Asian Nursing Research 13 (2019) 86–91

Contents lists available at ScienceDirect

Asian Nursing Research

journal homepage: www.asian-nursingresearch.com

Research Article

Relationships between Exercise Behavior and Anger Control of Hospital Nurses

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ARTICLE INFO

Article history:
Received 12 May 2018
Received in revised form
11 January 2019
Accepted 15 January 2019

Keywords:
anger
exercise
hospitals
nurses

ABSTRACT

Purpose: This study examined the relationships between nurses' exercise behavior and their anger control using a cross-sectional descriptive design.
Methods: The participants were 290 nurses in South Korea, who completed a survey questionnaire on general characteristics, the stage of exercise behavior change, and anger emotion, evaluated using state anger and anger expression method.
Results: Those who engaged in regular exercise behavior exhibited lower levels of state anger and higher levels of anger control than those who did not. In the prediction model, a significant association of exercise behavior with anger control was found. The levels of anger control decreased as the age, education level, and work experiences of nurses decreased. Anger control scores were significantly higher than anger suppression scores and anger expression-out scores in the hospital nurses.
Conclusion: Engaging in regular exercise may help nurses manage anger emotions better.

Introduction

Anger is a natural emotion that rises from environmental distress, causing frustration related to personal needs or threat. It is a subjective and adaptive feeling that ranges from subtle irritation or upset feelings to intense rage [1]. Spielberger [2] classified anger into experiential and expressional aspects. Anger experience refers to emotional feelings one experiences, which is accompanied by physiological responses, while anger expression refers to the behavioral domain that is a person's way of dealing with anger feelings. Anger experience typically includes both state anger and trait anger. State anger is the immediate reaction to an anger-stimulating context expressed as negative subjective feelings with varying intensity. Trait anger is an emotion that is relatively stable and continuous, regardless of specific situations or timing, which is an important concept in measuring one's baseline anger level [3].

Expressional aspects of anger are composed of three types of anger expression, including anger suppression, anger expression-out, and anger control [2]. Anger suppression and expression-out are regarded as noncontrolled, mal-adaptive ways of anger expression, whereas anger control is considered as a controlled, adaptive method of anger resolution [2]. Inappropriate management of anger has negative impacts on one's physical health, including increase in the prevalence of cardiovascular diseases [4] and increase in the body mass index in eating disorders [5]. It also causes psychological problems including low level of self-esteem [6] or interpersonal problems [7]. Therefore, controlling anger feelings appropriately is essential for maintaining physical and mental health.

Approximately 18% of South Korean nurses are reported to experience state anger at their workplace [8]. Factors triggering anger of nurses include clinical environments, including heavy workloads, high levels of severity of patients, complex technologies, and interpersonal conflicts with multiple levels of healthcare providers who possess varied degrees of clinical expertise [9]. In terms of anger expression, nurses show the highest level in anger suppression [10], whereas the public show the highest level in anger control [4]. Such a high level of anger suppression among nurses could be related to the clinical context that they are required to have harmonious relationships with and friendly and accepting attitude toward colleagues and patients [10]. Accumulated and suppressed anger may also increase nurses' burnout, which might consequently alter quality care [11]. Therefore, appropriate

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https://doi.org/10.1016/j.anr.2019.01.009

management of anger would ultimately improve job motivation and well-being of nurses [9].

Among the various lifestyle factors, exercise is known to have a positive effect on controlling emotions. Those who exercise regularly are less likely to perceive stress and experience depression, anxiety, or frustration [12]. Exercise is a subset of physical activity that is planned, structured, and repetitive. Among health–promoting behaviors, exercise behavior is the domain with the lowest engagement level in Korean nurses [13]. In children with obesity, exercise behaviors are known to reduce their anger expression [14]. Although regular exercise has been known as an effective factor for anger management, research on the relationship between regular exercise behavior and anger in the context of nurses has rarely been conducted.

In existing literature, nurses' anger is influenced by psychosocial factors, including workplace violence [8], interpersonal problems [10], and irrational beliefs [15]. For example, higher levels of nurses' irrational beliefs are associated with higher levels of anger-in and anger-out and lower levels of anger control [15]. However, there is scarce research on regular exercise as a lifestyle correlate of nurses' anger control. In this study, based on the fact that regular exercise may reduce negative emotions [12] and anger expression in other populations [14], it was hypothesized that exercise behavior is associated with state anger levels and the manner in which anger is expressed among hospital nurses. Because trait anger is difficult to intervene and tends to be linked to the inherent propensity of an individual, only state anger was focused in this study. Therefore, this study aimed to describe exercise behavior, the degree of anger, and the nature of anger expression and to examine the relationships between these variables among hospital nurses in South Korea.

Methods

Study design

This was a cross-sectional descriptive study to examine the relationships of exercise behavior with anger emotions of nurses.

Setting and sample

The study participants were 300 nurses who were recruited from a university hospital in the metropolitan area of South Korea. A convenience sampling was used and nurses who understood the purpose of and agreed to participate in the study were participants for this study. Only full-time nurses were recruited for study participation. Nurses in all types of wards were invited to participate in the study, and newly employed nurses who were trainee under the supervision of preceptors were excluded from the subject pool. The sample size was estimated using G-power 3.1. program (http://www.gpower.hhu.de/) (Copyright (c) by Franz Faul, Universität Kiel, Germany) based on a significance level of .05, an effect size of .25, and a power of .90 for analysis of variance (ANOVA), which resulted in a total of 255 participants as a minimum number of participants. The final number of participants included 300 nurses after the consideration of 15% of potential dropout rate. One researcher recruited the participants on a voluntary basis at the data collection site and conducted data collection. The final data included 290 participants after excluding 10 incomplete surveys, with 3.4% of data loss rate.

Ethical considerations

The participants were informed about the research aim and survey procedure. Participation in the study was voluntary. Each participant was informed of the confidentiality of the data collection procedure before the survey. The data were collected after the approval from the institutional review board of the study site (Approval no. UC16QASI0145). Survey questionnaires in sealed envelopes were distributed to those who were interested in participating in the study, and signed informed consents were obtained.

Measurements

General and exercise-related characteristics

General characteristics included sex, age, marital status, religion, living arrangement, education, work department, shift work pattern, year practicing as a registered nurse, and current job position. Exercise-related characteristics included two questions, including motivations for regular exercise and reasons for not engaging in regular exercise behavior.

Exercise behavior

Exercise behavior was measured using Stage of Exercise Behavior Change scale [16]. The Stage of Exercise Behavior Change scale is a single-item scale that describes the current exercise behavior and categorizes individuals into one of the five stages: precontemplation, contemplation, preparation, action, or maintenance stage. According to the scale, regular exercise behavior refers to involvement in physical activity of at least 30 minutes three times a week. Therefore, individuals in either the action or maintenance stages were regarded as those who were engaged in regular exercise behavior in this study. Individuals in the precontemplation stage are those who do not engage in exercise behaviors and have no intention to start exercising within 6 months. Individuals in the contemplation stage are not currently engaged in exercise behavior but are interested in initiating exercise behavior within 6 months. Individuals in the preparation stage are involved in exercise behavior but do not engage in exercise behavior regularly. Individuals in the action stage are those who are currently involved in regular exercise behavior but do not sustain such behavior for more than 6 months. Individuals in the maintenance stage are those who have been maintaining regular exercise behavior for more than 6 months. The validity of the Stage of Exercise Behavior Change scale as a measure for exercise behavior has been addressed in English nurses [17] and Korean women [18].

Anger emotion

Anger emotion was measured in terms of state anger and anger expression, including anger expression-in, anger expression-out, and anger control.

State anger

State anger was measured using a Visual Analogue Scale (VAS) [19]. The VAS is a single-item scale that ranges from 0 (not at all) to 10 (the highest level of state anger that a person can experience). The validity of the VAS as a single-item clinical scale in measuring state anger has been established [20]. The item contained a question, “Now, how angry you think you feel?” A higher score indicated a higher level of state anger.

Anger expression

Anger expression was measured using the Korean version of the State-Trait Anger Expression Inventory, which was originally developed by Spielberger et al. [21] and translated into Korean by Chon et al. [3]. The anger expression portion of the Korean version of the State-Trait Anger Expression Inventory is composed of three subdomains, including anger expression-in (eight items), anger

expression-out (eight items), and anger control (eight items). Each item is measured on a four-point Likert-type scale, with a higher score indicating a greater degree of anger expression. The score range for each domain ranged from 8 to 32. Individuals with anger expression-in exhibit anger suppression, whereas those with anger expression-out express their anger easily. Those with anger control indicate that they are aware of their anger and are able to control it. This scale has been validated in Korean nurses [15]. Cronbach α reliability of anger expression ranged from .64 to .71 in the original version [21] and ranged from .67 to .82 in the Korean version [3]. In this study, the Cronbach α reliability of anger expression was .86 for anger expression-in, .81 for anger expression-out, and .83 for anger control.

Data collection procedure

The data were collected in January 2017. Participants were recruited from a university hospital located in Gyeonggi province in South Korea. After obtaining approval from the director of the nursing department for data collection, a verbal announcement was made by the researchers to nurses in nursing units of the hospital regarding the research aim and survey procedure. Participants spent approximately 20-30 minutes on completing the survey and were compensated with an equivalent of US $5 for their participation.

Data analysis

The data were analyzed using SPSS 25.0 program (IBM Corp., Armonk, NY, USA), and the level of significance was set at $\alpha < .05$. Descriptive statistics were performed for all study variables. Associations of anger emotion with general characteristics and exercise-related variables were analyzed using *t* test, analysis of variance with Sheffé *post hoc* test, Mann–Whitney U test, and Kruskal–Wallis test. The correlations among the exercise behavior and anger control were tested using multiple regression techniques.

Results

General characteristics

Approximately half of the participants (51.0%) were aged less than 30 years. The majority of the respondents were single (57.9%) and women (96.6%). In terms of education, 45.9% of the participants were baccalaureate degree graduates. More than half of the participants reported they were religious (67.9%) and were living with parents and/or siblings (50.7%). Approximately one-third of the participants were working in general ward units (37.9%). The participants had been practicing as registered nurse for an average of 8.91 years. Of the participants, 79.0% were engaged in the shift work pattern and 65.9% were working as staff nurses (Table 1).

Anger control by general characteristics

Anger control scores were significantly associated with all the general characteristic variables except with gender, living arrangement. Significantly higher levels of anger control were reported among those who were aged 30 years or older ($F = 10.52$, $p < .001$), married ($t = -3.81$, $p < .001$), and religious ($t = 3.06$, $p = .002$). Those who had graduated from 4-year college or had attended graduate school ($F = 4.38$, $p = .005$), had work experience of 11 years or more ($F = 15.15$, $p < .001$), had no shift work pattern ($t = -2.05$, $p = .041$), and were working as charge nurses ($\chi^2 = 24.13$, $p < .001$) demonstrated significantly higher levels of anger control than other groups.

Table 1 *Differences in Anger Control by General Characteristics (N=290).*

Variables	Categories	n	%	M±SD	Anger control		
					M±SD	t/F/Z/χ^2(*p*)	*Post hoc*
Age (yrs)	≤29[a]	148	51.0	31.59 ± 6.80	18.65 ± 3.53	10.52 (<.001)	a<b, c
	30–39[b]	93	32.1		19.86 ± 3.61		
	≥40[c]	49	16.9		21.31 ± 4.03		
Gender	Women	280	96.6		20.40 ± 3.69	0.80 (.424)	
	Men	10	3.4		19.45 ± 3.77		
Marital status	Married or living with partner	122	42.1		20.45 ± 3.73	−3.81 (<.001)	
	Single	168	57.9		18.79 ± 3.64		
Having religion	Yes	197	67.9		19.94 ± 3.77	3.06 (.002)	
	No	93	32.1		18.51 ± 3.57		
Education level	3-year college[a]	56	19.3		18.68 ± 3.24	4.38 (.005)	a, c
	4-year university[b]	133	45.9		19.82 ± 3.93		<b, d
	RN-BSN[c]	54	18.6		18.44 ± 3.62		
	Graduate school[d]	47	16.2		20.70 ± 3.62		
Living arrangement	Living alone	67	23.1		19.46 ± 3.62	2.31 (.077)	
	With parents/sibling	147	50.7		19.19 ± 3.94		
	With spouse	33	11.4		19.09 ± 3.10		
	With spouse and children	43	14.8		20.84 ± 3.63		
Work department	Outpatient department[a]	54	18.6		20.37 ± 3.97	2.53 (.040)	
	General ward[b]	110	37.9		19.03 ± 3.75		
	Emergency unit[c]	29	10.0		20.28 ± 3.80		
	Intensive care unit[d]	66	22.8		18.77 ± 3.59		
	Operating room[e]	31	10.7		20.35 ± 3.30		
Years working as RN	≤5[a]	124	42.8	8.91 ± 6.73	18.83 ± 3.64	15.15 (<.001)	a, b<c
	6-10[b]	81	27.9		18.60 ± 3.28		
	≥11[c]	85	29.3		21.28 ± 3.80		
Shift work pattern	Shift work	229	79.0		19.25 ± 3.77	−2.05 (.041)	
	Nonshift work	61	21.0		20.36 ± 3.62		
Work position	Staff nurse[a]	191	65.9		18.69 ± 3.53	24.13 (<.001)	a<b
	Charge nurse[b]	83	28.6		21.06 ± 3.67		
	Unit manager[c]	16	5.5		20.81 ± 4.18		

Note. BSN = bachelor of science in nursing; M ± SD = mean ± standard deviation; RN = registered nurse; yrs = years.
[a,b,c,d,e] Sheffé test: means with the different letter are significantly different.

There was a significant difference in anger control by work department without any group difference in *post hoc* analysis (Table 1).

Exercise-related characteristics

Motivation to engage in regular exercise included health maintenance and promotion (64.2%), weight control (46.3%), stress management (8.9%), and the pleasure of exercise (4.9%). Reasons for not performing regular exercise included a lack of time (65.9%), physical exhaustion (41.9%), not being able to find individually tailored exercise program (17.4%), burden of exercise-related expenses (9.6%), and unnecessary (3.0%) (Table 2).

Exercise behavior

In terms of the percentage of those who were engaged in regular exercise, 20.0% of the participants, including individuals in either the action or maintenance stages, were engaged in regular exercise behavior. In the stage of exercise behavior, the percentage of participants in the contemplation stage was highest at 39.7% (n = 115), followed by 22.1% in the preparation stage (n = 64) and 18.3% in the precontemplation stage (n = 53) (Table 3).

Anger emotion by exercise behavior

Exercise behavior was significantly associated with state anger and anger expression. State anger was significantly lower in those who were engaged in regular exercise behavior (i.e. maintenance stage) than those who were not (i.e. precontemplation or contemplation stage) ($F = 3.90$, $p = .004$). Of anger expression domains, higher levels of anger control were significantly associated with regular exercise behavior ($F = 2.87$, $p = .024$). In particular, those who were engaged in regular exercise behavior (i.e. maintenance stage) showed significantly higher levels of anger control than those who were not (i.e. precontemplation stage) (Table 3).

Levels of anger emotion

The mean VAS score for state anger was 4.46 of 10 points. In subdomains of anger expression, the mean score was 15.07 for anger expression-in, 14.57 for anger expression-out, and 19.49 for anger control (Table 4).

Predictors of anger control

Multiple regression analysis was conducted to examine predictors of anger control. Residual analysis confirmed that the assumptions of multicollinearity, linearity, normality, and equality of variance were met in the regression equation. Two-step hierarchical regression analysis was conducted with the following order of entry of independent variables: demographic factors and work-related variables those were significantly associated with anger control for step 1 and exercise behavior for step 2. The addition of exercise behavior to the step 1 equation resulted in 15.0% of the explained variance in anger control, showing that exercise behavior was a significant predictor of anger control ($\beta = .15$, $p = .010$), and the model was adequate ($F = 4.31$, $p < .001$) (Table 5).

Discussion

This study aimed to describe exercise behavior, the degree of anger, and the nature of anger expression and to examine the relationships between these variables among hospital nurses in South Korea. In the present study, the nurses who maintained regular exercise behavior exhibited lower levels of state anger and higher levels of anger control than the nurses who did not, which is consistent with the results of previous studies that exercise behavior has a positive effect on anger reduction and stress control [12,14]. This implies that performing regular exercise might be important for hospital nurses to control anger effectively. In a previous study on sedentary women, exercise improved self-efficacy [22]. Those with high levels of self-efficacy show efficient stress management skills, which ultimately enforces their anger control abilities [23]. It is suggested to examine the mediating effects of self-efficacy between regular exercise and anger control of nurses in future studies to clarify the specific mechanisms among these variables.

The level of anger control increased as the age, education level, and work experiences of nurses increased. Subgroups that are vulnerable to anger control in the present study were nurses who were younger than the age of 30 years, unmarried, had less than 11 years of nursing work experience, and associate degree graduates. These findings are consistent with those by the previous study [8]. Future intervention studies should focus on the risk group and provide them with anger management techniques that motivate them to recognize problems affecting anger expression and to learn anger control skills during their daily nursing practice.

In this study, anger control scores were significantly higher than anger suppression scores and anger expression-out scores in the hospital nurses, which is consistent with the result of the previous study of nurses using the identical measurement scale [15]. These findings may indicate that nurses tend to use anger control strategy more frequently than anger suppression or anger expression, which are nonadaptive ways of managing anger. However, the finding is inconsistent with that of a previous study reporting that the anger expression-in score was higher than other anger expression domains in nurses [10]. Considering that nurses with 10 years of clinical experience or over showed higher levels of anger control than their counterpart group in this study, the difference in findings among the studies may be due to the fact that the participation rate by experienced nurses in this study was higher than that of the

Table 2 *Exercise-related Characteristics (N=290).*

Questions	Answers	n	%
Motivation to engage in regular exercise[a] (n = 123)	Health maintenance and promotion	79	64.2
	Weight control	57	46.3
	Stress management	11	8.9
	Pleasure of exercise	6	4.9
	Other	3	2.4
Reasons for not performing regular exercise[a] (n = 167)	Lack of time	110	65.9
	Physical exhaustion	70	41.9
	Not being able to find individually tailored exercise program	29	17.4
	Burden of exercise-related expenses	16	9.6
	Unnecessary	5	3.0
	Other	3	1.8

[a] Multiple answers possible.

Table 3 *Differences in Anger Emotion According to Exercise Behavior (N=290).*

Exercise behavior	n (%)		State anger		Anger expression-in		Anger expression-out		Anger control	
			M (SD)	F (*p*) Sheffé	M (SD)	F (*p*)	M (SD)	F (*p*)	M (SD)	F (*p*) Sheffé
Nonregular exercise										
Precontemplation[a]	53	(18.3)	4.91 (2.67)	3.90 (.004) a, b>e	14.64 (3.65)	2.19 (.070)	14.68 (3.97)	1.22 (.304)	18.04 (4.45)	2.87 (.024) a<e
Contemplation[b]	115	(39.7)	4.83 (2.15)		15.92 (4.23)		14.91 (3.37)		19.60 (3.37)	
Preparation[c]	64	(22.1)	4.23 (2.32)		14.63 (4.13)		14.36 (3.38)		19.89 (3.81)	
Regular exercise										
Action[d]	31	(10.7)	3.97 (2.42)		14.00 (3.79)		14.61 (2.94)		19.74 (2.99)	
Maintenance[e]	27	(9.3)	3.15 (2.03)		14.59 (4.62)		13.33 (3.56)		20.59 (4.03)	

Note. M = mean; SD = standard deviation.
[a,b,c,d,e] Sheffé test: means with the different letter are significantly different.

previous study [10]. However, because the data of this study were collected from one hospital, future research needs to be conducted in multiple hospitals in various regions to generalize the results of this study.

In this study, only 20.0% of the nurses were engaged in regular exercise, indicating the severity of Korean nurses' lack of regular exercise behavior. This rate is lower than 60.2% of English nurses [17] and 39.5% of US attending physicians [24] but higher than 9.8% of residents in the US [24]. Interestingly, compared with physician groups [24,25], exercise behavior of the nursing workforce has hardly been addressed in the literature, indicating the need for assessing healthy lifestyles among clinical nurses. Reasons for not exercising regularly in this study included the lack of time, physical exhaustion, and not being able to find an individually tailored exercise program, which implies that fatigue from shift work [26] and lack of time [17] are the major factors for the lack of exercise in nurses. Family responsibility was reported to be a major barrier to regular exercise among adults in the previous study [27], but this was not the case in the present study, which may be due to the fact that most Korean nurses participating in this study were single and living alone or with spouse without children. Because nurses' fatigue from shift work can be reduced by exercise [28], nurses should be award of the benefits of regular exercise and initiate it in their daily routines.

In the prediction model, a significant association of exercise behavior with anger control was found, even after controlling for the general and work-related characteristics in the regression model. Therefore, it can be inferred that engaging in regular exercise may help nurses manage anger emotions. However, independent variables in this study explained only 15% of the variance in anger control, suggesting that there might be other predictors not examined in this study. In fact, activities such as meditation or art therapy are known to impact anger control in previous studies [29,30]. Therefore, future studies need to include other variables to improve explanatory power of the prediction model in anger control.

This study has other limitations. Because this study was conducted only for nurses recruited from one university hospital in South Korea, it is difficult to generalize the results of this study to

Table 4 *Levels of Anger Emotion (N=290).*

Variables	M±SD	Range
State anger	4.46 ± 2.36	0-10
Anger expression-in	15.07 ± 4.13	8-31
Anger expression-out	14.57 ± 3.47	8-29
Anger control	19.49 ± 3.76	9-32

Note. M = mean; SD = standard deviation.

Table 5 *Predictors of Anger Control (N = 290).*

Variables	Categories	Model 1				Model 2			
		B	β	t	*p*	B	β	t	*p*
(Constant)		2.28		6.27	<.001	2.19	.36	6.05	<.001
Age (yrs)		−0.01	−.09	−0.43	.666	−0.01	−.12	−0.55	.581
Marital status	Single (ref)								
	Married	0.05	.05	0.71	.482	0.09	.09	1.18	.239
Having religion	No (ref)								
	Yes	0.10	.10	1.54	.125	0.08	.08	1.34	.180
Education level	3-year university (ref)								
	4-year university	0.07	.07	0.90	.371	0.06	.06	0.82	.415
	RN-BSN	−0.18	−.15	−2.03	.044	−0.20	−.16	−2.19	.029
	Graduate school	−0.07	−.05	−0.59	.557	−0.09	−.07	−0.77	.444
Work department	General ward (ref)								
	Emergency unit	0.22	.14	2.35	.019	0.21	.13	2.24	.026
	Outpatient department	0.09	.07	0.96	.339	0.09	.07	0.92	.359
	Intensive care unit	−0.03	−.03	−0.47	.636	−0.02	−.02	−0.25	.802
	Operating room	0.18	.12	1.88	.061	0.17	.11	1.83	.068
Years working as an RN		0.00	.20	0.90	.368	0.00	.22	1.00	.317
Shift work pattern	Nonshift work (ref)								
	Shift work	0.05	.04	0.53	.600	0.04	.04	0.45	.652
Work position	Staff nurse (ref)								
	Charge nurse	0.23	.22	2.72	.007	0.21	.20	2.55	.011
	Unit manager	0.18	.09	1.01	.315	0.16	.08	0.88	.378
Exercise behavior						0.06	.15	2.60	.010
Adjusted R^2		.13				.15			
F (*p*)		4.05 (<.001)				4.31 (<.001)			

Note. BSN = bachelor of science in nursing; Ref = reference; RN = registered nurse; yrs = years.

nurses in other regions and cultures. Study results may vary by hospital grades, work department, gender difference, and personal habits. A sampling bias could also exist as the data were collected using a convenience sampling method. To improve representativeness of study participants, future studies need to recruit participants using proportional sampling strategies. In this study, state anger was measured using VAS, which made it difficult to compare study findings with those of other research. It is suggested, in future studies, to use a more valid and standardized measurement to evaluate state anger of nurses.

Conclusion

This study may contribute to the literature in that it provides evidence on regular exercise behavior as an anger management strategy for nurses by demonstrating the relationship between their exercise behavior and anger emotion. Therefore, nurses need to be aware that it is better to control their anger feelings rather than suppress them from the standpoint of mental health. In addition, examining the effects of an anger control program for nurses by applying regular exercise as an intervention variable is needed in future studies.

Conflicts of interest

The authors declared no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.anr.2019.01.009.

Source of research funding

This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (2017R1A2B1010413).

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