects, and the specific indirect effects can be compared. Control
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43 150 variables should be included in studies when there are theoretically based justifications rather
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45 151 than previous empirical relationships ³¹. Therefore, control variables were not included in this
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47 152 study.
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50 153 **Results**

51 154 **Preliminary analyses**

Table 1 presents means, standard deviations, the Cronbach's α , average variance extracted (AVE), and correlations of study variables. AVE for autonomy, optimism, work engagement, and organizational citizenship behavior was 0.71, 0.67, 0.50, and 0.63, respectively, which indicated that convergent validity was acceptable. The square of root of AVE values exceeded the construct correlation values suggesting that discriminant validity is satisfactory.

Table 1: Correlation coefficient, mean, standard deviation, and AVE

Variables	M	SD	The Cronbach's α	AVE	1	2	3	4
1 Autonomy	5.56	1.27	0.89	0.71	0.84			
2 Optimism	4.17	0.70	0.87	0.67	0.36**	0.82		
3 WE	4.83	1.01	0.92	0.50	0.49**	0.54**	0.71	
4 OCB	5.01	0.78	0.95	0.63	0.35**	0.47**	0.60**	0.79

Note: **Significant at the 0.01 level; the square of root of AVE values are bolded; WE: work engagement; OCB: organizational citizenship behavior; AVE: average variance extracted.

Mediation analyses

Model 6 of the PROCESS macro was adapted to test if the association between autonomy and organizational citizenship behavior can be mediated serially by optimism and work engagement. The results are presented in Figure 1 and Table 2. The results of serial mediation analyses showed that a total effect of autonomy on organizational citizenship behavior was found to be significant ($c = 0.21$, $SE = 0.04$, $t = 5.71$, $p < 0.001$). The direct effect of autonomy on organizational citizenship behavior was not significant when optimism and work

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5 172 engagement served as mediators ($c'=0.03$, $SE = 0.04$, $t = 0.72$, $p= 0.47$). The total indirect effect
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7 173 of autonomy on organizational citizenship behavior was found to be significant ($ab=0.19$,
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9 174 $SE=0.03$, $CI=0.13$ to 0.26). The indirect effect of autonomy on organizational citizenship
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11 175 behavior via optimism was significant ($a_1b_1=0.04$, $SE=0.02$, $CI=0.01$ to 0.09). The indirect effect
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13 176 of autonomy on organizational citizenship behavior via work engagement was also significant
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15 177 ($a_2b_2=0.10$, $SE=0.02$, $CI=0.06$ to 0.15). The indirect effect of autonomy on organizational
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17 178 citizenship behavior was also found to be significant through both optimism and work
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19 179 engagement ($a_1a_3 b_2=0.04$, $SE=0.01$, $CI=0.02$ to 0.07).

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23 180 All specific indirect effects were contrasted to determine whether one indirect effect is
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25 181 different than another (Table 2). Only one pair of contrasting findings were found to be
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27 182 statistically significant (effect $=0.06$, $SE=0.02$, $CI=0.01$ to 0.11). The results showed that the
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29 183 indirect effect was larger through work engagement only than the path through both optimism
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31 184 and work engagement.

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35 185 Figure 1. should be inserted here.

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37 186 Table 2: Serial mediation analyses

Effect	b	se	BootLLCI	BootULCI
<i>ab</i>	0.19	0.03	0.13	0.26
<i>a₁ b₁</i>	0.04	0.02	0.01	0.09
<i>a₂ b₂</i>	0.10	0.02	0.06	0.15
<i>a₁ a₃ b₂</i>	0.04	0.01	0.02	0.07
Contrasts				
<i>a₁ b₁ minus a₂ b₂</i>	-0.06	0.03	-0.13	0.01
<i>a₁ b₁ minus a₁ a₃ b₂</i>	0	0.02	-0.04	0.04

$a_2 b_2$ minus $a_1 a_3 b_2$	0.06	0.02	0.01	0.11
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187 Note. Bootstrap sample size = 5,000. a and b represent unstandardized regression coefficients:

188 a_1 = direct effect of autonomy on optimism; a_2 =direct effect of autonomy on work engagement;

189 a_3 =direct effect of optimism on work engagement; b_1 =direct effect of optimism on organizational

190 citizenship behavior; b_2 =direct effect of work engagement on organizational citizenship

191 behavior; ab =total indirect effect; $a_1 b_1$ =specific indirect effect through optimism; $a_2 b_2$ =specific

192 indirect effect through work engagement; $a_1 a_3 b_1$ =specific indirect effect through optimism and

193 work engagement; ULCI = Upper Limit of Confidence Interval, LLCI = Lower Limit of

194 Confidence Interval.

195

196 Discussion

197 The present study contributes to integrate personal resources (e.g., optimism) as a

198 mediator into the JD-R model. Through the sample of nurses in the study, it was found that

199 autonomy was associated with organizational citizenship behavior through the following

200 mechanisms: (i) indirectly through work engagement; (ii) indirectly through both optimism and

201 work engagement; and, (iii) indirectly through optimism. This means that three specific indirect

202 effects were found to be significant.

203 The findings suggest that a high level of autonomy was associated with a higher level of

204 work engagement, and thus was associated with greater organizational citizenship behavior. This

205 is consistent with earlier research, which showed that the relationship between job resources and

206 performance was mediated work engagement³². Similarly, in a study among nurses, Maurits et

207 al. (2015) found that work engagement served as a mediator in the relationship between

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5 208 autonomy and intention to leave the health care sector³³. In a motivational process described by
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7 209 JD-R model, the indirect effect of job resources on employee behavior can be mediated by work
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9 210 engagement¹⁷. When independence and freedom of a job were given to nurses, they will work in
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11 211 a positive affective-motivational state, which can help generate attitudes and behaviors that lead
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14 212 to achieve goals. In turn, nurses are more likely to have beneficial voluntarily behaviors at work,
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16 213 such as organizational citizenship behavior.

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18 214 Despite the mediating role of optimism having been studied in the past, understanding of
19
20 215 its connection to work engagement and employee behavior is still unclear. Early research shows
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22 216 that the relationship between job resources and motivation can be mediated by optimism³⁴.
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24 217 Xanthopoulou et al., (2011) found that the relationship between day-level coaching and work
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26 218 engagement was mediated by optimism. However, this study suggested that an indirect effect of
27
28 219 autonomy on organizational citizenship behavior among nurses through both optimism and work
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30 220 engagement. This serial mediation model has been demonstrated for the first time between these
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32 221 variables. Hobfoll (1989) proposes that resources intend to accumulate, which means that if
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34 222 employees work in an environment with rich resource, they are more likely to become optimistic
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36 223 and confident about career development³⁵. These personal resources can be positively related to
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38 224 work engagement. Work engagement can not only enable employees to be goal-oriented and
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40 225 focus on their work tasks, but also provide the energy and enthusiasm to perform well. In other
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42 226 words, the mediating effect of personal resources suggests that existing resources can accumulate
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44 227 further resources, which are beneficial to job performance and employee behavior.

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46 228 Interestingly, the findings also suggest that the relationship between autonomy and
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48 229 organizational citizenship behavior is mediated by optimism, which is not proposed in JD-R

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5 230 model. However, this result was consistent with previous studies. For example, Le et al. (2018)
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7 231 suggested that the relationship between job resources and employee behavior was mediated by
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9 232 optimism ³⁶. Similarly, optimism has also been found to have a mediating effect on the
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11 233 relationship between job resources (e.g., salesperson knowledge) and salesperson performance ³⁷.
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14 234 The reason may be that autonomy as a job resource gives nurses authority to choose task
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16 235 distribution, work pace, work skills, and collaborators ³⁸. Therefore, nurses can use a resource
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18 236 rich working environment as an instrument to activate optimism, allowing them to have the
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20 237 ability to control their working environment and become confident, thus contributing to excellent
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22 238 job performance ³⁵.

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25 239 In this study, three mediation models were significant. However, comparing specific
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27 240 indirect effects of mediators, the findings indicated that the indirect effect was larger through
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29 241 work engagement only than the path through both optimism and work engagement. Meanwhile,
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31 242 effect sizes for optimism as mediator were small in the single mediator path and serial-multiple
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33 243 mediation, which limits practical significance of data. Therefore, the mediated capabilities of
34
35 244 optimism should not be overestimated. Additionally, the other possible places for personal
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37 245 resources should be taken account. For example, Schaufeli (2017) suggested that the relation
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39 246 between job characteristics and wellbeing(e.g., work engagement) can be moderated by personal
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41 247 resources ²⁰.

42 248 **Implications**

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47 249 Since optimism and work engagement are significant mediators in the autonomy-
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49 250 organizational citizenship behavior linkage, a wide range of interventions should be adopted to
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51 251 improve optimism and work engagement among nurses fighting COVID-19. First, it is necessary

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5 252 for nursing management to boost nurses' awareness of the underlying optimism by highlighting
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7 253 the concept of goals, as it allows nurses to set goals that were frustrated in the past and then
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9 254 design strategies to accept challenge and achieve goals³⁹. For instance, Zhang et al. (2014) found
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11 255 that individuals can be taught about setting goals and developing measures to achieve them when
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14 256 facing adversity, thus leading to a forward-thinking, positive person⁴⁰. The findings also suggest
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16 257 that it is important for hospital administrators to focusing on improving work engagement. They
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18 258 should make an effort to provide an interesting and challenging work environment with
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21 259 sufficient job resources fitting nurses' role expectations. Moreover, supportive management also
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23 260 plays a vital role, as it provides a positive climate containing more job resources and endurable
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26 261 job demands for nurses, resulting in a higher level of work engagement¹³.

262 **Limitations**

263 When these finding were interpreted, some limitations should be considered. First, because
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265 it is was a cross-sectional study, the results cannot be interpreted with causal directionality.
266
267 Longitudinal or experimental designs are encouraged to confirm the causal directionality.
268
269 Second, common method variance may be a potential issue due to self-report questionnaires
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271 when interpreting the results. However, Harmon's single-factor test was performed, and the
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273 results revealed that the explained variance of the first factor was below 50%. Additionally, four
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275 factors had an eigenvalue greater than 1.0. Therefore, common-method bias may not be a major
276
277 issue in our study. Third, other types of personal resources, like self-efficacy, may also mediat
278
279 the relationship between autonomy and organizational citizenship behavior, so future studies are
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281 encouraged to adopt the different types of personal resources in this association. Lastly, the
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283 purposes of the study was tested among nurses came across china working in Wuhan Jinyintan

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5 274 hospital fighting COVID-19 epidemic, so the results should not be generalized in other samples.
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7 275 However, as the COVID-19 epidemic has spread worldwide, nurses in other countries may also
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9 276 work temporarily with new colleagues to deliver treatment to patients with COVID-19. The
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11 277 findings of this study have provided a better understanding for policy makers and nursing
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14 278 management about improving nurses' organizational citizenship behavior.
15

16 279 **Conclusion**

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19 280 Our framework aligns with the call (Schaufeli, 2017) to clarify the role of personal
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21 281 resources in the JD-R model²⁰. In a sample of nurses who came from across China to work in
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23 282 Wuhan Jinyintan hospital during the COVID-19 epidemic, it was found that the relationship
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25 283 between autonomy and organizational citizenship behavior is influenced by the sequential effects
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27 284 of optimism and work engagement. A high level of organizational citizenship behavior can
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29 285 enable nurses to cooperate with other medical staff effectively to provide high quality of nursing
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31 286 care in this globe health emergency. Although future studies should focus on substantiating and
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33 287 improving the findings when considering the association between these important variables,
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35 288 nursing management and hospital administration should consider a multi-faceted approach to
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37 289 enhance optimism and work engagement among nurses fighting COVID-19.
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41 290 **Acknowledgements**

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43
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45

46 292 **Authors contributions**

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48
49 293 HZ, YZ, and ZHY designed the study. HZ, SDL, DDC, PZ, and YZ analyzed the data, and
50
51 294 drafted the manuscript and interpreted the data. HZ, LWT, JS, ZHY, LY and PZ revised the
52
53 295 manuscript. YZ and LY participated in the data collection. All authors read and approved the
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5 296 final manuscript.

6
7 297 **Funding statement**

8
9 298 Not applicable.

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11
12 299 **Competing interests**

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14 300 The authors declare that they have no competing interests.

15
16 301 **Patient consent for publication**

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18
19 302 Not required.

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22 303 **Ethics approval and consent to participate**

23
24 304 Ethical approval was obtained from ethics committee of the third People's Hospital of Hubei

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26
27 305 Province. The study was performed in accordance with the ethical principles set forth in Helsinki

28
29 306 declaration. Informed consent was obtained from all participants.

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31 307 **Data availability statement**

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34 308 The datasets used and analyzed during the current study are available from the corresponding

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37 309 author on reasonable request.

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44 **References**

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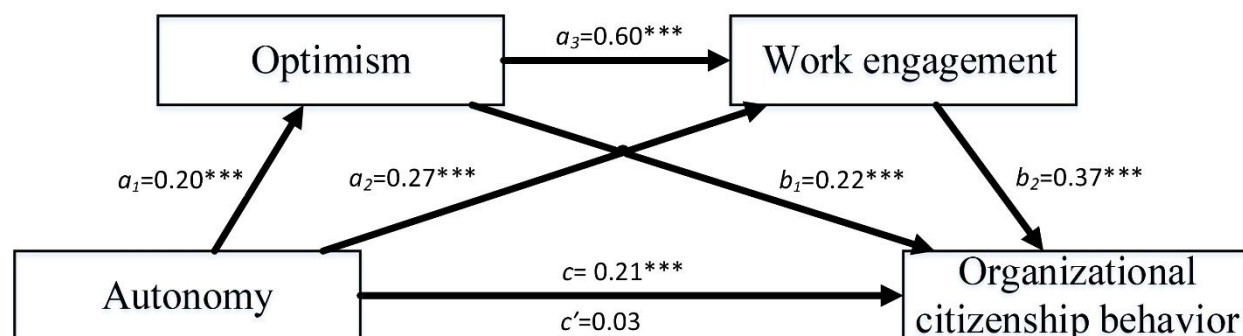
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Figure 1. Three-path mediation model



Note. a_1 = direct effect of autonomy on optimism; a_2 = direct effect of autonomy on work engagement; a_3 = direct effect of optimism on work engagement; b_1 = direct effect of optimism on organizational citizenship behavior; b_2 = direct effect of work engagement on organizational citizenship behavior; c = total effect of autonomy on organizational citizenship behavior, without accounting for optimism and work engagement; c' = direct effect of autonomy on organizational citizenship behavior when accounting for optimism and work engagement. *** $p < 0.001$.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract (page1-2)	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background (page3-8)	2	Explain the scientific background and rationale for the investigation being reported
Objectives (page8)	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design (page8)	4	Present key elements of study design early in the paper
Setting (page8)	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants (page9)	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables (page9)	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement (page8)	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias (page8)	9	Describe any efforts to address potential sources of bias
Study size (page8)	10	Explain how the study size was arrived at
Quantitative variables (page9)	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods (page10-11)	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants (page12)	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data (page12)	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data (page12)	15*	Report numbers of outcome events or summary measures
Main results (page13)	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a

		meaningful time period
Other analyses (page13)	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results (page15-16)	18	Summarise key results with reference to study objectives
Limitations (page16)	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation (page15)	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability (page15-16)	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding NONE	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

The relationship between autonomy, optimism, work engagement, and organizational citizenship behavior among nurses fighting COVID-19 in Wuhan: A Serial Multiple Mediation

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Keywords:	Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Human resource management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, COVID-19, Change management < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Health & safety < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

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8 **organizational citizenship behavior among nurses fighting COVID-19 in**
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13 Authors' information

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15 **Hui Zhang^{1,2} Yi Zhao^{3,**} Ping Zou⁴ Yang Liu⁵ Shuanghong Lin³ Zhihong Ye^{2,*}**
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18 **Leiwen Tang² Jing Shao² Dandan Chen²**
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23 ¹ Department of cardiology, Guizhou Provincial People's Hospital, Guiyang, China;

24 ² Zhejiang University School of Medicine Sir Run Run Shaw Hospital, Zhejiang, China;

25 ³ Department of nursing, The Third People's Hospital of Hubei Province, Wuhan, China

26 ⁴ School of Nursing, Nipissing University, Toronto, Ontario, Canada;

27 ⁵ Wuhan Jinyintan Hospital, Wuhan, China;

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34 ** Co-first author

35
36 * Correspondence Author

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39 Correspondence Author: Zhihong Ye Email Address: 3192005@zju.edu.cn
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Abstract

Objectives: High levels of organizational citizenship behavior can enable nurses to cooperate with co-workers effectively to provide a high quality of nursing care during the outbreak of COVID-19. However, the association between autonomy, optimism, work engagement, and organizational citizenship behavior remains largely unexplored. This study aimed to test if the effect of autonomy on organizational citizenship behavior through the mediating effects of optimism and work engagement.

Study design: This was a cross-sectional study.

Setting: The study was conducted in the Wuhan jinyingtang hospitals in China.

Participants: In total, 242 nurses who came from multiple areas of China to work at the Wuhan Jinyintan hospital during the COVID-19 epidemic participated in this study.

Methods: A serial mediation model (model 6) of PROCESS macro was adapted to test the hypotheses, and a 95% confidence interval for the indirect effects was constructed by using Bootstrapping.

Results: The autonomy–organizational citizenship behavior relationship was mediated by optimism and work engagement, respectively. In addition, optimism and work engagement mediated this relationship serially.

Conclusions: The findings of this study may have implications for improving organizational citizenship behavior. The effects of optimism and work engagement suggest a potential mechanism of action for the autonomy-organizational citizenship behavior linkage. A

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5 multi-faceted intervention targeting organizational citizenship behavior through optimism and
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7 work engagement may help improve the quality of nursing care among nurses supporting
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9 patients with COVID-19.
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12 Keywords: The Job Demands-Resources model; Autonomy; Optimism; Organizational
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14 citizenship behavior; Nurses; COVID-19
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16 **Strengths and limitations of this study**

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19 ● This is the first study to test a serial mediation model among autonomy, optimism,
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21 work engagement, and organizational citizenship behavior.
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- 24 ● The findings of this study have provided a better understanding for policy makers and
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26 nursing management about improving nurses' organizational citizenship behavior
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28 during the outbreak of COVID-19.
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- 31 ● The measures used in this study were internationally recognized and appropriately
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33 standardized for the Chinese population.
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- 36 ● The results cannot confirm causal directionality.
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40 Word count: 3763.
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1 Introduction

2 The coronavirus disease of 2019 (COVID-19) rapidly spread across the globe causing a
3 worldwide pandemic. In China, the Wuhan Jinyintan Hospital was the first designated hospital to
4 treat the COVID-19 epidemic. Due to Wuhan's shortage of health providers, the Chinese
5 government mobilized qualified personnel from across China to aid local medical staff in the city
6 to treat the health crisis ¹. As front line of health care providers, nurses play an important role as
7 they spend the longest time caring for and have the most frequent interactions with patients. With
8 a large number of nurses from across China coming to work with local medical staff in the
9 Wuhan Jinyintan Hospital, it is a necessity that they cooperate effectively with each other in
10 order to deliver high quality medical care to patients with COVID-19. Cooperative behavior is
11 important as it can increase the efficiency of an organization. However, some challenges and
12 difficulties, such as diverse backgrounds, different work standards, and different level of original
13 hospital, may pose a threat to enacting cooperative behavior for nurses.

14 Organizational citizenship behavior is one type of cooperative behavior, which increases
15 a person's tendency towards helping and sharing information, demonstrating integrity, and
16 championing the institution ². Nurses with high levels of organizational citizenship behavior can
17 cooperate with other medical staff effectively to deliver more efficient care and increase
18 organizational effectiveness ³. Therefore, it is necessary to focus on nurses' organizational
19 citizenship behavior during the COVID-19 epidemic in the Wuhan Jinyintan Hospital.

20 Researchers have shown an increased interest in work engagement among nurses due to
21 its relationship with organizational citizenship behavior. For example, the study conducted by
22 Sulea et al. (2012) showed that nurses with a high level of work engagement are more likely

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5 23 have organizational citizenship behaviors ⁴. A study in Thailand also showed that there were
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7 24 positive relationships between work engagement and organizational citizenship behavior ⁵.
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9 25 Additionally, researchers and practitioners are increasingly recognizing that a clear
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11 26 understanding of antecedents for work engagement is in needed to inform intervention efforts to
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14 27 maximize organizational citizenship behaviors. One of the antecedents to work engagement is
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16 28 autonomy. Mauno et al. (2010) in their longitudinal study demonstrated that autonomy can lead
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18 29 to work engagement ⁶. Moreover, Bargagliotti (2012) found that autonomy can positively impact
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20 30 work engagement among professional nurses ⁷. Studies, such as the one by Nordin et al. (2019)
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22 31 found that optimism positively related to work engagement ⁸. The positive relationship between
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24 32 optimism and work engagement was also shown in a study conducted in Korea ⁹.
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28 33 Although previous studies have made valuable contributions to the topic about autonomy,
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30 34 optimism, work engagement, and organizational citizenship behavior, the mechanism (e.g., how
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32 35 autonomy relates to organizational citizenship behavior) underlying the association between
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34 36 optimism and work engagement remains largely unexplored. The contributions of the present
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36 37 study are two-fold. First, it is the first to examine the association between autonomy, optimism,
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38 38 work engagement, and organizational citizenship behavior, thus generating new insights on the
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40 39 mechanisms underlying the effect of autonomy on organizational citizenship behavior. Second,
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42 40 by utilizing a sample of nurses, this study can help inform effective interventions to improve
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44 41 organizational citizenship behavior among nurses caring for patients with COVID-19.
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45 **Theory and hypotheses**

46 The Job Demands-Resources (JD-R) model can be used to present an understanding of
47 organizational citizenship behavior within an occupational health psychiatry context. Job
48 demands, such as workload or time pressure, can initiate a health impairment process, where
49 emotional exhaustion is predicted to decrease job performance. In contrast, job resources, such as
50 autonomy or performance feedback, can initiate a motivational process, where work engagement
51 can be predicted, resulting in positive employee behavior and job performance, including
52 organizational citizenship behavior and creativity^{10 11}.

53 Autonomy is one type of job resource, and the extent to which the job provides discretion,
54 freedom, and independence can be reflected by autonomy¹². Autonomy can help individuals
55 maintain positive learning through an intimate knowledge of their work, and during this process,
56 employees become engaged¹³. Work engagement refers to, “a positive, fulfilling, work-related
57 state of mind that is characterized by vigor, dedication, and absorption,”¹⁴. When engaged
58 individuals feel a high level of significance of their job, they are more likely to take pride in
59 being assigned challenging tasks performing better in the workplace¹⁵.

60 In line with the JD-R model, the relationship between autonomy and employee behavior can
61 be mediated by work engagement. Surveys such as that conducted by Kwon et al. (2019) have
62 shown that work engagement plays a mediating role in the relationship between autonomy and
63 employee behavior¹⁶. Keyko et al. (2016) found that autonomy can predict work engagement,
64 leading to positive outcomes among professional nurses¹⁷. Although extensive research has been
65 carried out on work engagement, no single study exists which test the mediating effect of work
66 engagement in the relationship between autonomy and organizational citizenship behavior. Thus,

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5 67 this study proposes:

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7 68 **Hypothesis 1.** Work engagement will mediate the association between autonomy and
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9 69 organizational citizenship behavior.

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12 70 As the aspects of the work environment were only considered in the early and revised versions
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14 71 of the JD-R model, recently personal resources are suggested to be integrated into the JD-R
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16 72 model, due to the fact that human behavior can be explained by an interaction between personal
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18 73 and environmental factors based on psychological approaches¹⁸. Personal resources is defined as
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20 74 “the psychological characteristics or aspects of the self that are generally associated with
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22 75 resiliency and that refer to the ability to control and impact one’s environment successfully”¹⁸.
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24 76 This kind of resources have a similar function as job resources to improve personal growth and
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26 77 development.

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30 78 Schaufeli (2017) suggested that though personal resources can be integrated and play an
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32 79 important role in the JD-R model, it is unclear where exactly they act¹⁹. Schaufeli and Taris
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34 80 (2014) stated that there were five places when considering personal resources in the JD-R model,
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36 81 and encouraged future research to collect more evidence to identify where and how personal
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38 82 resources act¹⁸. One possible place for personal resources is that the relationship between job
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40 83 resources and work engagement can be mediated by personal resources¹⁸. Optimism is an
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42 84 example of a personal resource. Seligman (2006) suggest that optimistic individuals consider that
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44 85 personal, permanent, and pervasive factors result in positive events, and negative outcomes can
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46 86 be interpreted in terms of temporary, external, and situation-specific factors²⁰. Optimistic people
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48 87 often view an event positively and internalize the good aspects of their lives in the past, present,
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50 88 and future, thereby increasing their sense of self-esteem and morale²¹. Studies have shown that

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5 89 optimism plays a mediating role in the positive relationship between job resources and work
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7 90 engagement, which is suggested by cross-sectional studies^{22 23}. Additionally, in a longitudinal
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9 91 study, Llorens (2007) found the association between job resources and work engagement can be
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11 92 mediated by personal resources(e.g., efficacy)²⁴. However, the mediating effect of optimism on
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14 93 the relationship between autonomy, work engagement, and organizational citizenship has not
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16 94 been investigated.

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19 95 In line with the JD-R model and the suggested place for optimism, optimism can be regarded
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21 96 as a mediator in the JD-R model. Thus, this study proposes:

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23 97 **Hypothesis 2.** The relationship between autonomy and organizational citizenship behavior will
24
25 98 be serially mediated by optimism and work engagement.

26 27 28 99 **METHODS**

29 30 100 **Study units and participants**

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32 101 A convenience sample was used with nurses caring for patients with COVID-19 from the
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34 102 Wuhan Jinyintan Hospital, in March 2020. This study was conducted online via Wenjuanxing,
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36 103 which is the Chinese professional survey website (www.sojump.com). A two-dimensional code
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38 104 was sent to all potential participants, who can scan two-dimensional codes having access to the
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40 105 questionnaires through WeChat.
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44 106 After obtaining agreement from head nurses, the research team sent the two-dimensional
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46 107 code of the electronic questionnaire to head nurses through WeChat. The head nurses then
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48 108 assisted with recruitment by sending the two-dimensional code to their nurses through WeChat.
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50 109 The first page of electronic questionnaire provided information about this study and information
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52 110 to allow participants to provide informed consent. Participation was voluntary and participants
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5 111 decided on an individual basis whether to take part in this study. The first page of electronic
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7 112 questionnaire also told participants that all data would be protected, and the survey was
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9 113 anonymous. A total of 305 nurses were invited and 242 nurses agreed to participate and
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11
12 114 completed the electronic questionnaire.

14 115 **Measures**

16 116 **Autonomy**

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19 117 The autonomy subscale of the Job Diagnostic Survey was used to measure autonomy ²⁵. It
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21 118 comprises three items, and the Chinese version of this scale is widely used ¹². One example of an
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23 119 item on the questionnaire is: “My job gives me the chance to use my personal initiative and
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25 120 judgement in carrying out the work” ²⁵. A seven-point scale ranging from “very little” to “very
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27
28 121 much” was rated by participants.

30 122 **Optimism**

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33 123 Optimism was assessed with a subscale of the Life Orientation Test ²⁶. The subscale
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35 124 comprised four items, and the Chinese version of this scale was used in this study ²⁷. One sample
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37 125 item in the short scale was, “In uncertain times, I usually expect the best”. A five-point scale
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39 126 ranging from “strongly disagree” to “strongly agree” was rated by participants.

42 127 **Work engagement**

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45 128 Work engagement was measured with the Utrecht Work Engagement Scale-9 ²⁸. There are
46
47 129 three dimensions in this scale: three items for vigor, three items for dedication, and three items
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49 130 for absorption. This scale has been widely used in China ²⁹. The items are “to my job, I feel
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51 131 strong and vigorous”, and “in the morning, I feel like going to work”. A seven-point scale
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53 132 ranging from “never” to “always” was rated by participants.

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7 **134 Organizational citizenship behavior**

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9 135 Organizational citizenship behavior was measured with organizational citizenship behavior
10 136 scale ³⁰. There are two dimensions and ten items in this scale: seven items for helping and three
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12 137 items for civic virtue. Examples of the items are “attend and actively participate in team
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14 138 meetings” and “willingly share expertise with other members of the unit”. A five-point scale
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16 139 ranging from “completely not true” to “completely true” was rated by participants.
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21 **140 Statistical analysis**

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23 141 This study used IBM® SPSS® Statistics, (Version 24, IBM Corporation, New York, NY) to
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25 142 calculate descriptive information and correlation matrix. A serial mediation model (model 6) of
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27 143 PROCESS macro was adapted to test the hypotheses ³¹. Bootstrapping is used in the mediation
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29 144 analysis, because it is a non-parametric resampling technique involving random and repeated
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31 145 sub-sampling of data, and it does not need to satisfy the assumption of normally distributed data
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33 146 ³¹. A 95% confidence interval for the indirect effects is constructed by using Bootstrapping. If
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35 147 the 95% confidence interval does not contain zero, it is considered to be significant for the
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37 148 indirect effects. In this study, the mediating results were based on 5,000 bootstrap samples.
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41 149 A total effect, direct effect, and a total indirect effect can be provided in a serial mediation
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43 150 model. For a serial mediation model with two mediators (e.g., optimism and work engagement),
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45 151 there are three specific indirect effects, and the specific indirect effects can be compared. Control
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47 152 variables should be included in studies when there are theoretically based justifications rather
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49 153 than previous empirical relationships ³². Therefore, control variables were not included in this
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51 154 study.
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155 Patient and public involvement

156 Patients and/or the public were not involved in the design, or conduct, or reporting, or
 157 dissemination plans of this research

158 Results

159 Preliminary analyses

160 Table 1 presents means, standard deviations, the Cronbach's α , average variance extracted
 161 (AVE), and correlations of study variables. AVE for autonomy, optimism, work engagement,
 162 and organizational citizenship behavior was 0.71, 0.67, 0.50, and 0.63, respectively, which
 163 indicated that convergent validity was acceptable. The square of root of AVE values exceeded
 164 the construct correlation values suggesting that discriminant validity is satisfactory.

166 Table 1: Correlation coefficient, mean, standard deviation, and AVE (N=242)

Variables	M	SD	The Cronbach's α	AVE	1	2	3	4
1 Autonomy	5.56	1.27	0.89	0.71	0.84			
2 Optimism	4.17	0.70	0.87	0.67	0.36**	0.82		
3 WE	4.83	1.01	0.92	0.50	0.49**	0.54**	0.71	
4 OCB	5.01	0.78	0.95	0.63	0.35**	0.47**	0.60**	0.79

167 Note: **Significant at the 0.01 level; the square of root of AVE values are bolded; WE: work
 168 engagement; OCB: organizational citizenship behavior; AVE: average variance extracted.

170 Mediation analyses

171 Model 6 of the PROCESS macro was adapted to test if the association between

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5 172 autonomy and organizational citizenship behavior can be mediated serially by optimism and
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7 173 work engagement. The results are presented in Figure 1 and Table 2. The total indirect effect of
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9 174 autonomy on organizational citizenship behavior was found to be significant ($ab=0.19$, $SE=0.03$,
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11
12 175 $CI=0.13$ to 0.26). The indirect effect of autonomy on organizational citizenship behavior via
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14 176 optimism was significant ($a_1b_1=0.04$, $SE=0.02$, $CI=0.01$ to 0.09). The indirect effect of
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16 177 autonomy on organizational citizenship behavior via work engagement was also significant
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18 178 ($a_2b_2=0.10$, $SE=0.02$, $CI=0.06$ to 0.15). The indirect effect of autonomy on organizational
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20 179 citizenship behavior was also found to be significant through both optimism and work
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22 180 engagement ($a_1a_3b_2=0.04$, $SE=0.01$, $CI=0.02$ to 0.07).

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26 181 All specific indirect effects were contrasted to determine whether one indirect effect is
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28 182 different than another (Table 2). Only one pair of contrasting findings were found to be
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30 183 statistically significant (effect $=0.06$, $SE=0.02$, $CI=0.01$ to 0.11). The results showed that the
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32 184 indirect effect was larger through work engagement only than the path through both optimism
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34 185 and work engagement.

36
37 186 Figure 1. should be inserted here.

38
39 187 Table 2: Serial mediation analyses (N=242)

Effect	b	se	BootLLCI	BootULCI
<i>ab</i>	0.19	0.03	0.13	0.26
<i>a₁b₁</i>	0.04	0.02	0.01	0.09
<i>a₂b₂</i>	0.10	0.02	0.06	0.15
<i>a₁a₃b₂</i>	0.04	0.01	0.02	0.07
Contrasts				
<i>a₁b₁ minus a₂b₂</i>	-0.06	0.03	-0.13	0.01

$a_1 b_1$ minus $a_1 a_3 b_2$	0	0.02	-0.04	0.04
$a_2 b_2$ minus $a_1 a_3 b_2$	0.06	0.02	0.01	0.11

188 Note. Bootstrap sample size = 5,000. a and b represent unstandardized regression coefficients:

189 a_1 = direct effect of autonomy on optimism; a_2 =direct effect of autonomy on work engagement;

190 a_3 =direct effect of optimism on work engagement; b_1 =direct effect of optimism on organizational

191 citizenship behavior; b_2 =direct effect of work engagement on organizational citizenship

192 behavior; ab =total indirect effect; $a_1 b_1$ =specific indirect effect through optimism; $a_2 b_2$ =specific

193 indirect effect through work engagement; $a_1 a_3 b_1$ =specific indirect effect through optimism and

194 work engagement; ULCI = Upper Limit of Confidence Interval, LLCI = Lower Limit of

195 Confidence Interval.

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197 Discussion

198 The present study contributes to integrate optimism in the JD-R model as a mediator.

199 Through the sample of nurses in the study, it was found that autonomy was associated with

200 organizational citizenship behavior through the following mechanisms: (i) indirectly through

201 work engagement; (ii) indirectly through both optimism and work engagement; and, (iii)

202 indirectly through optimism. This means that three specific indirect effects were found to be

203 significant.

204 These findings suggest that a high level of autonomy was associated with a higher level

205 of work engagement, and thus was associated with greater organizational citizenship behavior.

206 This is consistent with an earlier study published from Korea, which showed that the relationship

207 between job resources and performance was mediated work engagement³³. Similarly, in a study

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5 208 among nurses, Maurits et al. (2015) found that work engagement served as a mediator in the
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7 209 relationship between autonomy and intention to leave the health care sector³⁴. In a motivational
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9 210 process described by JD-R model, the indirect effect of job resources on employee behavior can
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11 211 be mediated by work engagement¹⁸. When independence and freedom of a job were given to
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13 212 nurses, they will work in a positive affective-motivational state, which can help generate
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15 213 attitudes and behaviors that lead to achieve goals. In turn, nurses are more likely to have
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17 214 beneficial voluntarily behaviors at work, such as organizational citizenship behavior.
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21 215 Despite the mediating role of optimism having been studied in the past, understanding of
22
23 216 its connection to work engagement and employee behavior is still unclear. Additionally, previous
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25 217 research shows that the relationship between job resources and motivation can be mediated by
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27 218 optimism³⁵. Xanthopoulou et al., (2011) found that the relationship between day-level coaching
28
29 219 and work engagement was mediated by optimism. However, this study suggested that an indirect
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31 220 effect of autonomy on organizational citizenship behavior among nurses occurs via both
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33 221 optimism and work engagement. This serial mediation model has been demonstrated for the first
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35 222 time between these variables. Hobfoll (1989) proposes that resources intend to accumulate,
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37 223 which means that if employees work in an environment with rich resource, they are more likely
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39 224 to become optimistic and confident about career development³⁶. These personal resources can be
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41 225 positively related to work engagement. Work engagement can not only enable employees to be
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43 226 goal-oriented and focus on their work tasks, but also provide the energy and enthusiasm to
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45 227 perform well. In other words, the mediating effect of personal resources suggests that existing
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47 228 resources can accumulate further resources, which are beneficial to job performance and
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49 229 employee behavior.
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5 230 Interestingly, the findings also suggest that the relationship between autonomy and
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7 231 organizational citizenship behavior is mediated by optimism, which is not proposed in JD-R
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9 232 model. However, this result was consistent with previous studies. For example, Le et al. (2018)
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11 233 suggested that the relationship between job resources and employee behavior was mediated by
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13 234 optimism³⁷. Similarly, optimism has also been found to have a mediating effect on the
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15 235 relationship between job resources (e.g., salesperson knowledge) and salesperson performance³⁸.
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17 236 The reason may be that autonomy as a job resource gives nurses authority to choose task
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19 237 distribution, work pace, work skills, and collaborators³⁹. Therefore, nurses can use a resource
20
21 238 rich working environment as an instrument to activate optimism, allowing them to have the
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23 239 ability to control their working environment and become confident, thus contributing to excellent
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25 240 job performance³⁶.

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30 241 In this study, three mediation models were significant. However, in comparing specific
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32 242 indirect effects of mediators, the findings indicated that the indirect effect was larger through
33
34 243 work engagement only, compared to the path through both optimism and work engagement.
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36 244 Meanwhile, effect sizes for optimism as mediator were small in the single mediator path and
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38 245 serial-multiple mediation, which limits practical significance of data. Therefore, the mediated
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40 246 capabilities of optimism should not be overestimated. Additionally, the other possible places for
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42 247 personal resources should be taken account. For example, Schaufeli (2017) suggested that the
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44 248 relation between job characteristics and wellbeing (e.g., work engagement) can be moderated by
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46 249 personal resources¹⁹.

50 51 250 **Implications**

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53 251 Since optimism and work engagement are significant mediators in the autonomy-

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5 252 organizational citizenship behavior linkage, a wide range of interventions should be adopted to
6
7 253 improve optimism and work engagement among nurses fighting COVID-19. First, it is necessary
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9 254 for nursing management to boost nurses' awareness of the underlying optimism by highlighting
10
11 255 the concept of goals, as it allows nurses who were frustrated in the past, to design and implement
12
13 256 strategies to achieve their goals⁴⁰. For instance, Zhang et al. (2014) found that individuals can
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15 257 be taught about setting goals and developing measures to achieve them when facing adversity,
16
17 258 thus leading to a forward-thinking, positive person⁴¹. The findings of this present study also
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19 259 suggest that it is important for nursing management to focusing on improving work engagement.
20
21 260 They should make an effort to provide an interesting and challenging work environment with
22
23 261 sufficient job resources fitting nurses' role expectations. Moreover, supportive management also
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25 262 plays a vital role, as it provides a positive climate containing more job resources and endurable
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27 263 job demands for nurses, resulting in a higher level of work engagement¹⁴. For example, a
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29 264 study published from Japan has shown that psychological demands and decision latitude can
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31 265 increase work engagement⁴².

37 266 **Limitations**

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39 267 When these finding were interpreted, some limitations should be considered. First, the
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41 268 results cannot be interpreted with causal directionality as the study had a cross-sectional design.
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43 269 Longitudinal or experimental designs are encouraged to confirm causal directionality. Second,
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45 270 common method variance may be a potential issue due to self-report questionnaires when
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47 271 interpreting the results. However, Harmon's single-factor test was performed, and the results
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49 272 revealed that the explained variance of the first factor was below 50%. Additionally, four factors
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51 273 had an eigenvalue greater than 1.0. Therefore, common-method bias may not be a major issue in

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5 274 our study. Third, other types of personal resources, like self-efficacy, may also mediate the
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7 275 relationship between autonomy and organizational citizenship behavior, so future studies are
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9 276 encouraged to adopt the different types of personal resources in this association. Lastly, the
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11 277 purposes of the study was tested among nurses came across china working in Wuhan Jinyintan
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13 278 Hospital fighting COVID-19 epidemic, so the results may not be generalizable to other samples.
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15 279 However, as the COVID-19 epidemic has spread worldwide, nurses in other countries may also
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17 280 work temporarily with new colleagues to deliver treatment to patients with COVID-19. The
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19 281 findings of this study have provided a better understanding for policy makers and nursing
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21 282 management about improving nurses' organizational citizenship behavior.
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25 283 **Conclusion**

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28 284 Our framework aligns with the call (Schaufeli, 2017) to clarify the role of personal
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30 285 resources in the JD-R model ¹⁹. In a sample of nurses who came from across China to work in
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32 286 Wuhan Jinyintan Hospital during the COVID-19 epidemic, it was found that the relationship
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34 287 between autonomy and organizational citizenship behavior is influenced by the sequential effects
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36 288 of optimism and work engagement. A high level of organizational citizenship behavior can
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38 289 enable nurses to cooperate with other medical staff effectively to provide high quality of nursing
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40 290 care in this globe health emergency. Although future studies should focus on substantiating and
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42 291 improving the findings when considering the association between these important variables,
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44 292 nursing management and hospital administration should consider a multi-faceted approach to
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46 293 enhance optimism and work engagement among nurses fighting COVID-19.
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52
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5 296 **Authors contributions**

6
7 297 HZ, YZ, and ZHY designed the study. HZ, SHL, DDC, PZ, and YZ analyzed the data, and
8
9 298 drafted the manuscript and interpreted the data. HZ, LWT, JS, ZHY, LY and PZ revised the
10
11 299 manuscript. YZ and LY participated in the data collection. All authors read and approved the
12
13
14 300 final manuscript.

15
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17
18 302 Not applicable.

19
20
21 303 **Competing interests**

22
23 304 The authors declare that they have no competing interests.

24
25 305 **Patient consent for publication**

26
27 306 Not required.

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31 307 **Ethics approval and consent to participate**

32
33 308 Ethical approval was obtained from ethics committee of the third People's Hospital of Hubei
34
35 309 Province. The study was performed in accordance with the ethical principles set forth in Helsinki
36
37 310 declaration. Informed consent was obtained from all participants.

38
39 311 **Data availability statement**

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41 312 The datasets used and analyzed during the current study are available from the corresponding
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43 313 author on reasonable request.

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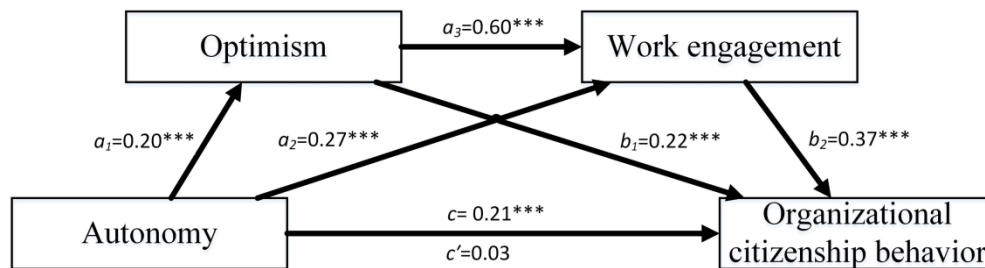
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48 412 Figure 1. Three-path mediation model
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51 413 Note. a_1 = direct effect of autonomy on optimism; a_2 = direct effect of autonomy on work
52 414 engagement; a_3 = direct effect of optimism on work engagement; b_1 = direct effect of optimism on
53 415 organizational citizenship behavior; b_2 = direct effect of work engagement on organizational
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416 citizenship behavior; c=total effect of autonomy on organizational citizenship behavior, without
417 accounting for optimism and work engagement; c'=direct effect of autonomy on organizational
418 citizenship behavior when accounting for optimism and work engagement. ***p <0.001.

For peer review only



Three-path mediation model

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60STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation
Title and abstract (page1-2)	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
Introduction		
Background (page3-8)	2	Explain the scientific background and rationale for the investigation being reported
Objectives (page8)	3	State specific objectives, including any prespecified hypotheses
Methods		
Study design (page8)	4	Present key elements of study design early in the paper
Setting (page8)	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants (page9)	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants
Variables (page9)	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement (page8)	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias (page8)	9	Describe any efforts to address potential sources of bias
Study size (page8)	10	Explain how the study size was arrived at
Quantitative variables (page9)	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods (page10-11)	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses
Results		
Participants (page12)	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data (page12)	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest
Outcome data (page12)	15*	Report numbers of outcome events or summary measures
Main results (page13)	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a

		meaningful time period
Other analyses (page13)	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results (page15-16)	18	Summarise key results with reference to study objectives
Limitations (page16)	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation (page15)	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability (page15-16)	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding NONE	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.