Work-Related Factors Associated With Health and Well-Being of Early Care and Education Workers

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Objective: We assessed and examined relationships between the health and working conditions of early care and education workers. **Methods:** We surveyed early care and education workers ($n = 2242$) about their socioeconomic characteristics; work organization; psychosocial, physical, and ergonomic exposures; coping behaviors; and health. **Results:** Nearly half of respondents reported chronic health conditions. Most worked full time, half earned less than $30,000 a year, and many reported unpaid hours or inability to take breaks. One-quarter reported economic strain. Numerous exposures were prevalent. Workers' general health was poorer than normed averages, although their physical functioning was slightly better. Sixteen percent of workers reported work-related injuries, and 43% reported depressive symptoms. Factors associated with health included socioeconomic characteristics, having a chronic condition, job type, access to benefits, eight psychosocial stressors, four physical exposures, sleep, and alcohol consumption. **Conclusions:** Findings support the need for attention to this workforce's health.

Keywords: early care and education, childcare, occupational health, health, work exposures, worker, well-being

LEARNING OUTCOMES

- After reading the article, readers will be able to describe at least five key characteristics of early care and education workers' work organization and work-related exposures based on one large statewide sample.
- After reading the article, readers will be able to describe the prevalence of five health-and wellness-related outcomes among early care and education workers based on one large statewide sample.

Educators and administrators working in the field of early care and education (ECE) play a vital role in the development of young children from birth to 5 years old. In recent decades, evidence about the importance of high-quality ECE experiences has grown.[1] As a result, demand for skilled ECE workers is increasing even as many continue to earn low to poverty-level wages.[2] ECE workers experience worse health compared with the US population as a whole or workers in other educational fields, demonstrating higher rates of poor overall health status, chronic disease, and depression.[3–6] Reasons for these disparities likely relate to a range of work-related factors, along with socioeconomic and personal health determinants.

ECE work is unique from that of other sectors in a variety of ways. It occurs in diverse settings, including private childcare centers, public early learning programs, family home care programs, and more. Privately run programs include those that are part of chains, as well as small or independent businesses. Using agencies and programs may work with a narrow range of child ages (eg, 4–5 years) or much broader. Although standard state and federal occupational and health standards typically apply, programs must also adhere to ECE-specific licensing requirements related to children, workers, or both—for example, child-to-provider ratios, training and credentialing requirements, and indoor and outdoor space specifications.[7] These licensing requirements are often established at the state or local level and address minimum health and safety standards pertaining to care for children. ECE workers face an increasing number of training, certification, and professional development requirements, including annual trainings that many must pay for; some states have begun to offering financial support to cover these costs.[8] Educational requirements for ECE work vary widely by state.[9] Work schedules often vary in their configurations and include full- or part-time hours throughout the year or excluding summers or other school breaks. Workers may be paid a salary or on an hourly basis, and benefits have often been minimal. Although some of these work characteristics are shared with other educational sectors (eg, K-12), ECE workers' rates of unionization, pay, and access to benefits tend to be lower and even vary further by ECE program type and characteristics (eg, age of children cared for).[9–11] ECE workers, as compared with K-12 teachers, are also more likely to speak a language other than English at home, identify as a race other than White, and be born outside the United States.[10]

Research on the ECE workforce has historically examined aspects of working conditions and provider well-being (eg, compensation, staff turnover, job satisfaction) and the ways in which the workforce affects the quality of care for children (eg, staff educational or training requirements).[12,13] With some exceptions,[6,14–17] less attention has been paid to the breadth and complexity of factors relating to the health of ECE workers. Although the relatively poor health status of the ECE workforce has been noticed, the ways in which specific work- and employment-related factors may contribute to workers' health have not been fully explored.

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In the fields of public and occupational health, there is growing recognition of ways that work impacts individual well-being and intersects with or contributes to health inequities.[18–22] The range of work-related determinants seen as pertinent to well-being has expanded far beyond occupational factors such as chemical, biological, and physical exposures. Psychosocial work factors, such as burnout and time pressures, have been studied for some time.[23,24] Aspects of work organization and employment quality—or the terms and conditions of employment—such as pay, hours, job security or precariousness, and provision of health insurance and other benefits are increasingly being studied.[25–28] Moreover, personal and socioeconomic factors interact with and shape work-specific determinants, and thus health outcomes.[29,30] Researchers have called for more study of the combined effects of occupational, social, and personal risk factors on health.[31]

In this article, we take a comprehensive view of the experience of ECE workers and work-related and social determinants of workers' health status. We examine traditional exposures—including physical, ergonomic, and psychosocial hazards—as well as ECE-specific psychosocial hazards and work organization factors, in addition to the demographics of this working population.

METHODS

Recruitment

This study sued a cross-sectional survey of all center-based ECE workers in one northwestern state (Washington). The full population of ECE workers in the state's early learning professional development registry as of January 2021 comprised the sampling frame. Eligible workers included those registered as working in center-based programs (as opposed to family home programs) and working with children up to 6 years old (excluding school age programs). Before the state early learning agency providing workers' contact information to our study team, 51 workers took an opportunity to opt out of the study.

In early 2021, the study team emailed invitations to all remaining individuals in the registry (n = 28,306) and invited them to participate in the survey. Email invitations were sent in English or Spanish, based on the language preference noted in the worker's database record. The study invitation included a link to the online survey in the same language and gave recipients the option to request a mailed hard copy survey. Before accessing the full survey, respondents answered screening questions to ensure study participants were 18 years or older, could understand English or Spanish, and had worked in a center with children younger than 6 years in the prior year. The survey was deployed during the early stages of the COVID-19 pandemic when many ECE workers experienced some employment disruptions.

The survey was pilot-tested with several ECE workers before full deployment and took an estimated 30 to 40 minutes to complete. All study participants had the opportunity to enter a raffle for a gift card after completing the survey; gift cards ranged in value from $20 to $500. The survey remained open for approximately 2 months. Informed consent was obtained from all subjects involved in the study, and the study was approved by an institutional review board.

Measures

Survey questions producing variables used in our analyses are described hereinafter. Some survey questions were developed by the research team, whereas others were used or adapted from existing tools.

Socioeconomic and Personal Characteristics

The socioeconomic and personal characteristics examined included workers' age, sex, race, and ethnicity; if they were born in the United States; whether they lived with young children; if they had any common chronic health conditions (eg, hypertension, diabetes, obesity); their level of education; and several economic factors (eg, household income, ability to pay for basic needs, food security status, and use of or access to safety net programs and health insurance).[6,32–34] Because of small samples within some race and ethnicity categories, these variables were combined and dichotomized to White and persons of color, the latter of which included all workers except those identifying as non-Hispanic White.

Years of ECE Experience and Work Organization

Questions about workers' work history and current ECE job (eg, aspects of work organization) addressed the number of years in ECE work, job type (administrator, teaching role, other), age range of children who workers cared for, pay, hours of work, frequency of unpaid work, ability to take breaks, and access to benefits (paid vacation or sick leave, employer wellness program).[6,35]

Psychosocial Work Exposures

Questions assessing psychosocial exposures included those comprising selected subscales from the short version of the Copenhagen Psychosocial Questionnaire II[36]: quantitative demands (lacking enough time for work), emotional demands (having to relate to others' problems and be in emotionally disturbing situations), influence at work (having a large degree of influence concerning work and the amount of work assigned), possibilities for development (work requiring initiative and having the possibility of learning new things at work), meaning of work (whether work is seen as meaningful or important), recognition (being recognized and appreciated, and treated fairly), social support from supervisors, work-family conflict (work having a negative effect on private life), and burnout (feeling worn out and emotionally exhausted). Additional questions pertaining to psychosocial exposures came from the Child Care Workers Job Stress Inventory[37] and related to ECE-specific job demands (parents blaming child behavior on care, parents bringing in sick children for care, and having to pay for work supplies) and job resources (the extent to which one feels respected at work and the extent to which one feels they help children develop).

Ergonomic and Physical Work Exposures

Questions pertaining to physical and ergonomic exposures were developed by the research team. Composite variables were created for question groupings based on responses for time spent in awkward positions (bent over, squatting, kneeling, sitting on the floor, or sitting in a child-sized chair), time spent with light work tasks (cleaning, vacuuming or sweeping, picking up toys or supplies, moving or lifting furniture, pushing strollers or pulling wagons), time spent toileting or providing diapering assistance, frequency of carrying or picking up a child, and frequency of being hit, bit, or tripped. Results of individual questionnaire items are presented in the online results (Supplemental Digital Content 1, http://links.lww.com/JOM/B315, Table).

Work-Related Injury and Illness

Aspects of injury and illness included the number of work-related injuries and days of work missed due to injuries in the prior year, as well as the number of illnesses, days worked while ill, and the reasons for working while ill in the prior year.[38]

Health Status

Other aspects of health that were measured included workers' self-rated general health (eg, excellent, very good, good, fair, or poor) and dimensions of physical health, including physical functioning (ie, moderate activities or stair climbing limited by physical health), role limitation (ie, accomplishing less than would like, being limited in work or activities), and pain using subscales from the Short Form-12 (SF-12),[39] depression as assessed by the revised 10-item Center for Epidemiological Studied Depression tool (CESD-R-10),[40] and perceived stress as assessed by the 10-item Perceived Stress Scale.[41]

Coping Behaviors

Finally, the survey asked about health and coping behaviors including sleep (amount and perceived quality) and amount of alcohol consumed.[6,42]

Analytic Approach

Respondents from the full sample of survey responses were excluded from the analytic sample if they did not answer a minimum number of questions in each survey section (66%–80%, depending on the section), if they answered fewer than 75% of all questions asked of them in the survey, or if they reported being unemployed at the time of the survey. Because the survey was conducted during the COVID-19 pandemic, some ECE workers in the registry were on temporary or permanent leave at the time and thus unable to report on the organization of their current work or current work exposures. Responses from unemployed workers were included in other analyses addressing the effects of the COVID-19 pandemic on this workforce, and reported on elsewhere.[43]

We first compared key demographics of the survey sample with those of nonrespondents using variables provided from the state's professional development registry (eg, staff role, age, race, ethnicity, sex, primary language). We then conducted descriptive analyses (eg, frequencies, means, SDs) for all survey variables, stratifying by ECE job type. Next, we developed independent models for five aspects of health and well-being to describe the numerous potential risk factors potentially simultaneously contributing to five dimensions of poor health among our sample of ECE workers: general health, injury at work, physical health, mental health, and economic health.

For each type of health outcome, we selected a representative dependent variable (described in Tables 1 and 3):

- Poor general health was represented by a score <44.7 on the general health question from the SF-12.[39] Scores for this item can range from 0 to 100, with scores lower than 50 indicating below average general health. The variable was dichotomized at the 25th percentile of our sample's distribution.
- Work-related injuries were represented by report of one or more injuries at work in the prior year.
- Poor physical functioning was represented by a score of <47.9 (25th percentile) on the SF-12 physical function subscale, with the same potential range and interpretation guidance as that for poor general health.[39]
- Poor mental health was represented by a depression score of 13 or higher as assessed by the CESD-R-10. Scores from this tool range from 0 to 30, with higher scores indicating more depressive symptoms.[40] Although a score of 10 or higher may be indicative of depressive symptoms, we dichotomized this variable at the 75th percentile in the same manner as we did for general health and physical functioning to characterize those in the sample with the poorest outcome.
- Poor economic health was represented by reported difficulty paying for the "very basics like food, housing, medical care, or heating" as "hard" or "very hard" as opposed to "somewhat hard," "not very hard," or "not hard at all."

Potential risk factor variables were the same for all five models and included variables pertaining to five domains: socioeconomic and personal characteristics, tenure in the field and work organization, psychosocial exposures, physical exposures, and coping behaviors. (Independent variables included in the modeling process are noted with asterisks in Tables 1, 2, and 3.) As with several of the dependent variables, risk factor variables pertaining to exposures were dichotomized so that high exposure values either below the 25th or above the 75th percentile, depending on the variable, were categorized as "most" exposed and all others as "least" exposed. For each outcome, we first ran a base model including, a priori, age, job title, and the age group of children cared for; these variables were included in all subsequent models. We then tested the association of potential risk factor variables in each of the five domains with each outcome using a forward stepwise procedure with $P < 0.05$ for entry. Once the domain-specific variables meeting this criterion were selected, we ran a combined model for each outcome, selecting variables across domains using $P < 0.05$ for entry. This multistep modeling approach was adopted to help avoid potential multicollinearity among the large number of potential independent variables and loss of data due to missingness for the full list of variables, while still including potential risk factors for multiple domains affecting health at work.

RESULTS

Participant Response

In total, 3299 ECE workers participated in the survey, 9% of the individuals in the initial contact list; 857 responses were excluded from the analytic sample because of ineligibility as described previously in Analytic Approach. Remaining respondents were more likely than nonrespondents to be an administrator (20% administrators compared with 10%) and to be White (66% White compared with 59%). Survey respondents were very similar to the nonrespondent population with respect to sex (95% female compared with 93%), age (mean age of 39.6 compared with 36.3 years), and ethnicity (16% Hispanic compared with 19% Hispanic). After this comparison, respondents reporting unemployment at the time of the survey ($n = 200$) were also removed from the sample, leaving 2242 respondents for analysis.

Socioeconomic and Personal Characteristics

A large majority of ECE workers identified as female (93%), White (72%), non-Hispanic (80%), and born in the United States (79%; Table 1). Respondents reported a mean age of 40 years. Fewer than one-quarter of respondents reported having young children at home, and fewer than half reported having a bachelor's degree or higher. Forty-three percent of respondents reported an annual household income less than $40,000, and between one-quarter and one-third of respondents reported difficulty paying for basic needs (eg, housing, food, medical expenses), food insecurity, or participation in a safety net program (eg, Medicaid, nutrition assistance). Nearly half reported living with one or more chronic health conditions. Ten percent of respondents lacked health insurance coverage. Higher percentages of teachers and "other" staff than administrators reported Hispanic ethnicity, a race other than White, and having been born outside the United States. Teachers and "other" staff also reported lower household incomes and higher rates of food and economic insecurity than administrators.

ECE Experience and Work Organization

Survey respondents had 11.5 years of ECE experience on average. Nearly two-thirds reported working in teaching roles, followed by administrators, and then other roles (eg, cook, programmatic support). Nearly half reported working primarily with children 2.5 years or older; the remainder worked primarily with infants or toddlers (22%) or children of multiple ages (30%; Table 2). More than 80% of respondents worked full time, with nearly a quarter working more than 40 hours per week. Nearly half of respondents reported annual ECE income of less than $30,000, and 38% reported working unpaid hours at least occasionally. Many respondents opted not to report how often they were able to take work breaks, but most of those that did reported that ability to take breaks was infrequent. Most respondents reported that their employer offered sick or vacation leave, but not a wellness program. Higher percentages of administrators than teachers and "other" staff reported working full time, working unpaid hours, and

TABLE 1. Socioeconomic and Personal Characteristics of ECE Worker Survey Respondents, Washington State, 2021

	All (n = 2242)	Job Type[a]		
		Administrators (n = 573)	Teachers (n = 1459)	Other (n = 206)
Age[a], mean (SD), yr	40.06 (12.96)	43.86 (11.76)	38.26 (12.97)	42.41 (13.50)
Missing/not specified, n (%)	7 (0.3)	0 (0)	5 (0.3)	2 (0.09)
Sex[a], n (%)				
Female	2079 (93)	538 (94)	1355 (93)	184 (89)
Male	98 (4)	23 (4)	56 (4)	18 (9)
Missing/not specified	65 (3)	12 (2)	48 (3)	4 (2)
Hispanic or Latino ethnicity[a], n (%)				
Yes	386 (17)	79 (14)	267 (18)	40 (19)
No	1802 (80)	482 (84)	1157 (79)	159 (77)
Missing/not specified	54 (2)	12 (2)	35 (2)	7 (3)
Race[a], n (%)				
White	1605 (72)	471 (82)	979 (67)	153 (74)
Persons of color	637 (28)	102 (18)	480 (33)	53 (26)
Born in the United States[a], n (%)				
Yes	1780 (79)	509 (89)	1084 (74)	183 (89)
No	419 (19)	58 (10)	339 (23)	22 (11)
Missing/not specified	43 (2)	6 (1)	36 (2)	1 (<1)
Child(ren) <5 yr old in household, n (%)				
Yes	520 (23)	134 (23)	344 (24)	42 (20)
No	1473 (66)	384 (67)	938 (64)	147 (71)
Missing/not specified	249 (11)	55 (10)	177 (12)	17 (8)
Lives with >1 chronic health condition(s)[a], n (%)[b]				
Yes	1020 (45)	231 (40)	714 (49)	73 (35)
No	1222 (55)	342 (60)	745 (51)	133 (65)
Education, n (%)				
Less than high school	32 (1)	6 (1)	23 (2)	3 (1)
High school	582 (26)	83 (14)	449 (31)	50 (24)
Associates	561 (25)	160 (28)	357 (24)	43 (21)
Bachelors	718 (32)	204 (36)	438 (30)	74 (36)
Graduate	274 (12)	101 (18)	142 (10)	30 (15)
Missing/prefer not to say	75 (3)	19 (3)	50 (3)	6 (3)
Annual household income[a], n (%)				
Up to $15,000	175 (8)	8 (1)	156 (11)	10 (5)
$15,000–$40,000	795 (35)	119 (21)	608 (42)	65 (32)
$40,000–$70,000	505 (23)	156 (27)	288 (20)	61 (30)
≥$70,000	546 (24)	235 (41)	261 (18)	50 (24)
Missing/unspecified	221 (10)	55 (10)	146 (10)	20 (10)
Ability to pay for basic needs[c], n (%)				
Somewhat hard, not very hard, or not hard at all	1598 (71)	457 (80)	981 (67)	157 (76)
Hard or very hard	553 (25)	92 (16)	419 (29)	41 (20)
Missing/not specified	91 (4)	24 (4)	59 (4)	8 (4)
Food security status, in last 12 mo				
Low or very low	719 (32)	120 (21)	536 (37)	61 (30)
High or marginal	1481 (66)	448 (78)	888 (61)	143 (69)
Missing/not specified	42 (2)	5 (1)	35 (2)	2 (1)
Use of >1 nutrition assistance programs[d], n (%)				
Yes	668 (27)	103 (17)	483 (30)	79 (35)
No	1774 (73)	490 (83)	1134 (70)	146 (65)
Use of Medicaid, n (%)				
Yes	528 (24)	121 (21)	357 (24)	50 (24)
No	1714 (76)	452 (79)	1102 (76)	156 (76)
Health insurance coverage, n (%)				
Yes, covered by employer	949 (42)	258 (45)	584 (40)	106 (51)
Yes, covered by another source	1077 (48)	274 (48)	714 (49)	87 (42)
No, not covered	213 (10)	41 (7)	159 (11)	12 (6)
Missing/not specified	3 (<1)	0 (0)	2 (<1)	1 (<1)

[a]Included as an independent variable in modeling.

[b]Includes a provider having been diagnosed by a health care provider with hypertension, heart disease, diabetes, or asthma, or a body mass index indicating obesity.

[c]Included as an dependent variable in modeling.

[d]Includes Supplemental Nutrition Assistance Program; Special Supplemental Nutrition Assistance Program for Women, Infants and Children; food pantry/bank; and free- or reduced-price school meals.

ECE, early care and education.

TABLE 2. Years of ECE Experience; Work Organization; and Psychosocial, Ergonomic, and Physical Exposures Experienced by ECE Worker Survey Respondents, Washington State, 2021

		Job Type[a]		
	All (n = 2242)	Administrators (n = 573)	Teachers (n = 1459)	Other (n = 206)
Years of ECE experience[a], mean (SD)	11.51 (8.77)	16.65 (8.20)	9.50 (8.12)	11.47 (9.00)
Missing/unspecified, n (%)	14 (0.6)	2 (0.3)	11 (0.8)	1 (0.5)
Work organization				
Age of children cared for most often[a], n (%)				
Infants and toddlers (<29 mo)	500 (22)	26 (5)	460 (32)	14 (7)
Preschool and school age (>30 mo)	1074 (48)	186 (32)	814 (56)	72 (35)
Multiple ages	668 (30)	361 (63)	185 (13)	120 (58)
Annual ECE pay[a], n (%)				
Up to $20,000	464 (21)	35 (6)	382 (26)	45 (22)
$20,000–$30,000	599 (27)	85 (15)	475 (33)	39 (19)
$30,000–$40,000	506 (23)	117 (20)	345 (24)	42 (20)
≥$40,000	509 (23)	293 (51)	158 (11)	58 (28)
Missing/unspecified	164 (7)	43 (8)	99 (7)	22 (11)
Typical hours worked per week[a], n (%)				
1–34 h	416 (19)	39 (7)	318 (22)	57 (28)
35–40 h	1279 (57)	206 (36)	958 (66)	113 (55)
>40 h	527 (24)	324 (57)	169 (12)	34 (17)
Missing/unspecified	20 (1)	4 (1)	14 (1)	2 (1)
Frequency of working unpaid hours, n (%)				
Never	1092 (49)	190 (33)	779 (53)	120 (58)
Occasionally or monthly	502 (22)	146 (25)	316 (22)	40 (19)
Weekly or daily	351 (16)	168 (29)	163 (11)	20 (10)
Missing/unspecified	297 (13)	69 (12)	201 (14)	26 (13)
Ability to take work breaks[a], n (%)				
Never or some of the time	934 (42)	305 (53)	550 (38)	78 (38)
Most of the time or always	876 (39)	196 (34)	596 (41)	82 (40)
Missing/unspecified	432 (19)	72 (13)	313 (21)	46 (22)
Employer offers paid vacation time[a], n (%)	1585 (71)	446 (78)	986 (68)	151 (73)
Employer offers paid sick leave[a], n (%)	1794 (80)	495 (86)	1121 (77)	174 (84)
Employer offers wellness program[a], n (%)	448 (20)	117 (20)	267 (18)	62 (30)
Psychosocial exposures, most exposed, n (%)[b]				
Quantitative demands[a]	557 (25)	215 (38)	308 (21)	34 (17)
Emotional demands[a]	627 (28)	237 (41)	331 (23)	58 (28)
Lack of influence[a]	684 (31)	102 (18)	525 (36)	57 (28)
Lack of possibilities for development[a]	660 (29)	95 (17)	497 (34)	68 (33)
Lack of meaning[a]	590 (26)	123 (21)	403 (28)	63 (31)
Lack of recognition[a]	587 (26)	93 (16)	444 (30)	50 (24)
Lack of social support from supervisor[a]	568 (25)	126 (22)	395 (27)	47 (23)
Work-family conflict[a]	855 (38)	250 (44)	532 (36)	72 (35)
Burnout[a]	875 (39)	261 (46)	543 (37)	69 (33)
Parents blame child's bad behavior on care[a]	1205 (54)	368 (64)	716 (49)	120 (58)
Parents bring in sick children[a]	786 (35)	153 (27)	568 (39)	64 (31)
Buy supplies with own money[a]	580 (26)	139 (24)	417 (29)	24 (12)
Do not feel respected for work[a]	611 (27)	139 (24)	425 (29)	47 (23)
Do not feel helping children develop[a]	542 (24)	137 (24)	331 (23)	73 (35)
Physical and ergonomic hazards, most exposed, n (%)[b]				
Time in awkward positions (bent over, squatting, sitting on floor or in child-sized chair)[a]	540 (24)	96 (17)	426 (29)	17 (8)
Time spent carrying or picking up a child[a]	557 (25)	122 (21)	403 (28)	31 (15)
Times hit, bit, or tripped by a child[a]	563 (25)	130 (23)	398 (27)	34 (17)
Time spent in light work (cleaning, vacuuming or sweeping; picking up toys/supplies, moving/lifting furniture; pushing strollers; pulling wagons)[a]	519 (23)	121 (21)	361 (25)	36 (17)
Time spent diapering or with toilet assistance[a]	565 (25)	91 (16)	444 (30)	29 (14)

[a]Included as an independent variable in modeling.

[b]Measure based on responses to one or more questions. Numbers and percentages for all measures in this category refer to those responses scored in the 25th or 75th percentile indicating highest exposure. The denominator for the percent is all respondents, including those with missing data.

ECE, early care and education.

an inability to take breaks, and that they were more likely to have access to paid vacation and sick leave.

Work-Related Exposures

The psychosocial exposures reported by the largest percentage of respondents overall included burnout and exposure to sick children, followed by lack of influence, not feeling respected, having to buy work supplies, and emotional demands (eg, having to relate to others' problems). On the other hand, very few respondents reported feeling that their work lacked meaning, that they did not feel they helped children grow, or that they lacked opportunities for development (Supplemental Digital Content 1, http://links.lww.com/JOM/B315, Table).

TABLE 3. Work-Related Injury, Illnesses, Health Status, and Coping Behaviors of ECE Worker Survey Respondents, Washington State, 2021

	All (n = 2242)	Job Type		
		Administrators (n = 573)	Teachers (n = 1459)	Other (n = 206)
Injuries and illness, n (%)				
No. work-related injuries in last year[a]				
0	1843 (82)	517 (90)	1155 (79)	169 (82)
≥1	366 (16)	52 (9)	277 (19)	35 (17)
Missing/unspecified	33 (1)	4 (1)	27 (2)	2 (1)
Days missed due to work-related injuries in last year				
0	2012 (90)	540 (94)	1279 (88)	191 (93)
1–5	159 (7)	26 (5)	119 (8)	12 (6)
6–10	11 (<1)	2 (<1)	8 (1)	1 (<1)
≥11	30 (1)	3 (1)	27 (2)	0 (0)
Missing/unspecified	30 (1)	2 (<1)	26 (2)	2 (1)
No. infectious illnesses in last year[b]				
0–5	2086 (93)	548 (96)	1339 (92)	196 (95)
≥6	109 (5)	14 (2)	87 (6)	7 (3)
Missing/unspecified	47 (2)	11 (2)	33 (2)	3 (1)
Days worked with infectious illness in last year				
0	1325 (59)	380 (66)	797 (55)	146 (71)
1	178 (8)	40 (7)	125 (9)	13 (6)
2–5	408 (18)	86 (15)	293 (20)	28 (14)
6–10	96 (4)	20 (3)	67 (5)	9 (4)
>10	114 (5)	19 (3)	91 (6)	3 (1)
Missing/unspecified	121 (5)	28 (5)	86 (6)	7 (3)
Reasons for working while ill (of those working 1 or more days while ill)				
Did not feel ill enough to stay home	200 (25)	51 (31)	135 (23)	13 (25)
Did not have anyone to cover my shift	156 (20)	36 (22)	111 (19)	8 (15)
Felt an obligation to colleagues	157 (20)	42 (25)	107 (19)	8 (15)
Could not afford loss of income	140 (18)	17 (10)	112 (19)	11 (21)
Did not believe I was contagious	50 (6)	11 (7)	33 (6)	6 (11)
Did not have sick leave	47 (6)	2 (1)	41 (7)	4 (8)
Anticipated disciplinary action	37 (5)	3 (2)	34 (6)	0 (0)
Felt an obligation to children	36 (5)	4 (2)	29 (5)	3 (6)
Other				
Health status				
General health[a,c,d], n (%)				
>44.7 (better outcome)	1959 (87)	500 (87)	1276 (87)	179 (87)
<44.7 (poor outcome)	269 (12)	70 (12)	173 (12)	26 (13)
Missing/unspecified	14 (1)	3 (1)	10 (1)	1 (1)
Physical functioning[a,c,d], n (%)				
>47.9 (better outcome)	1565 (70)	416 (73)	1011 (69)	136 (66)
<47.9 (poor outcome)	635 (28)	150 (26)	420 (29)	63 (31)
Missing/unspecified	42 (2)	7 (1)	28 (2)	7 (3)
Depression[a,c,e] n (%)				
<13 (better outcome)	1558 (69)	417 (73)	992 (68)	147 (71)
>13 (poor outcome)	647 (29)	151 (26)	437 (30)	57 (28)
Missing/unspecified	37 (2)	5 (1)	30 (2)	2 (1)
Perceived stress (PSS-10)[f], mean (SD)	14.81 (6.69)	14.19 (6.41)	15.11 (6.76)	14.43 (6.93)
Missing/unspecified, n (%)	25 (1)	2 (<1)	23 (2)	0
Health and coping behaviors				
Typical sleep duration, per night[b], n (%)				
Up to 7 h	1574 (70)	426 (74)	1001 (69)	146 (71)
≥7 h	637 (28)	144 (25)	432 (30)	58 (28)
Missing/unspecified	31 (1)	3 (1)	26 (2)	2 (1)
Typical sleep quality[b], n (%)				
Very poor or poor	596 (27)	143 (25)	390 (27)	63 (31)
Fair	929 (41)	248 (43)	598 (41)	82 (40)
Good or very good	694 (31)	180 (31)	453 (31)	58 (28)
Missing/unspecified	23 (1)	2 (<1)	18 (1)	3 (1)
Amount of alcohol consumed when drinking[b], n (%)				
≤2 alcoholic drinks	1873 (84)	496 (87)	1212 (83)	163 (79)
≥3 alcoholic drinks	290 (13)	64 (11)	187 (13)	37 (18)
Missing/unspecified	79 (4)	13 (2)	60 (4)	6 (3)

[a]Included as a dependent variable in modeling.

[b]Included as an independent variable in modeling.

[c]Number and percent refer to those responses scored in the 25th or 75th percentile indicating the poorest outcome. The denominator for the percent is all respondents, including those with missing data.

[d]T-scores are based on the Short-Form 12 and can range from 0 to 100, with an SD of 10; scores higher than 50 indicate above average, and scores lower than 50 indicate below average.[29]

[e]Assessed using the revised, 10-item Center for Epidemiological Studies Depression tool. Using this tool, higher scores indicate more depressive symptoms.[30]

[f]Assessed using the 10-item Perceived Stress Scale. Using this tool, a score of 0 to 13 is considered low, 14 to 26 is considered moderate, and 27 to 40 is considered high perceived stress.[31]

ECE, early care and education.

TABLE 4. Association of Health Outcomes With Selected Risk Factors

	Odds Ratio (SE)				
	Poor General Health[a] (*n* = 1897)	**More Than 1 Injury[b] (*n* = 1541)**	**Poor Physical Functioning[c] (*n* = 1632)**	**Poor Mental Health[d] (*n* = 1606)**	**Difficulty Paying for Basics[e] (*n* = 1563)**
A priori included variables					
Constant	0.07 (0.03)**	0.01 (0.01)**	0.03 (0.01)**	0.47 (0.19)	0.08 (0.03)**
Age (10 yr)	1.00 (0.07)	1.21 (0.08)**	1.33 (0.06)**	0.85 (0.05)**	1.18 (0.07)**
Job type (Ref: administrator)	1.0	1.0		1.0	1.0
Teacher/aid	0.83 (0.18)	2.23 (0.53)**	1.34 (0.22)	1.11 (0.22)	1.21 (0.24)
Other	0.97 (0.27)	1.90 (0.58)*	1.37 (0.30)	0.99 (0.26)	1.16 (0.32)
Age of children cared for (Ref: infant/toddler)	1.0	1.0		1.0	1.0
Preschool and older	0.86 (0.18)	1.02 (0.19)	1.02 (0.15)	0.87 (0.16)	1.20 (0.20)
Mixed ages	1.02 (0.26)	1.34 (0.32)	0.94 (0.18)	0.77 (0.18)	1.00 (0.22)
Socioeconomic characteristics					
Sex (Ref: male)			1.0		
Female			2.72 (1.07)*		
Not specified			2.89 (1.50)*		
Persons of color (Ref: White)	1.62 (0.27)**				
Country of origin (Ref: United States)				1.0	
Non-US born				0.57 (0.12)*	
Not specified				3.41 (2.95)	
Household income (Ref: <$15,000)		1.0			1.0
$15,000–$40,000		1.13 (0.32)			1.30 (0.31)
$40,000–$70,000		0.91 (0.28)			0.63 (0.17)
>$70,000		0.60 (0.19)			0.37 (0.11)**
>1 chronic health condition (Ref: no conditions)	3.10 (0.55)**	1.45 (0.22)*	1.87 (0.23)**	1.37 (0.19)*	
Work organization					
Offers wellness program (Ref: no)	1.46 (0.24)*				1.87 (0.27)**
Offers paid vacation (Ref: no)				0.70 (0.11)*	
Offers paid sick leave (Ref: no)					0.53 (0.09)**
Psychosocial exposures					
Highest burnout[f] (Ref: lower)			1.35 (0.17)*	3.90 (0.62)**	1.79 (0.26)**
Highest emotional demands[f] (Ref: lower)		1.59 (0.26)**		1.75 (0.27)**	
Highest work-family conflict[f] (Ref: lower)	1.79 (0.30)**	1.61 (0.26)**		1.84 (0.29)**	
Least respected for work[f] (Ref: more)	1.56 (0.26)**			1.49 (0.23)**	1.65 (0.27)**
Parents most frequently bring sick children[f] (Ref: less)			1.38 (0.17)*		
Least possibilities for development[f] (Ref: more)				1.41 (0.22)*	
Least influence[f] (Ref: more)		1.45 (0.23)*			
Least recognition[f] (Ref: more)					1.49 (0.24)*
Physical and ergonomic exposures					
Most hit, bit, or tripped[f] (Ref: less)		3.11 (0.50)**			1.52 (0.23)**
>5 infectious illnesses in prior year (Ref: <5)	1.95 (0.53)*	1.83 (0.51)*	1.73 (0.44)*		2.51 (0.68)**
Most time spent in light work[f] (Ref: less)			1.53 (0.22)**		
Most time in awkward positions[f] (Ref: less)			0.69 (0.11)*		1.71 (0.25)**
Health and coping behaviors					
Sleep >7 h/night (Ref: <7 h/night)	1.27 (0.28)		0.71 (0.11)*	0.77 (0.14)	
Sleep quality (Ref: poor or very poor)	1.0			1.0	
Fair	0.38 (0.07)**		0.72 (0.10)*	0.42 (0.07)**	
Good or very good	0.19 (0.05)**		0.62 (0.11)**	0.14 (0.03)**	
Have >2 drinks when drinking alcohol (Ref: <2)				1.82 (0.34)**	

* $P < 0.05$; ** $P < 0.01$.

[a]Based on the Short Form-12 general health score: a score >44.7 indicates a better outcome, whereas a score <44.7 indicates a poorer outcome.

[b]Based on reported number of injuries at work in prior 12 months. An injury was defined as something that required first aid or time off from work.

[c]Based on Short Form-12 physical functioning subscale score: a score >47.9 indicates a better outcome, whereas a score <47.9 indicates a poorer outcome.

[d]Based on the Center for Epidemiological Studies Depression Scale: a score of <13 indicates a better outcome, whereas a score of 13 or higher indicates a poorer outcome.[30]

[e]Based on the response to the question "How hard is it for you to pay for the very basics like food, housing, medical care, or heating?": a response of "somewhat hard," "not very hard," or "not hard at all" indicates a better outcome, whereas a response of "hard" or "very hard" indicates a poorer outcome.

[f]Refers to those responses scored in the 75th percentile, indicating highest exposure.

Table 2 presents the number and percent of respondents categorized as most exposed to work-related psychosocial exposures based on individual or subscale scores. Higher percentages of administrators than teachers and "other" staff were most exposed to parent blame for children's bad behavior, burnout, work-family conflict, more demands (eg, lack of time for work), and emotional demands. For most other psychosocial factors, higher percentages of teachers and "other" staff were most exposed as compared with administrators, including lack of influence, possibilities for career development, meaning in work, recognition, and social support, as well as exposure to sick children, having to purchase work supplies with their own money, and not feeling respected.

With regard to ergonomic and physical exposures, more than one-quarter of respondents reported picking up a child from a raised

surface (eg, crib or table) more than five times a day, and more than one-third reported doing so from the floor (Supplemental Digital Content 1, http://links.lww.com/JOM/B315, Table). Nearly a quarter reported sitting in a child-sized chair for at least 1 hour per day, and nearly one-third reported standing bent over for more than 2 hours each day. Approximately one-quarter reported being hit (28%) or tripped (23%) by a child as fairly or very common in a typical day. Nearly half of respondents reported cleaning with cleaning supplies for at least 1 hour per day, and 29% reported spending at least an hour each day moving furniture. Higher percentages of teachers than administrators or staff in "other" roles were categorized as most exposed to all composite ergonomic and physical hazards examined (Table 2).

Injury, Illness, and Health

Table 3 presents the number and percent of respondents reporting various work-related injuries and illnesses, aspects of health status, and coping behaviors (see Supplemental Digital Content 2, http://links.lww.com/JOM/B316, Table, for additional descriptive statistics associated with questions and composite scores, including those dichotomized to serve as outcome variables). Sixteen percent of all respondents reported one or more work-related injury in the prior year, and slightly fewer reported missing any work because of injury. Only 5% of respondents reported experiencing six or more infectious illnesses in the prior year. Thirty-five percent reported working at least 1 day while ill. The most frequently reported reasons for working while ill included not feeling ill enough to stay home, not having anyone to cover their shift, feeling an obligation to colleagues, and to avoid losing income.

Table 3 also presents results for the general health, physical functioning, and mental health (depression) variables dichotomized at the 25th or 75th percentile, as they are used in the regression analyses. These results show no difference in general health by job type, but slightly higher percentages of teachers and "other" staff than administrators reported the poorest physical functioning and depression scores. As detailed in Supplemental Digital Content 2, http://links.lww.com/JOM/B316 (Table), most respondents (87%) reported their health as good, very good, or excellent. Respondents reported mean scores of 49.5 for general health, 52.2 for physical functioning, 49.7 for role limitation, and 48.4 for pain, all of which are near the normed mean score of 50.[39] Respondents reported a mean depression score of 9.51 on a scale of 0 to 30, with 43% reporting scores meeting the threshold for depressive symptoms (a score of 10 or greater). A substantial number of respondents reported moderate to severe pain in their shoulders, neck, upper back (41%), or low back (40%).

Respondents also reported a mean perceived stress score of 14.8, which equates to moderate perceived stress (Table 3).[41] Seventy percent of respondents reported fewer than 7 hours of sleep per night, and less than one-third rated their typical sleep as good or very good. Most respondent reported drinking alcohol monthly or less frequently and consuming two or fewer alcoholic drinks in those instances.

Risk Factors for Injury and Poor Physical Functioning, General Health, Mental Health, and Economic Health

Results of multivariable regression to examine potential risk factors for the five selected outcomes are provided in Table 4. Older workers were at higher risk for injury, poor physical functioning, and economic strain, but lower risk for poor mental health. Compared with administrators, teachers and other workers were at higher risk for injury. Despite our expectation that the age of children cared for would predict health-related outcomes, this did not occur with statistical significance for any of the five outcomes.

Regarding workers' socioeconomic characteristics, women and those not specifying a sex were at higher risk for poor physical functioning compared with men, but sex was unrelated to the other four outcomes. Workers of color reported poorer general health, but no differences were seen in the other outcomes. As would be expected, higher household income was associated with lower economic strain, whereas having one or more chronic health conditions was associated with the four health outcomes, but not economic strain.

In terms of work organization, those with access to paid vacation had lower odds of poor mental health, and access to sick leave was associated with lower levels of economic strain. Interestingly, hours of work and ECE-related income were not associated with any of the health outcomes in these models, whereas those at working at centers offering wellness programs had poorer general and economic health.

Eight of the 14 examined psychosocial exposures were associated with one or more of the five outcomes, with the highest number of associations and some of the largest odds ratios occurring for poor mental health. Three stressors—burnout, work-family conflict, and low respect at work—were each related to three adverse health outcomes. High emotional demands of work, parents bringing sick children to work, limited opportunities for professional development, low influence, and low recognition were risk factors for one or two poor outcomes.

For ergonomic and physical exposures, those reporting being hit, bit, or tripped were more likely to report being injured at work and economic strain. Frequent infectious illness was associated with all poor outcomes except mental health. Those reporting more time in awkward postures had lower odds of poor physical functioning, whereas time spent in light work tasks was associated with poor physical functioning.

Higher quality of sleep was associated with better general health, mental health, and physical functioning outcomes, whereas amount of sleep was associated with better physical functioning. Alcohol consumption was associated with poor mental health.

DISCUSSION

Although ECE has not historically been considered dangerous work, ECE workers are exposed to multiple safety and health risks at their work environment. To our knowledge, this is one of the largest and most detailed surveys documenting working and employment conditions related to the health of ECE workers conducted to date. We assessed multiple dimensions of health among this workforce including general health, physical functioning, mental health, injury, and economic strain. We also examined associations between these health outcomes and a wide range of potential work-related and social determinants to explore their contribution on ECE workers' health.

Given that this sample included only actively working individuals with a mean age of 40 years, the prevalence of some poor health outcomes reported is notable. In our study, the mean score for general health was slightly below the normed average for the measure, and the percent of respondents reporting fair or poor health (12%) was somewhat higher than a broader adult population between the ages of 18 and 44 years in the state where the study was based (8%).[44] A distressingly high percentage of workers (43%) also reported depressive symptoms. The percentage of respondents meeting the threshold for depressive symptoms in this sample was similar to, but slightly higher than, that reported in other ECE worker studies using slightly different versions of the CESD instrument.[6,15] On the other hand, respondents in our sample reported physical functioning slightly above average. The percentage of ECE workers in our sample reporting a work-related injury in the prior year (16%) was considerably higher than the rate reported by the Bureau of Labor Statistics for the industry category inclusive of ECE workers (3.1 per 100 workers)[45]—although injuries reported by our sample may have included more minor injuries that go unreported to data sources used by the Bureau of Labor Statistics. Finally, one-quarter of workers reported finding it hard or very hard to pay for their basic needs. This finding aligns with a strong theme in the ECE workforce literature relating to economic vulnerability.[12,46]

Our findings demonstrate that psychosocial exposures are commonly experienced by ECE workers and associated with poor health.

More than a quarter of ECE workers reported frequently experiencing aspects of at least six of the psychosocial exposures assessed, with more than 40% reporting burnout. As has been reported elsewhere,[15] ECE teachers and administrators in our sample differed in the psychosocial exposures they experience; for example, teachers were more likely than administrators to experience limited influence or possibilities for development at work, whereas administrators were more likely to report high levels of emotional demands. For the sample as a whole, eight psychosocial exposures were associated with one or more of the key outcomes, especially poor mental health. Other research has found that psychosocial working conditions—such as lack of job control, the need to manage difficult child behaviors, chaotic work environments, and interactions with and expectations of parents—are commonly reported, and these conditions have been linked with poor ECE worker mental health outcomes, such as emotional exhaustion, stress, and burnout.[13,16,37,47–49] Among our sample, burnout, work-family conflict, and feeling disrespected for work, each contributed to three of the five dimensions of health and well-being.

We also found that ergonomic and physical exposures were prevalent among ECE workers in our sample and associated with four of the five health and economic outcomes. ECE work can be physically demanding given the amount of time spent lifting and carrying children, kneeling, and sitting or bending in awkward positions.[50–52] Indeed, in our sample, many teachers in particular reported spending more than 2 hours each day in awkward positions, especially standing bent over, lifting children many times a day, and being frequently hit by children. Interestingly, although light work, time in awkward postures, and frequency of being hit, bit, or tripped were associated with health outcomes, lifting or carrying children was not. It seems plausible that the health of ECE workers may influence some of the work types or ergonomic positions in which they engage. For example, the risk of poor physical functioning was lower for workers who spend more time in awkward postures and higher for those spending more time doing light work. Some workers may avoid awkward positions or seek out lighter work because of their physical state.

ECE workers also regularly face other exposures, including biohazards and infectious disease.[52] In this study, nearly a third of workers spent 2 hours or more each day cleaning, and more than a third reported that parents bring sick children in for care. Although most workers reported experiencing relatively few illnesses, more than a quarter reported working at least a few days while ill in the prior year. This is striking given that the survey was conducted approximately 1 year into the COVID-19 pandemic when sensitivity to infectious illness was high. Experiencing more frequent infectious illnesses was associated with four of the five poor outcomes in our study—especially economic strain, but also general health, injury, and poor physical functioning. It seems likely that the pandemic context played a role in these findings. During the pandemic, rules in many centers became stricter about cleaning protocols and working while ill, and many workers may have run out of paid sick time, for example.[53]

It is perhaps notable how few aspects of work organization emerged as significant in our models. Three work organization variables, including ECE pay, the number of hours worked each week, and the ability to take breaks, were not associated with any of the outcomes and therefore did not make it into any of the final models. This was true, even though sizeable portions of the sample reported working more than 40 hours per week, working some unpaid hours, and a limited ability to take breaks. In other studies, low wages and minimal benefits have been associated with poor health outcomes, potentially as a result of financial-related stressors and more limited access to health-supporting resources.[27,54] It is possible that ECE pay was not associated with health outcomes in these models, partly because of the inclusion of job title and household income in the models, both of which are related to wage. Other studies have also shown that ECE workers tend to earn few benefits such as paid leave or health insurance, which can further compound financial stresses; higher percentages of workers in this sample than elsewhere likely have access to paid sick and vacation leave because of a mandated sick leave policy in the state.[55] As might be expected, access to paid vacation was associated with better mental health, and sick leave was associated with better ability to pay for the basics. The reasons for access to a worksite wellness program being associated with poorer general and economic health are difficult to explain.

Finally, socioeconomic and personal factors, including age, health conditions, and health and coping behaviors (eg, diet, smoking, sleep, alcohol consumption), can also be important determinants of general health and may also be influenced by or interact with work-related factors in ways that influence health.[56–58] In our sample, living with a chronic condition, age, and reported sleep quality were each associated with three or four of the five poor outcomes, although increased age was also associated with more positive mental health. Nearly half of workers in the sample reported one or more chronic conditions, and it is perhaps not surprising that having a chronic condition had the largest effect size for the general health model. Reasons for high rates of chronic disease in this population are themselves multifaceted and likely related to both work and other personal factors.

Sex, race, country of origin, and household income were each found to be associated with one health outcome. Links between health and social factors—such as sex, race, income, and others—are well established and would presumably play a role in health disparities experienced by ECE workers given that workers who are female, are Black, and speak a language other than English at home are overrepresented in the ECE field as compared with the general US population.[10,59,60] The limited associations observed between these and other risk factors may be the result of our examining only those selected into ECE work and other limitations of our analytic approach.

Our approach to assessing risk in this population had both strengths and weaknesses. Strengths of our approach include the study's large sample size and the fact that the sample was generally representative of one state's population of ECE workers. We also assessed a wide range of psychosocial, physical, economic, and personal factors using multiple measures for each, many with well-established tools. As with all surveys, however, the data are potentially subject to self-report biases. It may be difficult for workers to assess the frequency and amount of time spent in specific postures, positions, or activities, for example. We used dichotomized versions of key exposure variables in part to address this likely imprecision. Given that this survey was conducted during the COVID-19 pandemic, it is also possible that perceptions of and experiences with some work factors and exposures differed in important ways from those experienced at other times, or that some workers with poorest health had stopped working during this period. Indeed, analyses reported elsewhere describe the range of pandemic-specific impacts experienced by this population and showed that ECE work changed substantially in a range of ways during this time.[43] Finally, our cross-sectional study design does not allow us to make causal inferences between risk factors and assessed outcomes. For instance, the association between poor sleep quality and depression could be causal in either direction. Nevertheless, observing this association may provide clues to needed interventions. Despite the inability to determine causal linkages in these data, we feel that it is useful to consider this breadth of multifactorial associations between potential risk factors and health in a manner that allows for the strongest associations to emerge.

In this study, we were interested in understanding ECE workers' experiences related to a wide range of risk factors, including classical occupational health exposures, psychosocial conditions, aspects of work organization, and upstream socioeconomic characteristics—all of which can individually or in combination result in poor health outcomes. In addition, we examined outcomes that included multiple dimensions of health and economic well-being. This broad perspective stems from the increasing importance for occupational health researchers to consider the complex interactions between work and nonwork factors in determining workers' health and contributing to disparities in

health across populations.[21,31] Rather than only being a source of widely studied hazardous exposures, work is bidirectionally intertwined with important social determinants of health. We note that several scholars have attempted to use more holistic statistical frameworks, such as clustering approaches, to elucidate the complex patterns of interacting risk factors experienced by workers[27,61,62]—with some studies including detailed information from nonwork life domains[63]—and their associations with poor health. Although these approaches have the advantage of identifying typologies of risk factors, they often have a limited ability to identify specific working conditions associated with an outcome. Instead, we chose to use a more standard multivariable regression approach. However, to accommodate the large number of potential risk factors, we grouped them into general types of risks, tested the components of each of these groups separately, and subsequently combined them into a final model identifying the risks most strongly associated with our outcomes.

In conclusion, in this large survey of the center-based ECE workforce in Washington State, we documented high levels of some adverse health outcomes, including general health, injury, mental health, and economic health, despite the relatively young age of the population, and the fact that they were all working at the time of the survey. In addition, we documented risk factors potentially contributing to poor health in several domains: socioeconomic characteristics, work organizational factors, psychosocial stressors, physical occupational exposures, and coping behaviors. Variables within each of these domains seem to be significantly associated with poor health outcomes, although in somewhat different ways and in different combinations. The significance of the findings is somewhat muted by the subjective and cross-sectional nature of the survey data, and the potential for many factors being correlated. Nevertheless, our findings support the need for additional attention to this vital workforce and the myriad factors contributing to their health, as well as the well-being of the children and families that they serve.

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