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Work and SCI: a pilot randomized controlled study of an online resource for job-seekers with spinal cord dysfunction

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Abstract

Study design A prospective, parallel randomized controlled trial (RCT).

Objectives To test the preliminary effects of an online resource targeted to job-seekers with spinal cord injury or disorder (SCI/D), and to determine the feasibility of proceeding to a full-scale RCT.

Setting A community cohort in Australia.

Methods Forty-eight adults ($M = 42$ years, $SD = 10.95$, 27 males) were randomized to receive 4-weeks access to the *Work and SCI* resource ($n = 25$) or to a wait-list control group ($n = 23$). The *Work and SCI* intervention involved six stand-alone learning modules which provided job-searching and career-planning information through text, videos, and interactive activities. Self-report measures were administered at baseline and after 4 weeks: *Job Procurement Self-Efficacy Scale (JSES)*, *Life Orientation Test-Revised (LOT-R)*, and *Patient Health Questionnaire-9 (PHQ-9)*.

Results Online usage data identified high uptake of the *Work and SCI* resource, although study attrition was problematic. Intention-to-treat analyses failed to reach statistical significance, whereas complete data revealed a significant interaction effect for optimism (LOT-R).

Conclusion Further research to develop and enhance *Work and SCI* is indicated. Remediable strategies to optimize recruitment and statistical power in a future definitive RCT are discussed.

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Introduction

Unemployment is highly prevalent among Australians living with a spinal cord injury or disorder (SCI/D). As many

as 60% living with a traumatic SCI experience long-term job loss [1, 2], despite many being capable of engaging in paid work. Equally problematic is underemployment: people with a disability are more likely to experience unstable employment of inferior or lower quality, in comparison to able-bodied peers with similar levels of education and work history [3]. Work is not only critical to achieving financial independence but important for optimal physical health and psychological well-being post injury [4]. Conversely, both

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unemployment and underemployment are associated with reduced confidence in one's abilities (i.e., lowered self-efficacy), increased pessimism (helplessness and hopelessness), and depressed mood—factors that inevitably undermine a person's quality of life [3, 5]. Interventions to improve employment outcomes for persons with SCI/D are therefore critical.

While early, targeted employment support services can make competitive work a reality for injured individuals [6], currently available services in Australia are typically delivered post hospital discharge by a disorganized assemblage of federal government-approved Disability Service Providers [7–10]. These services are significantly constrained by cost and accessibility—particularly for those residing in regional areas [7]. Our own research also indicates that consumers living with severe impairment and complex needs are dissatisfied with the quality of available employment supports, with many not receiving the services they require to access and maintain employment [11]. Moreover, there remains a lack of controlled research in this area [12].

To help improve return-to-work outcomes of individuals with SCI/D living in Australia, our team of multidisciplinary SCI specialists, in consultation with an advisory group of consumers, developed and tested a freely accessible, online information resource. Our *Work and SCI* resource targets a range of job-search activities and processes, as indicated by systematic reviews of employment readiness interventions for the SCI cohort [13, 14]. This includes generic employment-related knowledge (e.g., knowledge of the labor market) and specific job search and job retention skills (e.g., coping with work and disability). The aim is to enhance self-management and self-efficacy, or perceived self-competence, in the job search process. This is important as good information and planning about work-related issues and options can help job-seekers maintain a positive attitude and, in turn, increase their chances of employment success [11]. Indeed, how a person views his or her job search knowledge and skills, in addition to self-confidence in their job search, determines their success in finding work, even in the face of obstacles experienced [15].

The results from our initial feasibility trial of *Work and SCI* were promising [11]. Participants engaged in the modules, commenting favorably on the tailored multimedia approach, which included links to personal case stories. The generic information on job-seeking was also seen as very helpful. The next project phase is to test the preliminary effects of *Work and SCI* using a randomized controlled design. There are, however, challenges with undertaking a controlled design with a low-incidence disorder such as SCI. Indeed, the methodological quality of available RCTs conducted with this population remains characteristically

low [16]. The scientific rigor of a full-scale RCT can, however, be improved by undertaking pilot work to facilitate sample-size calculations [17]. The present study therefore had two aims: (1) check the usage and preliminary effects of *Work and SCI* in a pilot RCT; and (2) collect data to inform sample size and evaluation in a future, definitive RCT.

Methods

Sample eligibility

Inclusion criteria required that participants be Australian residents (aged 18–65 years) with a SCI/D who were currently unemployed (with or without a work history). Those in uncertain employment (i.e., casual/contract/part-time labor) and seeking work were also eligible. English language literacy, at least 6 years of formal education, and access to a computer, tablet, or smartphone device with Internet connectivity were further requirements. Individuals who had accessed the *Work and SCI* modules in our initial trial [11] were excluded. Similarly, those in full-time and/or permanent employment were ineligible (see Fig. 1 CONSORT flowchart [17]).

Procedure

Following ethics approval from the University of Adelaide Human Research Ethics Committee (2015/078), Australian

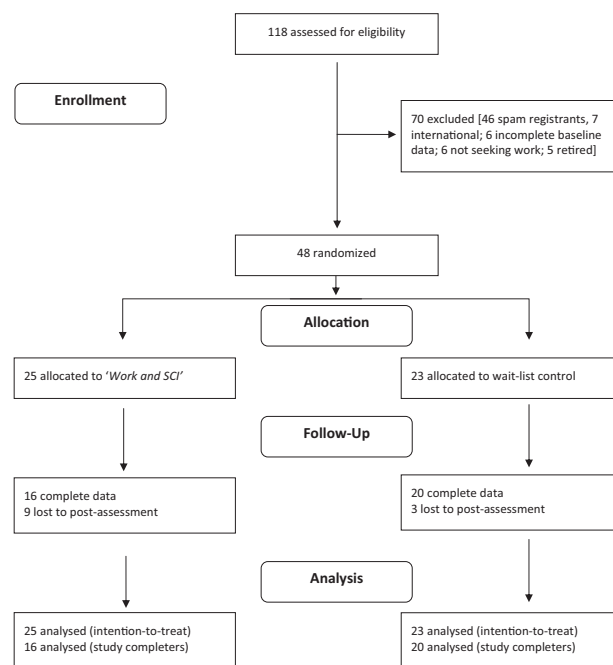


Fig. 1 CONSORT flowchart

Federal Government approved Disability Employment Service providers (available from <https://www.dss.gov.au>) were emailed and invited to participate. Of 33 organizations contacted, 20 agreed to promote the study to their members via social media (e.g., Facebook, Twitter) and/or e-mail marketing (i.e., electronic mailing list, e-newsletter). Recruitment occurred over a 14-month period from April 2017 to May 2018 and was contingent on limited-term funding. The trial was retrospectively registered (May 2017) on the Australian New Zealand Clinical Trials Registry (no. ACTRN12617000728336).

Participants were randomly assigned (50:50) to the *Work and SCI* intervention or wait-list control group after completing a baseline assessment (Time 1; T1). The randomization procedure involved a simple, unrestricted feature available through SurveyMonkey[®] software. Study allocation was therefore concealed insofar that the researchers did not know to which group participants would be allocated. However, the study was not blinded, with both participants and the lead researcher (first author) aware of group allocation.

This assessment included a survey preamble, with participants providing informed written consent. A research assistant monitored the online completion of the survey and sent email reminders to complete a partially filled survey. The survey included disqualifying questions (i.e., age and current employment status). In addition, geolocation (<https://www.iplocation.net/>) was utilized to confirm participant eligibility. Data were also flagged as suspect if a respondent provided numeric inconsistencies and/or excessively vague answers—this resulted in several respondents who provided multiple responses or inactive/invalid email addresses being excluded. The first author (D.D.) undertook this data screening.

Eligible intervention participants who completed the survey were automatically emailed a hyperlink to the *Work and SCI* modules hosted on a password-protected webpage of a lead SCI/D service provider in the region: The Paraplegic and Quadriplegic Association of South Australia (PQSA). To promote engagement with the *Work and SCI* material, standardized coaching emails were additionally provided on a weekly basis over the next month by the first author (D.D.). Each email provided a prompt to access the *Work and SCI* resource by highlighting a key job search strategy (i.e., additional training, peer support, managing health and well-being, and workplace assistance) along with an explanation of where to find this material within the six modules (refer to example email in online supplementary material). At 4 weeks post enrolment (Time 2; T2), all participants received a follow-up online survey. On study completion, control participants were provided access to the *Work and SCI* material. Participants who completed both T1 and

T2 surveys were offered a small financial incentive (\$AUD 20 shopping voucher) for their time.

Intervention

Work and SCI is an online information package co-created by a team of SCI specialists—namely rehabilitation psychology (including vocational consultants), nursing, occupational therapy, social work, and medicine. In its first iteration, the resource comprised of one introductory and six stand-alone learning modules covering requisite job search and career-planning skills which were emailed to participants [11]. Modules 1–3 relate to the job-seeking process (i.e., reviewing/recognizing one's transferable vocational skills/aptitudes/interests, knowledge of the labor market, how to find a job, and be identified by employers). Modules 4–5 relate to job interviewing (i.e., resume writing, interviewing skills, employers' needs, and expectations). Module 6 focuses on career development (i.e., networking and mentoring, professional development, and coping with work issues in relation to SCI/D). Each module contains informative webpages and interactive materials. The modules are completed at the user's own pace over approximately 4 weeks, as suggested by our feasibility trial [11].

Baseline characteristics

In addition to baseline socio-demographic and injury characteristics, details pertaining to disability impairment were obtained using the three-item Physical Independence subscale of the Revised Craig Handicap Assessment and Reporting Technique (CHART) [18]. Subscale scores range from 0 to 100; a score of 100 corresponds to complete independence in performing daily tasks and activities (i.e., equivalent to functioning of an individual without disability). Subscale reliability was demonstrated ($\alpha = 0.73$).

Primary outcome

The 25-item Job Procurement Self-efficacy Scale (JSES; [19]) was administered pre- and 4 weeks post intervention. Participants rate each item on a five-point scale from 0 ("not at all like me") to 5 ("very much like me"), with five items reverse-scored. Total scale scores range from 0 to 100; higher scores indicate greater levels of efficacy, or self-confidence in one's ability to successfully engage in the job search process. In this study, the JSES demonstrated high internal consistency ($\alpha = 0.90$).

Secondary outcomes

Two additional pre-post measures were utilized. This included a measure of dispositional optimism: the Life

Orientation Test-Revised (LOT-R [20]). Participants rate each of ten items from 0 (“strongly disagree”) to 4 (“strongly agree”). The responses to six-scale items are summed (three reverse scored and four filler items not scored) to produce a total score ranging from 0 to 24. Scoring is continuous—with higher scores indicating higher optimism and no benchmark for being an optimist/pessimist [20]. The internal reliability coefficient for the LOT-R was 0.81 in the current study. Depressive symptom severity was screened using the Patient Health Questionnaire (PHQ-9), which scores each of nine DSM-IV depressive mood criteria as 0 (“not at all”) to 3 (“nearly every day”; [21]), resulting in a total score ranging from 0 to 27. Higher scores (>11) are suggestive of probable depression in persons with SCI [22]. Internal consistency for the PHQ-9 was reliable in this study ($\alpha = 0.87$).

In addition, intervention participants were asked whether they had engaged in a list of nine job search behaviors at post-test (e.g., prepare a resume, apply for a job, attend an interview, and search online for jobs). This purposely designed list provided a rudimentary index of overall job search intensity. Engagement with the *Work and SCI* intervention was also examined, with participants asked to indicate which of the modules they had accessed during the 4-week assessment period. Finally, the number of logins to the *Work and SCI* webpage was monitored.

Statistical analyses

Data were analyzed using the Statistical Package for the Social Sciences (IBM SPSS v24). Although statistical significance for this pilot RCT was not the major objective, limited analyses were performed in order to examine trends that could indicate possible intervention effects. It is recognized that these analyses are preliminary and underpowered. Intervention effects were examined using repeated measures ANOVAs, with each of the three pre- and post measures (JSES, LOT-R, PHQ-9) inputted as the dependent variable, group (*Work and SCI/control*) as the between-subjects factor, and time (baseline T1/follow-up T2) as the within-subjects (fixed) factor. Current employment status was added as a covariate, to adjust for baseline differences on this demographic. Analyses were performed on an intention-to-treat basis (using the last observation carried-forward method, i.e., assuming that those lost to follow-up did not improve, nor deteriorate, on any of the psychological outcomes). Analyses were additionally performed on participants who completed baseline and follow-up questionnaires. Pre–post differences between groups were expressed as a standardized mean difference (Hedges’ g effect estimate) with associated 95% confidence interval and p value.

Statement of ethics

We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during the course of this research.

Results

Participants

The pooled sample, at baseline, comprised of 48 participants with a mean age of 42 years (range = 22–62; Table 1). This included persons with a newly acquired (i.e., 6 months post) or long-standing injury (i.e., up to 50 years post SCI). Four participants had spina bifida with myelomeningocele. Thirty-four participants were currently unemployed or studying, with 73% having a work history. Notably, more intervention participants were employed (on a casual or part-time basis only) on enrollment (44% vs. 13%; $\chi^2(1) = 5.56, p = .02$).

The total sample reported a high level of physical independence (CHART), accessing an average of 6 hours of care assistance per month (range 0–29 hours), including formal paid care and informal support provided by family/friends. Eighty-three percent ($n = 40$) reported multiple comorbid and secondary conditions, namely chronic pain (41%), fatigue (40%), sleep difficulties (29%, including sleep apnea), spasticity (29%), memory and concentration difficulties (21%), and pressure ulcers (11%). Almost half the sample self-reported symptoms on the PHQ-9 consistent with moderate (21%; PHQ-9 score ≥ 11 ; [22]), severe (8%; scores 15–19) to extremely severe depression (19%; scores 20–27).

Work and SCI

Utilization

Engagement with the *Work and SCI* resource was acceptable. Sixteen participants completed follow-up surveys within a 4–5-week timeframe ($X = 36.6, SD = 18.5$), although two requested additional time (up to 8 weeks) to view the modules. Eleven participants accessed all six learning modules. Four participants (two of whom were working part-time) did not access the information on job-interviewing skills (module 3) and resume writing (module 4). One participant had read the introductory material on job facts (module 1) but could not recall the additional modules accessed. Online usage data identified a preference for text-based material, which was viewed on multiple occasions (average of 13 webpage logins, per participant). The two videos were viewed at least once by

Table 1 Baseline characteristics of the sample

		Total (<i>n</i> = 48)	<i>Work and SCI</i> (<i>n</i> = 25)	Control (<i>n</i> = 23)
Age (in years)		41.9 (10.9)	43.0 (10.9)	40.7 (11.0)
Gender	Female	21	13	8
	Male	27	12	15
Marital status	Married/de facto/partnered	20	9	11
	Single/divorced/widowed	28	16	12
Employment status (current)	Employed (casual/part-time)	14	11	3
	Not employed	34	14	20
Employment status (previous)	Employed (full/part-time)	33	17	16
	Not employed	15	8	7
Education level	Some high school	3	1	2
	High school completion	11	4	7
	Degree or diploma	26	15	11
	Other (e.g., trade qualification)	8	5	3
Lesion ^a	Complete	19	10	9
	Incomplete	27	13	14
Neurological level ^a	Tetraplegia (C2–C7)	19	10	9
	Paraplegia (T12–S1, four congenital)	28	15	13
Time since diagnosis (in years) ^a		12.3 (13.4)	12.5 (12.4)	10.7 (13.2)
CHART		83.8 (22.3)	88.6 (18.7)	78.6 (25.0)

^aMissing data for $n \leq 2$

each participant. The attrition rate was, however, high, with 36% ($n = 9$) of intervention participants lost to follow-up. Common reasons for non-participation included health experiences ($n = 2$ acute illness) and disinterest ($n = 3$). Four participants did not provide a reason for withdrawal.

Preliminary effects

ITT analyses found no significant main or interaction effects for the primary or secondary outcomes. *Work and SCI* participants did, however, report small improvements in optimism from T1 to T2 ($g = .24$ [CI: .04, .44] $p = .02$) in comparison to controls ($g = -.04$ [CI: -.29, .21] $p = .75$). This equated to a significant group \times time interaction effect (LOT-R $F(1, 33) = 3.98$, $p = .05$; $g = 0.36$, CI: .04, .68, $p = .03$). However, there was wide variability on this measure, with six intervention participants reporting negligible or no change in pre–post levels of optimism.

Notably, preparatory and active job search behaviors were reported by the 16 *Work and SCI* study completers during the 4-week study period. Most had considered job alternatives (81%, $n = 13$), searched online for job vacancies (56%, $n = 9$), and/or discussed work/study options with significant others (friends, family; 44%, $n = 7$). A further six participants submitted a job application, three updated

their resume, one attended a job interview, and, impressively, two received job offers (Table 2).

Discussion

This pilot RCT highlights the potential utility of an online resource, *Work and SCI*, as a vehicle to promote vocational rehabilitation practices in primary SCI/D care. More field-work and development are needed in order to improve our resource so as to better meet the needs of users. We summarize, here, the major operational challenges and lessons learned during this trial that can help to inform larger-scale evaluation of our *Work and SCI* intervention.

The loss to follow-up in this study, although consistent with that of other Australian-based Internet interventions [23], highlights the importance of personalized guidance and direction when developing a self-directed resource for job-seekers with SCI/D. Simply translating text and video-based material to an online setting does not, in itself, reliably provide an effective online learning environment for job-seekers. Future *Work and SCI* trials might adapt the coaching emails to the situation of each participant in order to facilitate effective job-seeking strategies and maintain motivation to job-seek.

Table 2 Pre-post scores and associated effect sizes after accessing *Work and SCI*

Measure	Scale range	Analysis	Time	<i>Work and SCI</i>		Control		Between-groups raw mean difference [CI]	Between-groups <i>g</i> [CI]
				<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
<i>Primary outcome</i>									
Job Procurement Self-efficacy	0–100	ITT	1	58.8	17.6	53.2	14.3	.74 [–3.64, 5.11]	.09 [–.46, .65]
			2	60.9	17.5	54.5	15.0		
		Completers	2	63.0	20.6	54.6	13.9	2.79 [–3.64, 9.23]	.28 [–.37, .93]
<i>Secondary outcomes</i>									
Life Orientation Test-R	0–24	ITT	1	12.2	6.4	12.3	4.7	1.78 [–.16, 3.72]	.51 [–.06, 1.08]
			2	13.8	5.9	12.1	5.3		
		Completers	2	14.1	5.7	12.0	5.5	2.14 [–0.42, 4.71]	.54 [–.12, 1.19]
Patient Health Questionnaire-9	0–27	ITT	1	10.5	6.4	10.6	7.1	–.06 [–2.24, 2.13]	–.02 [–.57, .54]
			2	9.2	7.3	9.4	7.3		
		Completers	2	8.6	7.5	9.5	7.6	–.79 [–3.62, 2.04]	–.18 [–.82, .05]

ITT intention to treat, *M* (*SD*) raw mean scores with standard deviation, *g* Hedges' effect estimate, *CI* 95% confidence interval (lower–upper limit)

Nonetheless, the sample attrition reported in the current study provides some guidance to achieve adequate power in future definitive RCT. To allow for an estimated 40% drop-out rate in a main trial, designed with 90% power and two-sided 5% significance, the baseline sample size would need to be at least 100 participants (i.e., 50 per treatment arm). This sample size would be sufficient to detect clinically meaningful effects ($g > 0.50$) on the primary outcome: job search self-efficacy [24]. Alternative randomization options for small-scale RCTs should also be considered. This includes the use of unequal allocation, a scientifically advantageous technique for early-phase intervention trials in SCI [25], or stratified randomization to adjust for baseline prognostic variables (e.g., length of time since last employment) and to help control for potential self-selection bias [26].

The current findings also raise questions about the appropriate timing for accessing the *Work and SCI* resource. Ideally, vocational preparation and return-to-work services should be delivered in the acute setting for newly injured individuals with SCI, to enhance motivation to work and increase the chances of longer-term job retention [7, 12].

The high prevalence of self-reported depressive symptoms in this sample, although consistent with estimates based on the PHQ-9 among those living in the community with SCI [27], also highlights a need to provide work-directed interventions in tandem with targeted mental health treatment. Indeed, there is evidence that prolonged job coaching is important to those who face a pathway of long-term unemployment—as demonstrated in the general population [28]. Evidence on integrated treatment models for job-seekers living with mental illness and SCI/D is needed.

Clinical implications

While online tools and resources, in themselves, are not sufficient to change the trajectory of employment following a SCI, *Work and SCI* would work well as a tool to facilitate vocational practices in SCI care. This might include a counseling context to orientate newly injured job-seekers to appropriate accommodations in the workplace, or as a training resource for SCI practitioners and potential employers—akin to print and web-based resources that have been developed internationally [29].

The content of *Work and SCI* could also be adapted to other disability groups. We have demonstrated preliminary effects in a separate randomized clinical trial of an email-based information resource targeted to adults living with chronic and progressive forms of multiple sclerosis. Job-seekers reported more positive expectations in relation to their work options and employability skills immediately after accessing the *Work and MS* material [30]. However, engagement with this resource remained an issue: 31% of participants were lost to follow-up and only 70% reported having read the material [30]. This finding, in combination with information from the current study, points to a need for more fieldwork and development with end users prior to widespread dissemination of our vocational resource.

Limitations

Current study findings need to be considered in the context of several methodological limitations. First, our operationalization of the primary outcome, job search self-efficacy, was one dimensional. There is some suggestion that a

two-dimensional measure that assesses job search behavior and job search outcomes may be more appropriate [31, 32].

Second, the 4-week assessment interval may not have allowed sufficient variation in scores between the *Work and SCI* and control groups on each of the outcomes. A follow-up, assessment interval between 3 and 6 months might better capture changes in job search behavior [32].

Third, while we endeavored to recruit a representative SCI/D sample by utilizing different recruitment methods (e.g., fliers, phone calls, and Internet), social media was the overwhelmingly most effective method, yielding the highest number (around 90%) of enrolments. This may have resulted in a coverage bias in which some groups were systematically excluded [33]. Moreover, the highly pre-screened sample may have introduced an accidental or selection bias. Quality steps were, however, necessary to ensure integrity during data screening. Provision of the *Work and SCI* material in various languages, greater collaboration with primary care physicians, and approaching potentially eligible participants in-person would help optimize recruitment [34]. Future trials might also consider accessing a centralized data registry. The Australian SCI community recognizes a need to restructure our current data registry (<https://www.aihw.gov.au/about-our-data/our-data-collections/australian-spinal-cord-injury-register>), having recently formulated a national research strategy to facilitate research coordination and networking [35, 36].

Finally, the broad definition of “job-seeker” adopted for this trial may have undermined the reported effect sizes. There is evidence that unemployed, new entrant job-seekers—more so than experienced job-seekers or those who view themselves as underemployed—require a combination of psychosocial (emotional), career-related (i.e., informational/educational), and practical (instrumental) support, with each exerting a unique effect on self-efficacy and actual job search behavior [37]. A future large-scale RCT might therefore consider the length of time since last employment as a baseline covariate adjustment, considered to be critical to successful employment post SCI [38]. Similarly, the inclusion of congenital disorders added to the sample heterogeneity. Notably, the limited available research examining employability among persons with an acquired or congenital condition suggests that lack of motivation and work satisfaction are key barriers to work participation for both patient groups [39, 40]. Importantly, the present study contributes to current understanding of job search self-efficacy as a construct, by focusing on a diverse set of job-seekers.

Conclusions

Although no significant intervention effects (as per ITT analyses) were identified, this pilot-controlled study has

demonstrated the potential for *Work and SCI* to be used as an online tool to supplement evidence-based vocational rehabilitation in SCI. Future research to develop and enhance our resource, using a fully powered RCT, is indicated.

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Author contributions DD was responsible for study conception, data collection, analysis and interpretation, and manuscript drafts. RR, GM, AC, and IK made substantial contributions to study design and assisted with manuscript draft and revision. PS, ACH, RM, JC, and CM critically reviewed the manuscript, providing important intellectual content.

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Compliance with ethical standards

Conflict of interest PS (CEO) is employed by PQSA, a participating organization in this project. The remaining authors declare that they have no conflict of interest.

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