Special Education Researchers' Knowledge, Attitudes, and Reported Use of Open Practices

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Abstract

Despite calls for open science reforms in special education research, little is known about the perceptions or practices of special education researchers regarding open science. In this study, we modified the Open Science Survey to conduct a preliminary examination of the knowledge, attitudes, perceived norms, and behavioral intent of 155 special education researchers for three open practices: preregistering studies, posting preprints, and sharing data. Respondents reported favorable attitudes toward each of the practices but low levels of implementation knowledge. Multiple linear regression analysis revealed that knowledge, attitudes, career stage, and methodological preference significantly predicted intent to engage in these open practices. We provide recommendations from these findings to inform efforts to increase open science uptake in the field.

Keywords

change/innovation, systems change, Legal/policy issues, Research methodology

Open science is an umbrella term encompassing a range of approaches aimed at increasing the credibility and accessibility of research through greater openness, transparency, and replicability (Cook, Fleming, et al., 2022). Within special education, researchers have begun to recognize the potential value of open practices to complement ongoing efforts to improve the quality and impact of the research base (Fleming et al., 2021) and have called for increased application of open practices in the field (Adelson et al., 2019). However, few studies have examined the attitudes toward, knowledge of, and reported use of open practices among special education researchers. In this study, we surveyed special education researchers, including both early-career researchers (ECRs; i.e., doctoral students and post-doctoral researchers) and non-ECR researchers (i.e., assistant, associate, or full professors, including clinical and research faculty), to better understand their knowledge, attitudes, and practices regarding open practices. We believe it is important to examine the perceptions of special education researchers to open practices at this time, when open science reforms are beginning to be implemented in the social sciences (Christensen et al., 2020) and will soon be required by funding agencies (Nelson, 2022). This study extends recent research on perceptions and perceived importance of open practices among editors of special education journals (Maggin, 2022) and use of open practices in special education (Cook et al., 2023) and other fields (Abele-Brehm

et al., 2019; Beaudry et al., 2022; Makel et al., 2021; Soderberg et al., 2020; Toribio-Flórez et al., 2021) by conducting the first study exploring factors relating to special education researchers' intent to engage in open practices.

Open Practices in Special Education

Recently, scholars in special education have begun to describe the potential benefits of and provide guidelines and recommendations for special education researchers to engage in open practices (Cook, Fleming, et al., 2022; Fleming & Cook, 2022; Fleming et al., 2023; van Dijk et al., 2021). Although descriptive research exploring researcher's attitudes and practices related to open science has been conducted in other fields, few researchers have explored these issues in special education. In their review of 250 randomly

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selected articles published in special education journals, Cook and colleagues (2023) found adoption of most open practices was rare (e.g., 2% of empirical articles were pre-registered, shared data were available for 1.5% of empirical articles, 23% of articles were openly accessible). The authors noted that additional research is needed to understand what factors affect researcher behavior and their decision to use or not use open practices.

In addition, in a survey of 140 editors and associate editors of special education journals, Maggin (2022) found that most participants were concerned about research reproducibility in the field, were aware of open practices, and believed that journals should encourage the use of these practices. The author found a positive correlation between familiarity and the perceived importance of open practices, indicating that beliefs about open practices may improve as researchers become more familiar with practices. Maggin also noted that additional research is needed to explore perceptions of open practices in the special education research community beyond editors and associate editors. Thus, although researchers have begun to explore issues related to open science in special education, it appears that additional research is needed to better understand what factors relate to special education researchers' intent to engage in open practices, which can inform efforts to improve on the relatively low rate of adoption of open practices in the extant special education research base (Cook et al., 2023).

Preregistration, Preprints, and Data Sharing

Broadly, advocates of open science aim to promote transparency and accessibility at every stage of the research process to increase the trustworthiness, credibility, and impact of research results (Cook, Fleming, et al., 2022; Fleming et al., 2021; Nosek et al., 2012). To achieve these aims, open science encompasses several practices that augment conventional procedures for conducting, reporting, and disseminating research, including preregistration, preprints, data sharing, materials sharing, and open peer review (Nosek et al., 2012). In this paper, we focus on three core open practices: preregistration, preprints, and data sharing.

Preregistration involves detailing research procedures and analytic methods before a study is conducted. Preregistration typically requires researchers to specify *a priori* research questions, hypotheses, and planned analyses, among other elements of the planned study (Cook, Wong et al., 2022; Fleming et al., 2023; Gehlbach & Robinson, 2018). Prior to conducting the study, this plan is submitted to a public repository to enhance transparency and establish whether analyses are confirmatory (i.e., examining a priori hypotheses using predetermined procedures) or exploratory (i.e., examining research questions developed after the study was designed using flexible procedures). Deviations from the preregistered plan should then

be noted in the write-up of the study. Preregistration can help to address questionable research practices, such as conflating confirmatory (hypothesis-testing) and exploratory (hypothesis-generating) research, which may result in biased or misleading results (Gehlbach & Robinson, 2018; Makel et al., 2021).

Preprints are scholarly works posted to a public repository and made freely available to the public. Most journals allow authors to post preprint versions of their papers (e.g., author-formatted version of the paper that was submitted for review) to online repositories (e.g., EdArXiv; https://edarxiv.org; Fleming & Cook, 2022). If an article is ultimately accepted for publication, some journals also allow authors to submit postprint versions of the articles (e.g., author-formatted version of the accepted version of the paper). Preprints allow everyone with internet access, including policymakers and practitioners, free access to scholarship, much of which is otherwise behind a paywall and inaccessible to many (Fleming & Cook, 2022).

Data sharing involves making raw data and metadata from a study freely available for others to examine and use (Cook, Fleming et al., 2022). To ensure that data are findable, accessible, interoperable, and reusable, data should be uploaded in non-proprietary formats (e.g., .txt) to an open-access repository (e.g., LDbase; Logan et al., 2021). Openly sharing study data along with analytic code increases the trustworthiness of study findings by providing other researchers the opportunity to replicate and reproduce the analyses and understand the analytic decisions that were made (Cook, Fleming, et al., 2022; J. P. Simmons et al., 2011).

Despite the potential benefits of open scholarship, limitations exist for each practice. First, many open practices require additional time and effort. For example, preregistering studies and sharing data can be time-consuming and may require researchers to develop new skills. Furthermore, for researchers who are new to open practices, knowing when and how to engage in practices is not always clear. For example, many journal policies regarding open access are unclear, thus making it challenging for researchers to follow journal guidelines when posting preprints. Posting a preprint before submitting an article to a journal can also potentially compromise the masked nature of peer review (Fleming & Cook, 2022). However, resources and guides are available to support special education researchers engaging in open practices (see Cook, Fleming, et al., 2022; van Dijk et al., 2021). These limitations are important for special education researchers to consider.

Open Scholarship Survey

The Open Scholarship Survey (OSS) was designed to assess the attitudes, behaviors, and norms regarding open scholarship of researchers from multiple disciplines. The survey was developed by cross-disciplinary experts in open

practices and has been used in multiple studies (Beaudry et al., 2022; Soderberg et al., 2020). The Center for Open Science first used the OSS in a sample of 3,619 researchers across multiple disciplines, including 489 researchers who identified education research as their primary discipline (Beaudry et al., 2022). These 489 educational researchers reported generally positive attitudes toward open practices but indicated that on average they shared open data for only 13% of their studies, posted a preprint for 16% of their studies, and preregistered 3% of their studies. These results indicate that some education researchers engage in open practices, but barriers to full implementation likely exist. However, it is unknown whether and how many special education researchers were included in Beaudry et al.'s (2022) study. Furthermore, because Beaudry and colleagues administered the OSS only to publishing authors, relatively few ECRs were included in the sample, with only 7% of participating education researchers identifying as doctoral students. Therefore, research should also examine the perspectives and experiences of ECRs, who will be the next generation of scientists.

Factors Associated With Open Practice Implementation

Researchers have examined the association of potential predictors of researchers' perspectives on open practices, including researcher experience, career stage, attitudes toward open practices, knowledge of open practices, and methodological preferences. For example, reported attitudes and knowledge regarding open science strongly predicted reported practice (Toribio-Flórez et al., 2021), but results were mixed on how methodological preferences impact researchers' attitudes and behaviors regarding open science in the social sciences (Bowman et al., 2021; Christensen et al., 2020).

In addition, multiple studies have highlighted the importance of career stage and experience on knowledge, attitudes, and implementation of open practices (Abele-Brehm et al., 2019; Christensen et al., 2020; Houtkoop et al., 2018; Soderberg et al., 2020). In a survey of 337 German psychological researchers, Abele-Brehm and colleagues (2019) found that ECRs held more positive attitudes toward data sharing and open science generally than senior researchers. Similarly, in a survey of 3,759 researchers from multiple disciplines on the credibility of preprints, graduate students and post-docs expressed the most favorable attitudes, whereas full professors were least favorable (Soderberg et al., 2020). Furthermore, in a survey of 600 psychology researchers, Houtkoop et al. (2018) found senior researchers shared data at a lower rate and indicated they were less likely to share data in the future compared to ECRs. However, Bowman and colleagues (2021) found that open practices did not significantly differ between career stages within the communication

field. It may be that the factors that predict open science knowledge, attitudes, and practices are dependent on the norms and traditions within each field (Christensen et al., 2020; Soderberg et al., 2020; Toribio-Flórez, 2021), underscoring the importance of examining these issues specifically for special education researchers.

Theoretical Framework

We used the theory of planned behavior (Ajzen, 1985) as our theoretical framework. The theory posits an individual's intention to engage in a particular behavior predicates their decision to engage in that behavior. Intentions to perform a behavior are assumed to reflect underlying motivational factors that influence behavior. These motivational factors are indicative of the extent to which a person is willing to put forth effort in accomplishing a behavior. The stronger the intention to enact a behavior, the more likely the behavior is to occur (Ajzen, 1985).

Three critical factors are theorized to influence a person's intention to engage in a behavior: (a) personal attitudes, (b) subjective norms, and (c) perceived behavioral control (Ajzen, 1985). Personal attitudes refer to a person's beliefs, prejudices, and feelings about a behavior. For example, personal attitudes include a researcher's views of open practices and their perceived benefits and limitations. Subjective norms are the perceived views of others around them. When considering adopting open practices, a researcher might consider the views and expectations of their colleagues. Finally, perceived behavioral control is the extent to which a person believes they can control their behavior, which is influenced by both internal factors such as self-efficacy and external factors such as available resources, for a researcher considering implementing an open practice, perceived behavioral control might be based on their knowledge of the skills, techniques, or procedures required to engage in the practice successfully.

We used the theory of planned behavior to guide the adaptation of the OSS survey and provide a lens for understanding researcher intention to engage in open practices. It has been argued that more holistic assessments of behavior are needed to better understand why and why not researchers engage in practices (Norris & O'Connor, 2019; Robson et al., 2021). Indeed, given the multiple factors that may influence the behavior of researchers, it is important to use relevant theory to guide the identification of variables potentially related to the uptake of open practices. For the current study, we measured personal attitudes by asking researchers their opinions of each of the three open practices. We framed knowledge of implementing the practice as an indicator of perceived behavioral control. We measured subjective norms by asking participants to estimate the percentage of researchers in their field who hold favorable attitudes toward the practice.

Purpose

As in other fields, scholars have suggested open practices may enhance the credibility, replicability, and accessibility of the special education research base (Cook, Johnson et al., 2022; Fleming et al., 2021; van Dijk et al., 2021). However, special education researchers' adoption of, perceived norms toward, knowledge of, and attitudes toward open practices have not been systematically examined. To better understand the contextual barriers to the adoption and implementation of open practices, we extended previous research by examining these constructs in the field of special education. The purpose of this study, then, is to examine the perceptions and behaviors of special education researchers regarding three core open practices. Specifically, we aimed to answer the following research questions:

1. What are the knowledge, attitudes, perceived norms, and practices of special education researchers toward preprints, data sharing, and preregistration?
2. What factors (i.e., attitudes, knowledge, perceived norms, experience, career stage, preferred methods) predict special education researchers' intended use of preprints, data sharing, and preregistration?

Method

Participants and Recruitment

Following Institutional Review Board approval, we recruited participants in two waves from June to September 2021. The first wave of participants was recruited through the Council for Exceptional Children's Division of Research (CEC-DR) listserv in the summer of 2021. CEC-DR is one of the special interest divisions of CEC, whose members are typically active special education researchers and therefore were considered an appropriate target group for responding to the survey. A total of 796 DR subscribers received invitations to complete the survey, and 88 responded to the survey, with a response rate of 11%.

Because one of the goals of the study was to assess the knowledge, attitudes, perceived norms, and practices of ECRs, we conducted a second wave of recruitment targeting doctoral students and post-doctoral researchers. We contacted the program coordinator for 53 institutions in the United States with doctoral-level programs in special education that were classified as having "very high research activity" (i.e., R1 universities). Of those invited, 28 programs forwarded the survey invitation to a total of 191 doctoral students and post-doctoral researchers. Sixty-seven ECRs responded in the second wave of recruitment for a response rate of 35%.

A total of 185 individuals opened the survey, with 155 individuals completing at least one of the three randomly presented item blocks (one for each of the three targeted open practices). Of the 155 participants, 18 participants

Table 1. Demographic Information for Respondents to Open Science Survey.

Variable		n	%
Career Stage	Doctoral Student/Post-Doc	80	52
	Assistant Professor	34	22
	Associate Professor	15	10
	Professor	16	10
	Clinical or Research Faculty	10	6
Race/ Ethnicity	White or Caucasian	119	77
	Hispanic or Latino	9	6
	Asian or Pacific Islander	8	5
	Black or African American	7	4
	Multiracial or biracial	7	5
	Other/Prefer not to say	3	2
	Native American or Alaskan native	2	1
Gender	Female	119	77
	Male	33	21
	Prefer not to say	2	1
	Non-binary	1	1
Research Method	Single-case design	47	30
	Group quantitative	43	28
	Mixed methods	29	19
	Qualitative	16	10
	Systematic reviews and meta-analyses	10	6.5
	Multiple	10	6.5

completed all but one item, and an additional 19 participants did not complete two or more items. A total of 80 ECRs (i.e., doctoral students or post-doctoral researchers) and 75 non-ECR researchers (i.e., assistant, associate, or full professors, including clinical and research faculty) completed the survey with a majority (77%) of participants self-identifying as female ($n = 119$) and White ($n = 119$). The median number of years of special education research experience was six, and the median number of articles published was nine. Participants most commonly identified single-case (30%) and group quantitative (28%) as the primary research design they used. Demographic characteristics of the sample are included in Table 1.

The relatively low response rate of 16% may be due to data collection occurring during the COVID-19 pandemic. As has been reported in other fields (de Koning et al., 2021) and by the U.S. Census Bureau (Rothbaum, 2022), response rates for survey research decreased drastically during the pandemic. The response rate for the current study is comparable to other survey research on open practices (see Makel et al., 2021; 10%) as well as other survey research with special education faculty (see M. Simmons & Sharp, 2021; 16%) during the pandemic. It is also possible that sending the invitation to participate during summer months may have diminished the response rate. Although we had hoped that researchers may have more time to respond to the survey during the summer, they may have been attending to their work emails less closely at this time.

Instrument

For this study, we adapted the OSS (Beaudry et al., 2022), which was developed by the Center for Open Science to assess the attitudes, perceptions, and behaviors of researchers toward open science across fields. The 43-item survey used for the current study asked researchers to provide information about their (a) demographics; (b) knowledge, attitudes, and practices for three open practices (i.e., preprints, open data, and preregistration); and (c) perceived barriers, perceived norms, and future learning and practices for the three practices. Survey questions were organized into blocks (one block for each open practice) and blocks were randomly presented to participants after the demographic items. The survey instrument is included as supplementary material (see Figure S1).

We first adapted the OSS to align with the tenets of the theory of planned behavior (Ajzen, 1985). The main constructs of the theory of planned behavior include attitudes, subjective norms, perceived behavior control, intention, and behavior. Given that the constructs of subjective norms, attitudes, and behavior were well-defined in the OSS, we did not add or remove items for these constructs. We added items for each practice relating to perceived behavioral control and intention. We examined perceived behavioral control by asking participants to rate their knowledge of how to engage in preprinting, preregistration, and data sharing on a four-point Likert-type scale from "none" to "high." For intention, we asked participants to rate their intention to complete each of the open practices in the next two years on a five-point Likert-type scale from "strongly disagree" to "strongly agree."

To improve face validity and limit response error, we piloted the survey with five researchers in education and the social sciences. Pilot participants also completed cognitive interviews including think-alouds and scripted questions while taking the survey to ensure coverage and clarity. As a result of the cognitive interviews, we revised question phrasing and response options. We also consulted two experts in open science to ensure coverage of relevant topics, remove extraneous information, and enhance content validity. Supplemental Table S1 includes an overview of the psychometric properties of the instrument, specifically highlighting the constructs of the theory of planned behavior. Cronbach's alpha of .85 across all survey questions indicates a high level of internal consistency.

Analysis

We used the statistical software program R (R Core Team, 2021) to compile descriptive data and conduct analyses. For the first research question, we summarized the knowledge, attitudes, perceived norms, and practices of special education researchers for each of the three open practices using descriptive statistics such as mean averages and proportions.

To examine the second research question, multivariate linear regression in R was used to analyze the relation of the predictor variables (i.e., career stage, attitudes, methodological focus, perceived norms, and knowledge) with participants' intended future practices. In these models, we also controlled for years of experience, number of publications, gender, and race/ethnicity through the inclusion of four covariates. The independent variables of attitudes, knowledge, and perceived norms were derived from the conceptual framework, and the career stage and methodological focus variables were derived from recent research examining researchers' perceptions of open practices (Abele-Brehm et al., 2019; Soderberg et al., 2020; Toribio-Flórez, 2021). Each predictor variable and covariate was derived from a single survey item. Years of experience, number of publications, attitudes, knowledge, and perceived norms were continuous variables and career stage, methodological focus, gender, and race/ethnicity were categorical variables. Tenured researchers, group-quantitative research, male, and non-White researchers served as the reference groups for the career stage, methodological focus, gender, and race/ethnicity variables, respectively. Before conducting the multivariate linear regression, the assumptions of linearity, normality, multicollinearity, homoscedasticity, and independence were tested for each dependent variable. We employed pairwise deletion to address missing data. Under this method, we retained all available data for each specific analysis, ensuring that responses were not deleted due to isolated missing items. This study was preregistered on OSF Registries (see https://doi.org/10.17605/OSF.IO/TWJ6G).

Results

In this section, we report participants' knowledge, attitudes, perceived norms, and practices related to preprints, preregistration, and open data, as well as predictions of intent to engage in open practices in the future.

Knowledge, Attitudes, Perceived Norms, and Practices

More participants reported low or no knowledge than moderate or high knowledge for all three open practices (see Figure 1). Specifically, 47% reported high or moderate knowledge of preprints (53% low or no knowledge), 32% indicated high or moderate knowledge of preregistration (68% low or no knowledge), and 29% had high or moderate knowledge of data sharing (71% low or no knowledge). There were no significant differences between the average knowledge of the three practices.

In contrast, most participants held positive attitudes toward the three open practices. Specifically, 60%, 66%, and 78% of participants indicated very favorable or favorable attitudes toward preprints, preregistration, and data sharing, respectively. Attitude ratings of data sharing were significantly
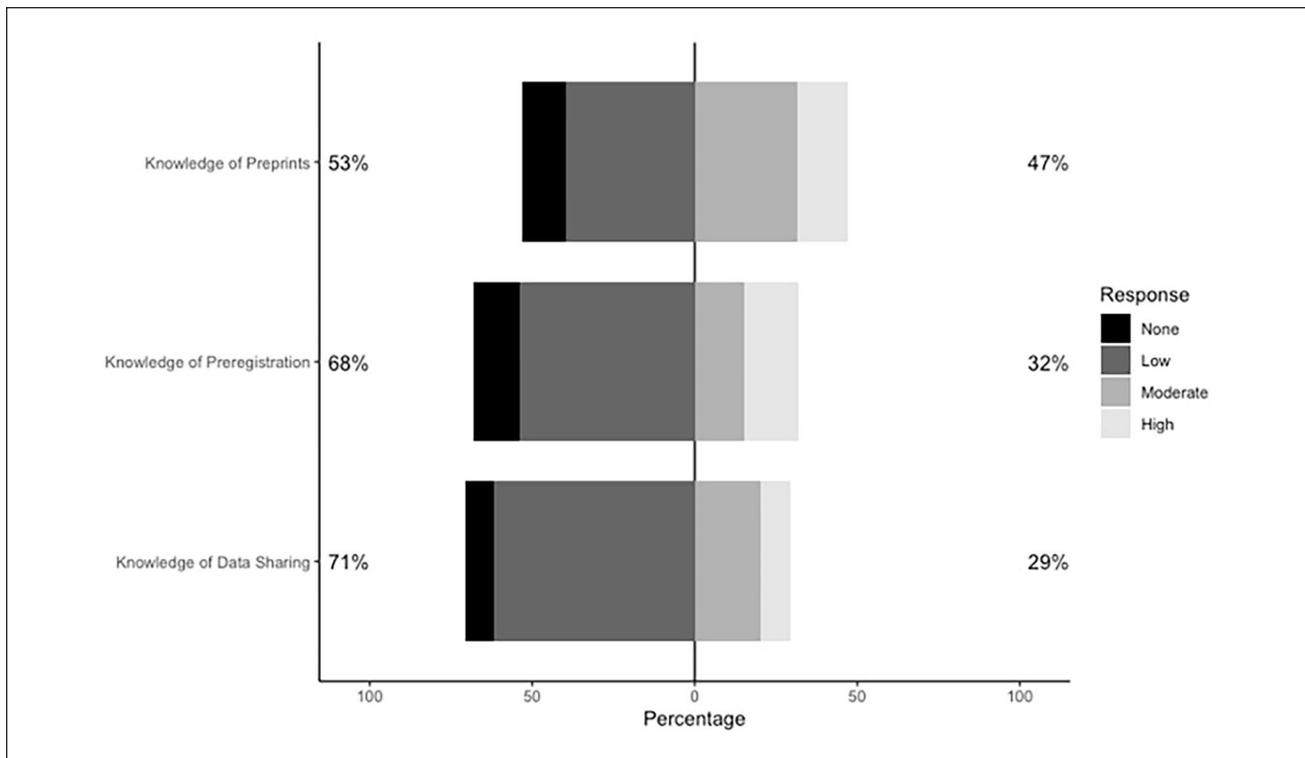
Figure 1. Knowledge of Open Science Practices.

higher than for preprints, $t(118) = 3.26, p = .001$, and preregistration, $t(118) = 2.79, p = .006$, but were not different for preregistration and preprints. Participants perceived colleagues as being less positive toward the three open practices, indicating 28% of colleagues favor preprints, 30% favor preregistration, and 34% favor sharing data. Participants' perceptions of peers' attitudes were significantly lower than their own attitudes for all three practices: preprints, $t(125) = -18.77, p < .001$; preregistration, $t(124) = -15.88, p < .001$; and data sharing, $t(137) = -21.74, p < .001$. See Figure 2 for a summary of the differences between actual and perceived attitudes toward open practices.

Relatively few participants reported engaging in the three open practices in their most recent published study; 10%, 11%, and 15% indicated they posted a preprint, shared data, and preregistered their most recent published study, respectively. Across all their published research, the average number of times participants reported to have engaged in each practice was less than one: $M = 0.37 (SD = 1.31)$ for posting a preprint, $M = 0.22 (SD = 1.30)$ for sharing open data, and $M = 0.27 (SD = 0.79)$ for preregistration. Of those who reported engaging in the open practices, most (75%) indicated they first participated in one of the three practices in the last three years.

Participants also perceived that relatively few of their colleagues had posted a preprint ($M = 16\%$), shared data ($M = 16\%$), and preregistered a study ($M = 12\%$). Perceived

peer engagement for posting preprints, $t(122) = 2.71, p = .007$, and data sharing, $t(121) = 3.27, p = .001$, were significantly greater than preregistration. There was no statistically significant difference between perceived peer engagement for posting preprints and data sharing. See Supplemental Figure S2 for a summary of actual and perceived practices.

When asked if they would engage in each of the open practices in the next 2 years, 66 (51%) agreed that they intended to post a preprint, and 97 (75%) agreed that they intended to read or download a preprint. Over half of the participants also indicated that they plan to share data (57%), access open data online (65%), preregister a study (55%), and read a preregistration online (59%). See Figure 3 for a summary of researchers' intent to engage in open practices in the next 2 years.

Predictors of Intention

See Table 2 and Supplemental Table S2 for the results of the regression analyses for all models. The overall model predicting intention to post a preprint was statistically significant, $F(11, 101) = 8.45, p < .001$, explaining 45% of the variance in intentions. Attitudes toward ($b = 0.60, p < .001$) and knowledge of ($b = 0.23, p = .04$) preprints were significantly and positively associated with intention to post a preprint when holding all other variables constant.
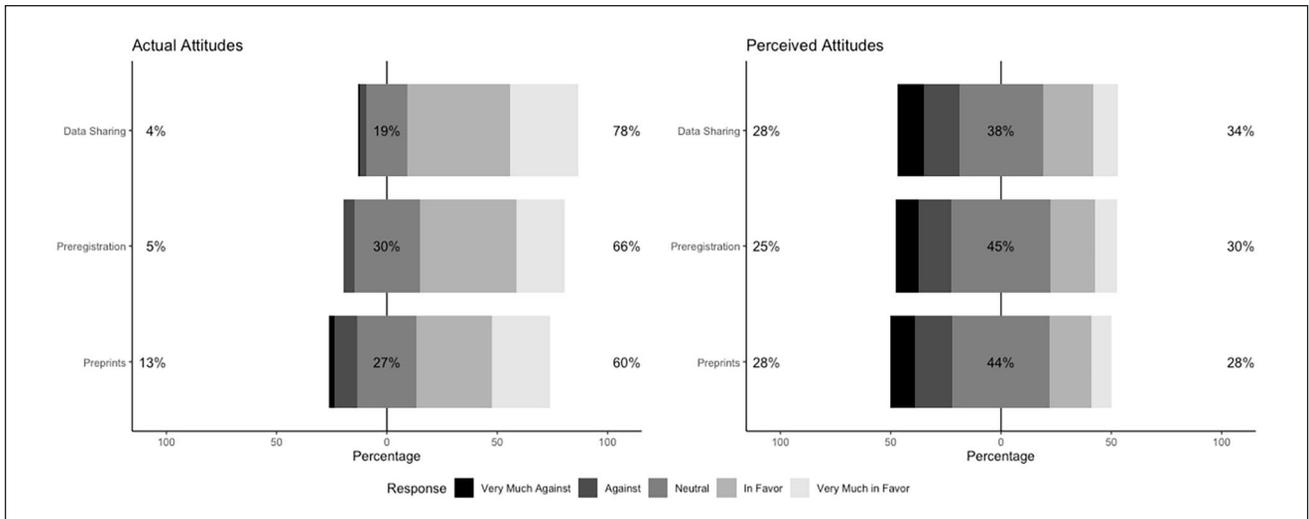
Figure 2. Actual and Perceived Attitudes Toward Open Science Practices.
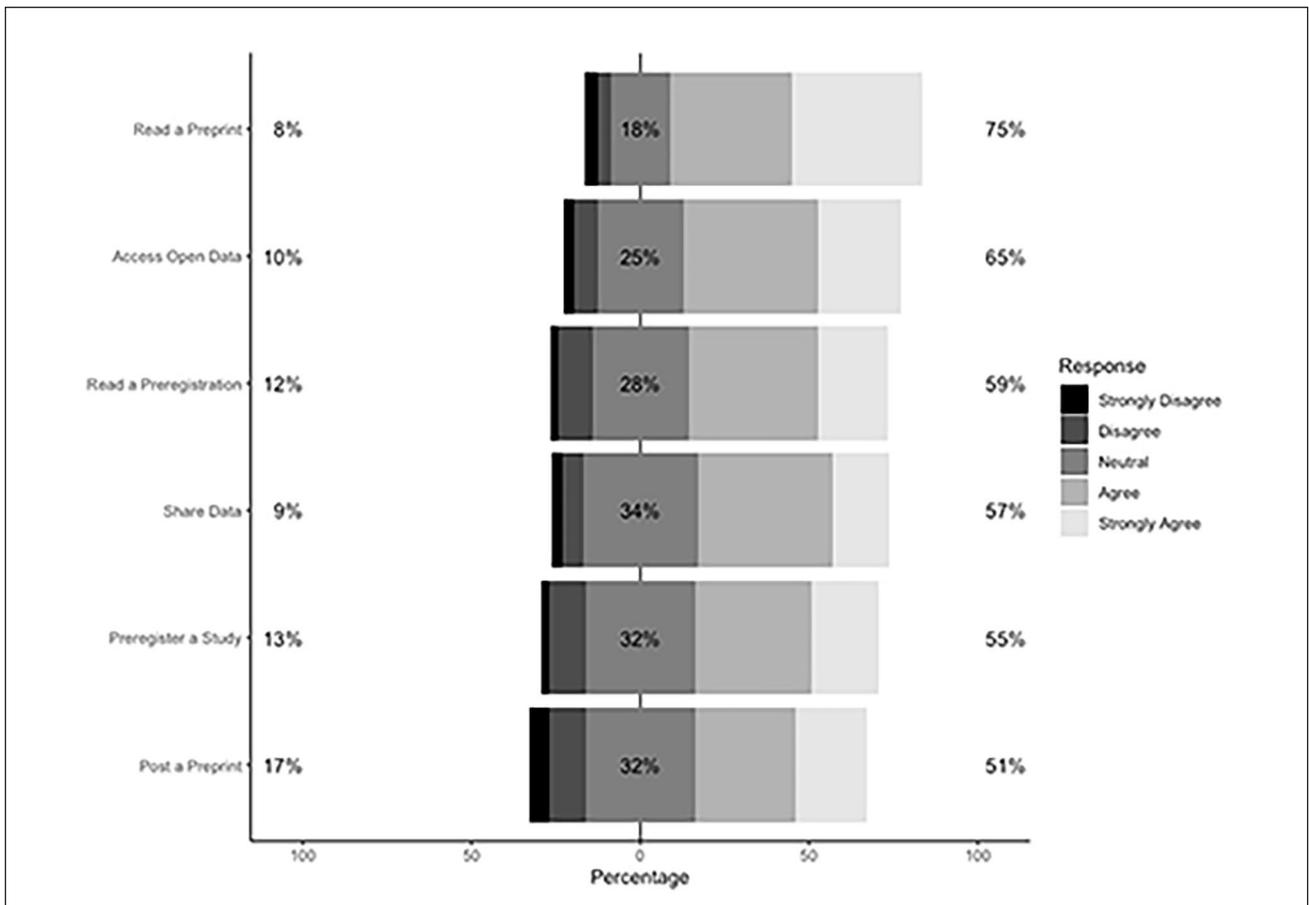

Figure 3. Intent to Engage in Open Science Practices in the Next 2 Years.

The overall model predicting intention to make data open was statistically significant, $F(11, 110) = 6.48$, $p < .001$, explaining 36% of the variance. Attitudes toward ($b = 0.35$, $p < .001$) and knowledge of ($b = 0.37$, $p = .003$) data sharing were significantly and positively associated with intent to make data open when holding all other variables constant. In addition, intent to make data open was greater for ECR researchers ($b = 0.99$, $p = .005$) when compared

Table 2. Linear Regression Analyses to Predict Intention to Engage in Open Science Practices.

Variable	Post a preprint				Share data				Preregistration			
	B	SE B	β	p	B	SE B	β	p	B	SE B	β	p
Experience (years)	0.01	0.02	0.03	.79	−0.02	0.02	−0.10	.31	−0.2	0.02	−0.12	.24
Total publications	0.02	0.33	0.14	.44	0.05	0.20	0.44	.002*	0.03	0.02	0.25	.08
Pre/Non-tenure	0.26	0.34	0.10	.44	0.29	0.29	0.14	.32	−0.01	0.28	−0.01	.97
ECR	0.43	0.42	0.19	.30	0.95	0.37	0.49	.01*	0.37	0.37	0.19	.33
Qual/Mixed methods	−0.26	0.23	−0.11	.26	−0.31	0.20	−0.15	.12	−0.44	0.21	−0.21	.03*
Single case	−0.34	0.22	−0.14	.12	0.01	0.20	0.002	.98	−0.26	0.20	−0.13	.19
Attitudes	0.60	0.11	0.53	.001*	0.35	0.11	0.30	.001*	0.42	0.12	0.34	.001*
Knowledge	0.23	0.11	0.18	.04*	0.37	0.12	0.29	.003*	0.26	0.09	0.25	.007*
Perceived norms	0.01	0.01	0.10	.24	−0.01	0.004	−0.10	0.24	0.01	0.01	0.13	.18
White	−0.19	0.22	−0.07	.38	0.43	0.20	0.18	.03*	0.28	0.20	0.12	.17
Female	0.29	0.21	0.11	0.18	0.01	0.20	0.003	.97	0.53	0.19	0.24	.007*
R^2	.51				.42				.47			
Adjusted R^2	.45				.36				.41			

Note. ECR= early-career researcher, non-White is the reference group for race/ethnicity, and male is the reference group for gender.
*$p < .05$.

to tenured researchers (the reference group), holding all other variables constant.

The overall model predicting intention to preregister a project was statistically significant, $F(11, 100) = 7.22$, $p < .001$, and explained 41% of the variance. The predictors of attitudes toward ($b = 0.42$, $p = .001$) and knowledge of ($b = 0.26$, $p = .007$) preregistration were positively and significantly associated with intent to preregister. In addition, intent to preregister was lower for researchers who primarily use qualitative or mixed methods designs ($b = −0.44$, $p = .03$) than for group quantitative researchers, holding all other variables constant.

Discussion

The purpose of this study was to investigate (a) special education researchers' use of, knowledge of, perceived norms for, attitudes toward, and future intentions for three core open practices (i.e., preprints, data sharing, and preregistration) and (b) what factors predict intent to use the practices in the future. The majority of respondents reported no or low knowledge of each practice–which is consistent with Cook and colleagues' (2023) finding that few publications in special education reflect open practices. Despite low engagement and knowledge, most respondents to our survey reported positive attitudes toward the three practices. Attitudes toward data sharing were significantly higher than the attitudes toward preprints and preregistration. These results are similar to Maggin's (2022) findings that 70%, 59%, and 35% of special education editors and associate editors believed data sharing, preregistration, and preprints were important or very important, respectively. Interestingly, despite the time and effort needed to publicly share data

(Logan et al., 2021), the perceived benefits of the practice (e.g., the ability to ask new research questions or run new analyses) may outweigh the challenges for many researchers. In contrast, given the relative ease of sharing preprints (Cook, Fleming, et al., 2022), it is surprising that attitudes regarding preprints are relatively low in the current study as well as in Maggin's survey of special education journal editors. It may be that special education researchers do not perceive preprints to be credible enough to read or use (Soderberg et al., 2020) or that the complexity of preprint policies prevents researchers from understanding or engaging in the practice (Fleming & Cook, 2022).

The perceived engagement of other special education researchers in posting preprints, sharing data, and preregistering studies mirrored the low levels of actual engagement by participants. However, participants' own attitudes were significantly more favorable than the perceived attitudes of other researchers in the field toward each of the open practices. Whereas 60%, 66%, and 78% of participants indicated favorable attitudes toward preprints, data sharing, and preregistration, respectively; participants perceived that only 28%, 30%, and 34% of their peers held favorable attitudes toward the respective practices. This misalignment of attitudes and perceived norms may indicate that positive signals regarding these open practices are not prominently visible within the field and that future efforts, such as journals highlighting and promoting the use of open practices (Maggin, 2022), should aim to close the gap between actual and perceived attitudes (Nosek, 2019).

The attitudes and behaviors of the special education researchers responding to this survey are somewhat more positive than those of the 489 education researchers surveyed by Beaudry and colleagues (2022). Sixty-six percent,

60%, and 78% of special education researchers, respectively, indicated favorable attitudes toward preregistration, preprints, and data sharing in this study compared to 37%, 51%, and 66% of education researchers in Beaudry et al. Across both samples, a minority of researchers indicated they engaged in open practices in their most recent publication. Whereas 10%, 11%, and 15% of special education researchers indicated that they posted a preprint, shared data, or preregistered their study for their most recent publication, respectively; 28%, 19%, and 9% of education researchers did (Beaudry et al., 2022). Collectively, these findings suggest that (a) both samples generally hold positive attitudes about open practices, but few engaged in the practices in their recent research, and (b) the discrepancy between attitudes and practices is greater among special education researchers.

Both attitudes and perceived behavioral control (i.e., knowledge) were statistically significant predictors of intent to engage in each of the three open practices. These findings align with the results of previous studies and the theory of planned behavior (Ajzen, 1985; Campbell et al., 2019; Houtkoop et al., 2018). Given the important role of attitudes and knowledge on behavioral intent, these findings can help guide future efforts to increase open scholarship practices in the field. Although we expected subjective norms to be a statistically significant predictor as well, it may be that this variable was not significant because many participants perceived their peers to have very low opinions of open practices.

Although not the primary focus of the study, trends emerged from the covariates included in our models. First, special education researchers with more total publications indicated greater intent to share data. It may be that these researchers have more experience collecting, cleaning, and sharing data than those with fewer publications. Second, non-White researchers indicated lower intent to share their data in the future, controlling for all other variables. Although these findings are preliminary and exploratory, given the long history of exclusion, erasure, and misappropriation of historically marginalized groups and their research, open science advocates should consider how open scholarship can be used to correct imbalances of power and ensure protection and inclusion for all researchers (Grahe et al., 2020; Pownall et al., 2021).

Recommendations for Practice and Research

Although open practices have the potential to enhance accessibility, transparency, and credibility in many fields, these issues may be of particular importance in highly applied fields such as special education if research findings are used as a basis for practice and policy (Cook et al., 2018). Findings from this study suggest several recommendations for supporting increased engagement in open science in special

education. Given that (a) knowledge significantly and positively predicted intent to engage in all three open practices examined and (b) attitudes and intent to use open practices in the future are relatively high but knowledge and current use are relatively low, it seems that increasing knowledge among special education researchers is an important first step toward increasing uptake of these practices (Maggin, 2022). Open-science advocates might start by creating training programs and support systems aimed at equipping special education researchers with the skills to effectively share their data. This approach aligns with findings in both the existing literature and the present study, where researchers demonstrated the most favorable attitudes toward this open practice (Beaudry et al., 2022; Maggin, 2022), but specific procedures outside the skillsets of many researchers are involved with responsibly and effectively sharing one's data (Logan et al., 2021).

In the current study, 72% of participants indicated that they primarily used methods other than group quantitative in their research. Indeed, identifying oneself primarily as a qualitative or mixed-method researcher significantly and negatively predicted intention to engage in posting a preregistration and sharing data. Thus, another potential strategy for increasing the use of open practices in special education is to engage researchers who use single-case, qualitative, and mixed-method designs in exploring issues and how open practices might be used in their research. Although open-science advocates have begun to consider how open practices can be applied in different areas of research (see Cook, Johnson et al., 2022, for a discussion of open science in single-case design), many researchers continue to perceive that open science is only applicable for their colleagues conducting group quantitative research (Haven et al., 2020). Efforts to facilitate use of open practices among qualitative and mixed-method researchers might include developing a mixed-method preregistration template (Fleming et al., 2023) and guidelines for qualitative researchers in special education on how and where to share data. Importantly, the voices and perspectives of qualitative and mixed methods special education researchers should be privileged in these efforts.

Results also indicated a large gap between the perceived attitudes of others in the field (i.e., subjective norms) and researchers' own attitudes toward open practices. It may be helpful to consider how open practices can be made more visible and normative in the field. Future efforts could include more special education journals recognizing and rewarding transparency through the use of open science badges, institutions of higher education recognizing and rewarding the use of open practices in promotion and tenure decisions, and professional organizations providing support and training on open practices (see Adelson et al., 2019). As special education researchers become aware of the use of open practices in the field, norms, policies, and incentives

may shift to make open practices more standard and visible (Nosek, 2019).

Limitations

Limitations to this study should be considered when interpreting study findings. First, the generalizability of results is limited because of the convenience nature of the moderately sized sample and the potential bias introduced from a self-report measure (e.g., socially desirable responding). We used a convenience sample because we did not have the contact information for all special education researchers in the United States, which impacted the precision of our estimates. Furthermore, our response rate of 16% limits the generalizability of findings and may reflect sampling bias (e.g., researchers who chose to participate may have held different views of open practices than those who did not). We recommend that future researchers update the study using procedures such as providing incentives to respondents to increase response rates. Second, limited racial diversity also limits the generalizability of findings. In the current study, 119 (77%) of participants identified as White or Caucasian. Although previous research has highlighted the lack of diversity among faculty in special education preparation programs (Smith & Montrosse, 2012) as well as doctoral students obtaining PhDs in special education (Corr et al., 2023), future researchers should recruit more diverse samples. Due to these limitations, our findings may not generalize, should be considered preliminary, and should be replicated.

Conclusion

Open practices have the potential to improve the openness and transparency of research in special education, as well as the credibility and replicability of findings. Results from the current study indicate that many special education researchers are in favor of preprints, preregistration, and open data, but most have low levels of knowledge of the practices and experience implementing them. Efforts to increase the uptake of open practices should consider improving attitudes toward and knowledge of practices, as results indicate that both predict intent to engage in open practices. Supports for ECRs as well as additional applications for qualitative and mixed-method research designs should also be considered. Study findings provide a preliminary indication of special education researchers' perceptions of open practices and can help inform efforts to support increased engagement with open practices in the field.

Declaration of Conflicting Interests

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Supplemental Material

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