

Program Structure and Organizational Support as Correlates of Retention and Satisfaction in a Student-Dominated Hospital Volunteer Cohort: A Cross-Sectional Study

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Abstract

Background: In Chinese tertiary hospitals, volunteer programmes are an integral part of patient-facing operations. We examined organisational and task-related factors associated with volunteers' intention to continue among active hospital volunteers in a Chinese tertiary teaching hospital.

Methods: We conducted a cross-sectional survey of registered hospital volunteers and examined factors associated with (i) definite intention to continue volunteering and (ii) maximum overall satisfaction using prespecified binary logistic regression models (top-box outcomes).

Results: In binary logistic regression models targeting high-threshold outcomes, a perceived high level of program structure (measured by a single-item global rating) emerged as the strongest predictor of both definite retention intention (OR 4.19) and maximum satisfaction (OR 6.01). Perceived Organisational Support (POS) scale scores (Q22; 3-item and 2-item forms) showed directionally consistent associations in sensitivity analyses (Supplementary Table S3).

Conclusions: In this active cohort, a highly structured and comprehensive organisational support system (single-item rating) and related programme features were strongly associated with definite continuation intention and very high satisfaction; POS scale scores corroborated the direction of these associations in sensitivity analyses. These findings provide an empirical foundation for hospital administrators to re-engineer support frameworks and foster sustained engagement among active student-volunteer workforces. These findings suggest that hospital volunteer management in this context should transition from a transactional focus on logging service hours to a 'structured support' model. This involves formalizing feedback channels and clarifying role boundaries, which our data suggest are key drivers of the psychological contract for student volunteers.

1. Introduction

Hospital volunteers are an important intermediary between clinical services and the public^{1–4}. In tertiary hospitals with high patient volumes, complex wayfinding and frequent overcrowding, volunteers often represent the first point of contact and take on non-clinical tasks that would otherwise fall to nursing and administrative staff^{1, 4–8}. While the contribution of such volunteers to patient experience is well-documented globally, the composition and motivation of the volunteer workforce in China present a unique paradigm that differs significantly from the older-adult-heavy cohorts common in Western health systems^{2, 9}.

In China, hospital volunteer programmes are dominated by student volunteers, predominantly university students fulfilling mandatory, credit-bearing service-learning requirements integrated into their academic curricula^{10, 11}. This institutionalised service-learning framework integrates community engagement directly into academic curricula. Consequently, participation is often characterized by a hybrid of intrinsic prosocial motives and extrinsic institutional requirements, distinguishing it from purely elective volunteerism^{12–16}. Student affairs offices and youth organisations (e.g., the Communist Youth League) typically coordinate these programmes and link certified service hours to academic credits, scholarship eligibility and comprehensive quality evaluations^{11, 17–19}. As a result, student volunteers often display a mixed motivational profile that combines prosocial, value-expressive motives with extrinsic, institutionally anchored incentives.

This semi-mandated context raises questions about whether instrumental requirements alone sustain participation once minimum hours are fulfilled, and whether longer-term engagement depends on the development of a stronger psychological contract between students and the host hospital^{10, 17, 20–22}.

The hospital environment poses specific challenges for student volunteers^{23, 24}. Emergency departments and outpatient clinics are emotionally charged and operationally complex settings; for young people with limited clinical experience, ambiguity regarding role boundaries in high-acuity settings may compromise the psychological safety of novice volunteers. Organisational psychology suggests that in high-uncertainty environments, clear structures—well-defined roles, visible supervision, and predictable protocols—may support role clarity and accessible help-seeking pathways, which are particularly salient for novices working in complex clinical settings^{25–27}.

Drawing on perceived organisational support theory and related work on supportive climates in organisations^{26, 28, 29}, we used the concept of “structure” as a framework for thinking about how managerial signals may align with volunteers' role clarity, confidence in task execution, and willingness to remain engaged. While we draw on the theory of psychological safety to interpret the importance of clear role boundaries, this study empirically tests the association between management “structure”—defined as role clarity and visible supervision—and volunteer engagement³⁰.

Furthermore, the potential misalignment between volunteer capabilities and assigned tasks remains an under-explored area, particularly regarding medical students³¹. A substantial portion of hospital volunteers are medical or nursing undergraduates seeking early clinical exposure^{12, 14–17}. However, owing to safety and liability concerns, these students are frequently assigned to wayfinding or self-service kiosk assistance—roles that are primarily logistical²⁷. There is a potential skill-task misalignment among medical undergraduates³⁰. While seeking early clinical socialisation, these students are often relegated to logistical roles (e.g., kiosk assistance), potentially inducing a perceived utility gap that may dampen long-

term professional commitment^{32, 33}. We postulate that a potential misalignment between academic background and assigned logistical tasks may influence engagement. However, as "relative deprivation" was not directly quantified, this framework serves as a conceptual lens rather than an empirically verified pathway in the current study. Specifically, we tested whether the association between simple wayfinding roles and self-reported intention to continue differed by academic major.

Despite the practical importance of volunteer programmes, evidence remains limited on which factors are associated with firm continuation intention and high overall satisfaction within student-dominated hospital volunteer programmes in Chinese tertiary hospitals^{7, 8}. In this cross-sectional study, we examined associations between perceived organisational support and other candidate factors with these outcomes, and explored whether patterns differed by academic major.

2. Materials and Methods

2.1. Study Design and Setting

This was a descriptive cross-sectional survey of hospital volunteers at the First Hospital of Hebei Medical University, a large tertiary teaching hospital in northern China with more than 2,000 inpatient beds and a high emergency and outpatient caseload. The hospital has an established volunteer management system in which students register in advance for specific service days and shifts via an electronic roster that is updated daily, rather than committing to fixed, long-term posts. Within this framework, some volunteers participate only once or a few times while others attend regularly throughout the semester, but at any given time there is no requirement that registered volunteers have achieved a minimum duration of service to be eligible for rostered activities. Volunteers are deployed across outpatient and emergency reception points, information desks and navigation posts, and they assist with wayfinding, queue management, escorting patients to examinations and inpatient wards, and providing psychosocial support in busy clinical areas.

From a nursing systems perspective, volunteers at this institution occupy roles at the margins of formal care delivery that nonetheless overlap with tasks routinely performed by nurses and emergency physicians, including orienting patients, answering basic process-related questions, providing companionship and helping to manage patient flow in crowded waiting areas. Although this study did not measure nursing workload directly, volunteers' descriptions of their activities suggest that they view themselves as supporting clinical teams by taking on some of the informational and emotional demands placed on staff. For nursing managers, these perceptions underline the potential value of volunteers as a complementary resource and the importance of defining safe, clearly bounded roles that interface with nursing and emergency care.

2.2. Participants and Sampling

Participant flow is shown in Figure S1.

We defined the study population as hospital volunteers who were registered in the hospital's volunteer management system and had at least one recorded volunteer activity between 28 May and 28 August 2025. Under the day-based scheduling model described above, students could sign up freely for individual service sessions during this period, with no minimum requirement for cumulative service duration or continuity. According to the central volunteer management roster, 881 individuals met these criteria. This frame therefore included first-time participants and those with longer service histories alike. This sampling frame did not capture individuals who had registered previously but did not volunteer during the study window; accordingly, the analytic sample reflects volunteers active during that period. First, the cross-sectional design sampled only currently active volunteers. This introduces survivorship bias, as individuals with negative experiences may have already exited the program. Consequently, our findings reflect the correlates of sustained engagement among the 'surviving' cohort rather than the causal factors of attrition. The results should be interpreted as correlates of engagement within the contemporaneously active workforce—those who have already successfully integrated into the system—rather than a baseline assessment of the entire initial intake. All 881 eligible volunteers recorded in the roster during the study window were considered eligible to participate in the survey. Additional inclusion criteria were being aged 14 years or older and being able to read and understand the study information and questionnaire. Consistent with institutional policies for adolescent volunteers, participants aged 14–17 years were eligible to complete the questionnaire provided that written parental or guardian consent had been obtained in advance. In practice, the volunteer cohort comprised both university students and junior/senior high-school students; throughout this article, we use the term "student volunteers" to refer to this combined group unless otherwise specified.

Questionnaires were distributed to all 881 eligible volunteers through the hospital's volunteer WeChat groups and during regular briefing sessions coordinated by the volunteer management office. During the study period, 562 volunteers returned completed questionnaires, yielding a response proportion of 63.8% among registered volunteers who had participated in activities between 28 May and 28 August 2025. No replacement sampling was performed. A priori sample size calculations were based on the number of potential independent variables in the planned ordinal logistic regression models; assuming a conservative minimum cell count of 10 observations per parameter for the least frequent outcome category, this sample exceeded the commonly recommended minimum^{34–36}. Although the initial sample size considerations referred to ordinal logistic regression models, the achieved sample size was also adequate for the prespecified binary logistic regression analyses using top-box outcomes, given the number of independent variables included and the observed distribution of the outcomes. Nevertheless, non-response may

still have introduced selection bias if volunteers who chose not to complete the survey differed systematically from respondents in unmeasured ways.

2.3. Questionnaire

A structured, self-administered questionnaire was developed based on a review of the international and Chinese literature on hospital volunteering, volunteer motivation and perceived organizational support^{1, 5, 6, 12–14, 28–30}, and in consultation with the hospital's volunteer management office and senior nurses from emergency and outpatient departments.

The instrument comprised five sections. Sections 1 and 2 collected socio-demographic characteristics (age, sex, education, occupation, student status) and volunteering patterns (routes of recruitment, weekly service time, cumulative service duration, recent service frequency, and current service posts such as self-service kiosk assistance, outpatient and emergency navigation, inpatient escort and translation services).

Section 3 assessed pre-joining concerns and motivations. Items on altruistic and value-expressive motives were adapted from domains of the Volunteer Functions Inventory (VFI), including "values", "understanding" and "enhancement"¹², while items on more instrumental motives (e.g., accumulating certified volunteer hours, gaining experience relevant to future careers) were developed de novo for the hospital context. Section 4 focused on perceived difficulties, emotional strain and safety-related incidents during service; several items on emotional exhaustion and stress symptoms were adapted from existing burnout and compassion-fatigue literature, whereas items on task trivialisation and role ambiguity were self-developed.

Section 5 covered training experiences, perceived organizational support, overall satisfaction with the volunteer program and intention to continue volunteering. Three items assessing perceived organisational support were adapted from the original Perceived Organisational Support (POS) scale by Eisenberger and colleagues, with wording modified to reflect hospital volunteer management²⁸, while a four-item scale capturing training and skills adequacy and a short global satisfaction item were developed specifically for this study. In this study, the POS items were treated as indicators of a single global perception of organisational support (i.e., an overall management-support signal), rather than as separable subdimensions.

Most attitudinal items used five-point Likert scales (e.g., ranging from "strongly disagree" to "strongly agree"), with higher scores indicating more positive perceptions (e.g., stronger motivation, better support, higher satisfaction). For multi-item constructs, composite scores were created by summing item responses. In particular, a five-item motivation scale (score range 5–25) reflected the strength of altruistic and growth-related motives for volunteering, a three-item organizational support scale (range 3–15) reflected the perceived systematic nature of support from the hospital, and a four-item training and skills adequacy scale (range 4–20) reflected volunteers' perceived preparedness and competence for their roles; higher scores on each of these scales indicated more favourable perceptions.

Content validity was assessed by an expert panel of volunteer managers and senior nurses. Items developed de novo for the local volunteer context were framed as pragmatic indicators of the intended domains informed by the literature and stakeholder consultation. Their use in regression models is intended to support construct representation in an associative analysis framework; further psychometric work (e.g., confirmatory testing in independent samples and longitudinal stability assessment) would be valuable to strengthen construct validation. Internal consistency was assessed for multi-item constructs. Cronbach's α coefficients exceeding 0.95 were interpreted as potential indicators of semantic redundancy—where overlapping item phrasing may artificially inflate reliability—rather than reflecting enhanced construct breadth^{37, 38}. This distinction is critical as excessive homogeneity can artificially inflate reliability coefficients while narrowing the breath of the underlying construct. For constructs with very high internal consistency (Cronbach's $\alpha > 0.95$), we treated the full-item scores as the primary operationalisation to preserve content coverage. To evaluate potential item redundancy without altering construct representation, we derived exploratory short-form scores based on redundancy diagnostics to facilitate post-hoc sensitivity analyses (corrected item–total correlations and α -if-item-deleted) together with content considerations (face validity of the retained items). We then examined agreement between the full-form and short-form scores and compared model estimates across these alternative operationalisations as sensitivity analyses. Item-level redundancy diagnostics and one-factor summary indices (first-factor eigenvalue, variance explained, and loading ranges) are reported in Supplementary Table S2, and comparisons of associations under full-form versus short-form scoring are provided in the Supplementary Materials.

The original questionnaire was developed and administered in Chinese. For the purpose of manuscript preparation, the items and response options most relevant to the analyses were translated into English by two bilingual researchers using a forward–backward translation procedure, with discrepancies resolved by discussion³⁹; the full Chinese wording of the questionnaire is available in the Supplementary Materials (File S1).

2.4. Data Collection

Data were collected between 28 May and 28 August 2025. Trained research assistants introduced the study during routine volunteer briefings and through the official hospital volunteer WeChat groups and other digital channels used by the volunteer management office. Eligible volunteers who agreed to participate accessed the anonymous questionnaire via a secure online survey platform using a QR code or hyperlink; for a small number

of volunteers without convenient smartphone access, research assistants provided paper questionnaires that were subsequently entered into the database by double data entry.

Participation was entirely voluntary and had no influence on volunteers' service records, evaluations or future opportunities within the hospital. No names or personal identifiers were collected. Completed online responses were exported and merged with data from paper questionnaires into a single dataset for analysis. Records with substantial missing data on key outcome variables or with obvious logical inconsistencies were excluded from the final analytical dataset⁴⁰.

Handling of academic major and the $n = 505$ analytic sample. The academic-major item was applicable to student volunteers; non-student respondents did not report a major (coded as not applicable). Therefore, models that included academic major (and the academic major $\times$ role interaction) were fitted in the student subsample with valid major information ($n = 505$). All descriptive analyses and models not involving academic major used the full respondent sample ($n = 562$).

The study is reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies⁴¹.

2.5. Data Analysis

Data were analysed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA) and R (version 4.3.0 or higher) for supplementary checks. Categorical variables are presented as frequencies and percentages, and continuous variables as means with standard deviations or medians with interquartile ranges, as appropriate. Group comparisons for categorical variables used χ^2 tests or Fisher's exact tests when expected cell counts were small. For proportional-odds ordinal logistic regression models, we assessed the proportionality (parallel lines) assumption using Brant tests and graphical diagnostics in R; no major violations were detected⁴². Odds ratios (ORs) with 95% confidence intervals (CIs) from selected ordinal and binary logistic regression models were visualised in forest plots using a logarithmic scale for the OR axis, with a vertical reference line at OR = 1.0.

Item-level missing data were generally low (< 5% for most variables). The academic-major item (Q5) was applicable only to student volunteers; responses from non-students were treated as not applicable rather than missing. Accordingly, models that included academic major were fitted in the student subsample with academic-major information ($n = 505$), whereas descriptive analyses and models not involving academic major used the full sample ($n = 562$).

Two key outcome variables were defined a priori. Intention to continue volunteering over the next 12 months was assessed with a 0–100 numeric rating item with five labelled categories (0%, 25%, 50%, 75% and 100%), asking respondents to rate the likelihood of continuing to volunteer at the hospital over the next 12 months. Overall satisfaction with the volunteer programme was assessed with a single four-point item ("dissatisfied", "neutral", "satisfied", "very satisfied") (corresponding to the Chinese options "非常/很/一般/很好", ordered from low to high). Both outcomes showed pronounced negative skew (ceiling effects), with the large majority of respondents selecting the highest categories. In this context, traditional mean-based analyses or models that assume approximately symmetric variability are inappropriate, and full-range ordinal models may yield unstable estimates for sparsely populated lower categories. Due to pronounced ceiling effects in satisfaction and intention scores (negative skew), we employed a "top-box" approach as the primary analytic framework. Outcomes were dichotomized to distinguish unequivocal commitment (100% score) from all other responses. Proportional-odds ordinal logistic regression was reserved for sensitivity analyses to verify the consistency of associations across the full response range. Top-box satisfaction was defined as the highest response category ("very satisfied") versus all other responses; top-box intention was defined as a 100% likelihood of continuing ("definitely continue") versus < 100% (any lower category). To address pronounced ceiling effects, we prioritised top-box models (dichotomising outcomes as 100% likelihood or "very satisfied"). This approach identifies the drivers of unequivocal commitment, which is operationally more distinct for administrators than average satisfaction. The maximum-category responses represent a high-threshold subgroup with unequivocal commitment ('definitely continue') or the strongest endorsement ('very satisfied'), which is operationally distinct from generally positive but less definitive ratings. Adjusted odds ratios are summarized in Table 7 and visualized in Figs. 5–6.

Table 7

Binary logistic regression models with top-box intention to continue and top-box overall satisfaction as outcomes (complete cases, student respondents with academic-major information (n = 505)). Simple wayfinding/navigation-only roles were coded as 1 if respondents reported serving exclusively in wayfinding/navigation support posts on the multi-response "current service posts" item, and 0 otherwise (other posts or mixed-role selections).

Outcome	Predictor	β	SE	OR	95% CI (lower)	95% CI (upper)	p-value
Top-box intention to continue	Female (vs. male)	0.21	0.22	1.24	0.81	1.9	0.328
Top-box intention to continue	Medical major (vs. non-medical/no major)	-0.78	0.3	0.46	0.25	0.83	0.010
Top-box intention to continue	Weekly service time ≥ 4 h (vs. <4 h)	0.85	0.25	2.33	1.42	3.83	0.001
Top-box intention to continue	Service duration ≥ 6 months (vs. <6 months)	-0.27	0.23	0.76	0.49	1.18	0.224
Top-box intention to continue	Cumulative volunteer hours ≥ 20 h (vs. <20 h)	0.71	0.22	2.04	1.33	3.14	0.001
Top-box intention to continue	Training fully/basically satisfied (vs. partially/not)	0.06	0.4	1.07	0.48	2.36	0.874
Top-box intention to continue	Self-rated organisational support system (single item): highly structured and comprehensive vs other	1.43	0.24	4.19	2.63	6.69	< 0.001
Top-box intention to continue	≥ 1 major difficulty during service (vs. almost none)	-0.28	0.4	0.75	0.34	1.66	0.482
Top-box intention to continue	Simple wayfinding/navigation-only roles (vs. other/mixed roles)	-0.88	0.31	0.42	0.23	0.77	0.005
Top-box intention to continue	Medical major $\times$ simple wayfinding/navigation-only roles	0.99	0.41	2.69	1.2	6.03	0.016
Top-box overall satisfaction	Female (vs. male)	-0.46	0.23	0.63	0.41	0.99	0.044
Top-box overall satisfaction	Medical major (vs. non-medical/no major)	-0.67	0.31	0.51	0.28	0.94	0.031
Top-box overall satisfaction	Weekly service time ≥ 4 h (vs. <4 h)	0.58	0.27	1.78	1.06	3.01	0.031
Top-box overall satisfaction	Service duration ≥ 6 months (vs. <6 months)	0.19	0.23	1.21	0.78	1.89	0.399
Top-box overall satisfaction	Cumulative volunteer hours ≥ 20 h (vs. <20 h)	-0.02	0.22	0.98	0.63	1.53	0.940
Top-box overall satisfaction	Training fully/basically satisfied (vs. partially/not)	0.75	0.42	2.12	0.93	4.87	0.075
Top-box overall satisfaction	Organisational support highly structured (vs. other)	1.79	0.23	6.01	3.83	9.44	< 0.001
Top-box overall satisfaction	≥ 1 major difficulty during service (vs. almost none)	-1.14	0.5	0.32	0.12	0.86	0.023
Top-box overall satisfaction	Simple wayfinding/navigation-only roles (vs. other/mixed roles)	-0.14	0.32	0.87	0.46	1.65	0.672
Top-box overall satisfaction	Medical major $\times$ simple wayfinding/navigation-only roles	0.49	0.42	1.62	0.71	3.7	0.248

As sensitivity analyses, we fitted proportional-odds ordinal logistic regression models that retained the full response scales; these models were used to assess whether the direction of associations was broadly concordant with the primary top-box results, and they were not used to define the main conclusions.

Because responses to the intention and satisfaction items were highly right-skewed with substantial ceiling effects, we prespecified a top-box approach as the primary analysis: each outcome was dichotomised as the maximum response (100%) versus any lower category, and associations were estimated using binary logistic regression. This operationalises a clear, high-threshold outcome ("definite continuation" / "maximum satisfaction") that is commonly used in experience research (e.g., HCAHPS)⁴³.

Binary predictor variables were constructed from questionnaire items according to substantive and distributional considerations. Weekly service time was dichotomised as ≥ 4 h vs. <4 h; cumulative volunteer hours as ≥ 20 h vs. <20 h; service duration in the hospital as ≥ 6 months vs. <6 months; training adequacy as "fully/basically satisfied" vs. "partially/not satisfied"; and the self-rated organisational support system (single item) as "highly structured and comprehensive" vs. all other evaluations. The POS scale score (Q22; 3-item mean and 2-item short-form mean) was examined in sensitivity analyses (Supplementary Table S3). A binary indicator of having encountered at least one major difficulty during service was created from the multi-response item on difficulties, distinguishing respondents who selected only "almost no difficulties" from those who endorsed any difficulty option. Sex and academic major (medical vs. non-medical/no major) were included as covariates. To evaluate effect modification by academic major, we additionally defined a binary indicator for simple wayfinding/navigation-only posts and included an interaction term (medical major $\times$ simple wayfinding) to test whether the association between post type and top-box outcomes differed between medical and non-medical volunteers.

Associations between candidate independent variables and each outcome were estimated using logistic regression and reported as odds ratios (ORs) with 95% confidence intervals (CIs). We prespecified an interaction term between academic major and post type to assess effect modification. All analyses were conducted in SPSS (v26.0). Given the cross-sectional design, estimates were interpreted as associations within the surveyed sample rather than causal effects.

2.6. Ethical Considerations

The study protocol was reviewed and approved by the Ethics Committee of The First Hospital of Hebei Medical University. All procedures complied with the Declaration of Helsinki⁴⁴. For volunteers aged under 18 years, written informed consent from a parent or legal guardian was obtained as part of the hospital's youth volunteer management procedures, and adolescents provided assent before completing the questionnaire. Participation was entirely voluntary, and respondents could withdraw at any time without consequences for their volunteer status or future opportunities. The questionnaire was anonymous, and no identifying information was collected or stored by the research team or by the hospital's volunteer management office.

All data were analyzed in aggregate form and used solely for research and quality improvement purposes. The survey had no impact on volunteers' service records, evaluations or future opportunities within the hospital.

3. Results

3.1 Socio-demographic characteristics

A total of 562 valid questionnaires were included in the analysis. Most volunteers were young (93.2% were aged 14–25 years) and two thirds were female (68.0%; Table 1).

Table 1
Socio-demographic characteristics of hospital volunteers (n = 562). High-school students without a specific major were grouped under 'no major' and included in the non-medical category.

Characteristic	Category	n	%
Sex	Male	180	32.0
	Female	382	68.0
Age group (years)	14–18	144	25.6
	19–25	380	67.6
	26–30	12	2.1
	31–35	12	2.1
	36–40	2	0.4
	41–45	8	1.4
	46–50	2	0.4
	51–55	0	0.0
	56–60	1	0.2
	≥ 61	1	0.2
Occupation	Student	505	89.9
	Healthcare worker	20	3.6
	Civil servant	9	1.6
	Enterprise/public institution staff	8	1.4
	Freelancer	17	3.0
	Unemployed	1	0.2
	Retired	1	0.2
	Other	1	0.2
Academic major			
	Medical major	269	47.9
	Non-medical	236	42.0
	Not applicable (non-student)	57	10.1
Education level	High school or below	115	20.5
	College/university (including current enrollment)	426	75.8
	Master's degree	14	2.5
	Doctoral degree or above	7	1.3

Nearly nine in ten volunteers (89.9%) were students; the remaining respondents were distributed across healthcare workers and other non-student occupational categories (Table 1). Three quarters had college or university education (including current enrolment), whereas only about 4% held a master's degree or above.

Among those who reported academic discipline, medicine (including clinical medicine and nursing) was the most common major, followed by arts, economics, science, engineering and other fields. In addition, 112 volunteers (approximately one-fifth of the sample) reported being junior or senior high-school students without a specific academic major; for analyses involving academic major, these respondents were coded as 'no major' and grouped with the non-medical/no-major category.

3.2 Service patterns and content

Volunteers were recruited through multiple channels (Table 2). The most common were the dedicated volunteer platform "Zhiyuanhui" (69.8%), recommendations from friends or classmates (41.5%) and the hospital's official mini-program (37.0%).

Table 2
Volunteering patterns, recruitment channels and service posts (n = 562)

Domain	Category	n	%
Recruitment channels*	Zhiyuanhui platform	392	69.8
	Hospital's official mini-program	208	37.0
	Classmates/acquaintances recommendation	233	41.5
	Other	9	1.6
Weekly service time	< 2 hours	243	43.2
	2–4 hours	182	32.4
	4–6 hours	57	10.1
	6–8 hours	37	6.6
	8–16 hours	17	3.0
	> 16 hours	26	4.6
Service duration at hospital	≤ 3 months	239	42.5
	3–6 months	97	17.3
	6–12 months	83	14.8
	1–2 years	92	16.4
	2–3 years	24	4.3
	> 3 years	27	4.8
Service frequency in last month	Once per month	122	21.7
	2–4 times per month	103	18.3
	5–8 times per month	42	7.5
	≥ 2 times per week	64	11.4
	Almost every day	12	2.1
	Not on a fixed schedule	219	39.0
Cumulative volunteer hours	< 10 hours	174	31.0
	10–20 hours	130	23.1
	20–50 hours	132	23.5
	50–100 hours	66	11.7
	≥ 100 hours	60	10.7
Current service posts*	Digital Health Literacy Support (Self-service kiosks)	404	71.9
	Wayfinding and directions	215	38.3
	Outpatient accompaniment	197	35.1
	Inpatient transfer/escort	73	13.0
	Inspection assistance	94	16.7
	Bedside companionship	41	7.3
	Therapeutic Music/arts Support	42	7.5
	Sign-language interpretation	20	3.6
	Foreign-language interpretation	21	3.7
	Other	11	2.0
* Multiple responses allowed.			

Weekly service time was typically short: around three quarters of volunteers served less than four hours per week, and only a small minority reported six or more hours (Table 2; Fig. 1). Service duration at the hospital was also limited, with about 60% having volunteered for no more than six months and fewer than 10% for more than three years.

Service frequency in the month prior to the survey ranged from once per month to at least twice per week, but 39.0% of respondents reported no fixed schedule.

Consistent with this pattern of brief and irregular engagement, cumulative volunteer hours were below 50 hours for more than three quarters of volunteers. The most common current posts were self-service kiosk assistance (71.9%), wayfinding and directions (38.3%) and outpatient accompaniment (35.1%), with smaller proportions involved in inpatient transfer, bedside companionship or specialized roles such as music/arts and language interpretation (Table 2; Fig. 2).

3.3 Motivations, perceived benefits and difficulties

3.3.1 Pre-joining concerns and motivations

Before starting volunteering, most respondents reported at least one pre-joining concern (Table 3). The preponderant pre-joining apprehension pertained to perceived deficits in clinical competence (416/562, 74.0%), followed by fear of facing patients' negative emotions or emergencies (313/562, 55.7%) and unfamiliarity with the hospital's management and support system (234/562, 41.6%). A total of 156/562 (27.8%) were worried that volunteering would take too much time and affect study or work, whereas 75/562 (13.4%) reported few or no concerns.

Table 3
Pre-joining concerns, motivations and perceived difficulties (n = 562)

Domain	Item	n	%
Pre-joining concerns*	Worried about insufficient professional knowledge/competence	416	74.0
	Afraid of facing patients' negative emotions or emergencies	313	55.7
	Unfamiliar with hospital management and support system	234	41.6
	Concerned that volunteering would take too much time and affect study/work	156	27.8
	Had few or no concerns	75	13.4
Motivations*	Use free time to help others and express altruistic values	448	79.7
	Need to accumulate certified volunteer hours	303	53.9
	Want to grow through volunteering	299	53.2
	Want to gain or demonstrate self-worth	245	43.6
	Once received help and wish to give back	174	31.0
Difficulties during service*	Professional knowledge or skills insufficient	410	73.0
	Time management is difficult	202	35.9
	Patients' emotions complex or communication is difficult	227	40.4
	Self-perceived communication barriers and poor communication	177	31.5
	Perceived task trivialization and limited sense of professional efficacy	92	16.4
* Multiple responses allowed.			

Key motivations for volunteering included using free time to help others and express altruistic values (448/562, 79.7%), needing to accumulate certified volunteer hours (303/562, 53.9%), wanting to grow through volunteering (299/562, 53.2%), wanting to gain or demonstrate self-worth (245/562, 43.6%) and having once received help and wishing to give back (174/562, 31.0%; Table 3). Overall, the findings indicate a mixed motivational profile in which prosocial motivation and altruistic values are prominent, but closely intertwined with instrumental motivations linked to formal recognition and certification within the education system. This pattern is consistent with the service-learning framework that underpins many Chinese education-linked volunteer programmes, especially those based in universities, in which community service simultaneously provides opportunities to help others and to fulfil formally recognised social-practice requirements^{10, 45}. In the present hospital setting, these requirements typically take the form of credit-bearing Social Practice modules for university students and documented social-practice hours within comprehensive quality assessment systems for upper-secondary school students, together forming a hospital-based institutionalised service-learning programme^{10, 13–15, 45}.

The psychometric properties of the motivation scale indicated good internal consistency and a clear unidimensional structure (Table 6). On Likert-scale items assessing motivational dimensions, most respondents scored in the upper range of the motivation scale, indicating strong endorsement of prosocial and altruistic values. At the same time, the high prevalence of endorsement of items such as "need to accumulate certified volunteer hours" and "want to gain or demonstrate self-worth" illustrates the importance of instrumental motivations, in which volunteering is also understood as a way to obtain formally recognised experience within the education and employment system. Overall, the motivational profile of this student-dominated cohort is consistent with an institutionalised service-learning model, in which volunteering is experienced both as an opportunity to express prosocial motivation and as a structured pathway to meet institutional requirements and strengthen future career prospects.

Table 6

For constructs with evidence of potential item redundancy (Cronbach's $\alpha > 0.95$), full-item scores were used as the primary operationalisation. Short-form versions were derived and evaluated as sensitivity analyses; full-item diagnostics and short-form selection metrics are reported in Supplementary Table S2.

Scale	No. of items	Cronbach's α	Eigenvalue of 1st factor	Variance explained by 1st factor (%)	Factor loadings on 1st factor (range)
Motivation	5	0.89	3.65	73.0	0.75–0.91
Perceived organisational support (short form)	2	0.93	1.87	93.4	0.97–0.97
Training and skills adequacy	4	0.91	3.15	78.8	0.85–0.92
Job experience and role clarity (short form)	4	0.92	3.24	81.0	0.89–0.91
Emotional exhaustion (short form)	2	0.91	1.85	92.3	0.96–0.96

3.3.2 Difficulties and emotional strain

Perceived difficulties during service are summarized in Table 3. The most common difficulty was insufficient professional knowledge or skills (410/562, 73.0%), followed by complex patient emotions or communication barriers (227/562, 40.4%) and time management problems (202/562, 35.9%). Self-perceived introversion and poor communication were reported by 177/562 (31.5%), and 92/562 (16.4%) felt that their tasks were trivial or low in perceived value.

Items directly assessing emotional strain and stress-related symptoms showed that between 27.8% and 32.7% of volunteers selected the "often" or "always" categories for these items. Specifically, 184/562 (32.7%) reported often or always feeling emotionally exhausted after volunteer shifts, 171/562 (30.4%) often or always feeling numb towards patients' requests, and 171/562 (30.4%) often or always needing longer time to recover after service. Furthermore, 167/562 (29.7%) often or always experienced recurrent thoughts or dreams about volunteer experiences that affected rest, and 156/562 (27.8%) reported often or always being more irritable or angry than usual, a pattern broadly consistent with recent reports on stress load among patient volunteers in Fangcang shelter hospitals in China^{46, 47}. The remaining respondents generally selected "never" or lower-frequency response options for these items. This subset of respondents, despite limited weekly service hours, appears to experience acute psychological burden linked to the complex clinical environment, which warrants distinction from chronic professional burnout^{48–50}.

3.4 Training, organizational support, satisfaction and intention to continue

3.4.1 Training and competency support

Pre-service and in-service training were widely implemented. Overall training adequacy was rated as "fully satisfying" by 210/562 (37.4%) and "basically satisfying" by 297/562 (52.9%), while 49/562 (8.7%) felt training was only partially satisfying and 6/562 (1.1%) were not satisfied (Table 4).

Table 4
Training, organizational support, satisfaction and intention to continue (n = 562)

Domain	Category	n	%
Overall training adequacy	Fully satisfied	210	37.4
	Basically satisfied	297	52.9
	Partially satisfied	49	8.7
	Not satisfied	6	1.1
Organizational support system	Highly structured and comprehensive	357	63.5
	Quite adequate	162	28.8
	Average	35	6.2
	Rather loose	8	1.4
Priorities for improvement*	Feedback and suggestion channels	298	53.0
	Training content	271	48.2
	Material support (e.g. water, rest space)	210	37.4
Overall satisfaction with volunteer programme	Very satisfied	298	53.0
	Satisfied	219	39.0
	Neutral	40	7.1
	Dissatisfied	5	0.9
Intention to continue volunteering in next year	100% (definitely continue)	243	43.2
	75% (high likelihood)	226	40.2
	50% (uncertain)	74	13.2
	25% (low likelihood)	14	2.5
	0% (definitely not)	5	0.9
* Multiple responses allowed.			

On detailed Likert-scale items, 90.4% of volunteers agreed or strongly agreed that their responsibilities and tasks were clear, 87.9% felt that their work was recognized by patients and 89.1% felt that collaboration with medical staff was smooth and that work intensity and time were within an acceptable range.

3.4.2 Organizational support and system evaluation

Regarding the volunteer management and support system, 357/562 (63.5%) described it as "highly structured and comprehensive", with regular communication, timely feedback and adequate logistic support and incentives; a further 162/562 (28.8%) considered it "quite adequate". Only 35/562 (6.2%) rated organizational support as "average" and 8/562 (1.4%) as "rather loose" (Table 4).

When asked about priorities for improvement, 298/562 (53.0%) selected "establishing more effective channels for feedback and suggestions", 271/562 (48.2%) chose "enriching training content" and 210/562 (37.4%) chose "strengthening material support such as drinking water and rest areas". Most volunteers reported that managers often communicated with them and provided necessary support and encouragement, while a small proportion reported infrequent contact.

3.4.3 Overall satisfaction, social meaning and 12-month intention to continue volunteering

Overall satisfaction with the volunteer programme was high (Table 4, Fig. 3): 298/562 (53.0%) respondents reported being "very satisfied" and 219/562 (39.0%) "satisfied", whereas only 40/562 (7.1%) were neutral and 5/562 (0.9%) dissatisfied, yielding 517/562 (92.0%) with positive satisfaction ratings. For inferential analyses, we used the prespecified top-box outcomes (see Methods).

Intention to continue volunteering over the next 12 months showed a similarly skewed distribution. Most respondents reported high or definite intention: 243/562 (43.2%) selected "100% (definitely continue)" and 226/562 (40.2%) "75% (high likelihood)", while only 19/562 (3.4%) indicated a low or zero likelihood of continuing. Overall, 469/562 (83.5%) had a self-rated likelihood of at least 75% to continue volunteering. For descriptive

reporting, we refer to $\geq 75\%$ as “high intention”; however, the pre-specified primary models define “top-box intention” strictly as 100% (“definitely continue”) versus $< 100\%$ (Table 7).

On a 0–10 numeric rating scale, the mean likelihood of recommending the volunteer program to friends or classmates was 8.44. When asked about the social meaning of hospital volunteer services, respondents most frequently chose options related to expressing altruism and compassion and helping others, followed by alleviating medical pressure and promoting harmonious doctor–patient relationships.

3.5 Factors associated with high intention to continue volunteering

In univariable χ^2 analyses, we summarised the distribution of intention using a pragmatic “high intention” threshold ($\geq 75\%$) for descriptive comparisons across groups. This $\geq 75\%$ threshold was used for descriptive purposes only and was not used to define outcomes in any inferential or multivariable analyses. However, all primary inferential analyses use the pre-specified top-box definition—100% (“definitely continue”) versus $< 100\%$ —as described in Section 2.5 and reported in Table 7. Univariable analyses revealed that high-level commitment clustered among volunteers with greater temporal investment (≥ 4 weekly hours or ≥ 20 cumulative hours) and those perceiving robust institutional support. Conversely, demographic traits such as occupation and total duration of hospital service showed negligible associations with continuation intent.

In supplementary proportional-odds ordinal logistic regression models that included demographic characteristics, service-time indicators and key attitudinal variables, broad patterns for intention to continue volunteering were consistent with those observed in the primary top-box analyses (Section 3.7). After mutual adjustment, volunteers who served four hours or more per week and those with at least 20 cumulative hours of volunteering were more likely to report higher intention to continue than those with shorter service time. Perceiving the organisational support system as highly structured was also strongly and positively associated with higher intention across the ordered response categories. In contrast, sex, academic major, service duration at the hospital and reporting at least one major difficulty during service did not show strong independent associations once other variables were taken into account. These ordinal estimates are best viewed as descriptive trends and are interpreted with less weight than the primary top-box models.

3.6 Factors associated with high overall satisfaction

Peak satisfaction levels were comparable across sex, age, and academic backgrounds, showing no significant demographic divergence. Instead, the key correlates of exceptional satisfaction were perceived training adequacy, a structured support climate, and role clarity, whereas service-time metrics (weekly or cumulative) yielded minimal independent impact.

In supplementary ordinal models for overall satisfaction, patterns were again broadly consistent with those from the primary top-box analyses. Female sex, being a medical-major student and reporting at least one major difficulty showed trends towards lower satisfaction, although 95% confidence intervals included the null value. By contrast, perceiving training as fully or basically adequate and describing the organisational support system as highly structured were strongly and significantly associated with higher satisfaction, with adjusted odds ratios of 4.90 (95% CI 2.45–9.80) and 5.44 (95% CI 3.57–8.29), respectively. Weekly service time, cumulative volunteer hours and most socio-demographic variables showed little or no independent association with satisfaction once training, organisational support and major difficulties were taken into account. These ordinal models mainly illustrate how organisational support, training adequacy and absence of major difficulties separate a small group with lower satisfaction from a high-scoring majority and should be interpreted as descriptive and less stable than the primary top-box models, rather than as providing precise quantitative estimates of “how many times more likely” volunteers are to be very satisfied. Adjusted odds ratios from the proportional-odds ordinal logistic regression model for overall satisfaction are shown in Table 5 and Fig. 4.

Table 5

Proportional-odds ordinal logistic regression of factors associated with intention to continue volunteering and overall satisfaction with the volunteer program (n = 505). OR, odds ratio; CI, confidence interval. Analytical sample restricted to volunteers with complete data on all covariates and the respective outcome (complete-case analysis).

Variable	Category (reference)	Intention β (SE)	Intention aOR (95% CI)	Intention Wald χ^2	Intention p-value	Overall satisfaction β (SE)	Overall satisfaction aOR (95% CI)	Overall satisfaction Wald χ^2	Overall satisfaction p-value
Sex	Female vs male	0.17 (0.18)	1.18 (0.82–1.69)	0.8	0.381	-0.29 (0.21)	0.75 (0.50–1.12)	2.0	0.158
Academic major	Medical major vs non-medical/no major	-0.12 (0.19)	0.89 (0.61–1.30)	0.4	0.548	-0.40 (0.21)	0.67 (0.44–1.01)	3.6	0.053
Weekly service time	≥ 4 h vs < 4 h	0.84 (0.23)	2.32 (1.47–3.68)	12.9	< 0.001	0.43 (0.25)	1.53 (0.93–2.52)	2.8	0.093
Service duration at hospital	≥ 6 months vs < 6 months	-0.15 (0.19)	0.86 (0.59–1.26)	0.6	0.452	0.14 (0.21)	1.15 (0.76–1.73)	0.4	0.520
Cumulative volunteer hours	≥ 20 vs < 20 hours	0.53 (0.19)	1.70 (1.16–2.48)	7.5	0.006	0.10 (0.21)	1.11 (0.74–1.67)	0.3	0.622
Training satisfaction	Fully/basically vs partially/not satisfied	0.36 (0.31)	1.43 (0.77–2.64)	1.3	0.259	1.59 (0.35)	4.90 (2.45–9.80)	20.2	< 0.001
Organizational support	Highly structured vs other	1.06 (0.20)	2.88 (1.96–4.22)	29.2	< 0.001	1.69 (0.21)	5.44 (3.57–8.29)	62.1	< 0.001
Difficulties during service	≥ 1 major difficulty vs almost none	-0.48 (0.31)	0.62 (0.34–1.13)	2.4	0.121	-0.40 (0.33)	0.67 (0.35–1.29)	1.4	0.231

3.7. Primary multivariable analyses using top-box outcomes

We treated binary logistic regression models with top-box outcomes as our primary multivariable analyses, using the ordered scales only in supplementary ordinal models. In these sensitivity analyses, top-box intention to continue was defined as a self-rated likelihood of 100% ("definitely continue") versus all lower categories, and top-box overall satisfaction as being "very satisfied" versus all other responses. Complete-case analysis yielded 505 respondents (89.9% of the sample) with non-missing data on all independent variables and both binary outcomes.

After adjustment for prespecified covariates, organisational and role-related variables showed stronger associations with the top-box continuation outcome than most socio-demographic characteristics. In sensitivity analyses, estimates for perceived organisational support were materially unchanged when the 3-item full score was replaced with a 2-item short-form score (e.g., unadjusted OR per 1-point: 2.77 vs 2.64 for top-box intention to continue), supporting the robustness of the observed association (Supplementary Table S3)^{10,31}. In the primary model, the single-item rating of a highly structured and comprehensive organisational support system (vs other ratings) had the largest adjusted association with top-box intention to continue. In contrast, duration of involvement in the programme in months showed little additional independent association with the top-box outcome, and reporting at least one major difficulty during service was negatively related to the likelihood of being "definitely" committed to continuing. Medical-major volunteers had lower odds of reporting definite continuation than non-medical volunteers (aOR 0.46). This between-group difference is reported descriptively; potential explanatory mechanisms (e.g., academic workload or scheduling conflicts) were not directly assessed in the survey.

We observed a significant interaction between academic major and role type ($p = 0.016$). For non-medical students, assignment to simple wayfinding roles was associated with significantly lower odds of definite retention intention (aOR 0.42; 95% CI 0.23–0.77). However, this negative association was not observed among medical students (Interaction aOR 2.69), indicating that role content was less of a determinant for medical students' retention intention compared to their non-medical peers. Given the cross-sectional design and potential self-selection into roles, these estimates indicate effect modification of associations and should not be interpreted as causal effects of reassignment.

The single-item rating of a highly structured and comprehensive organisational support system (vs other ratings) had the largest adjusted association with top-box satisfaction; Volunteers perceiving a highly structured organisational support system had approximately six-fold higher odds of being 'very satisfied' (aOR 6.01; 95% CI 3.83–9.44) than those reporting other levels of organisational support. While a substantial weekly

commitment (≥ 4 h) was associated with an 80% increase in the odds of top-box satisfaction (aOR 1.78; 95% CI 1.06–3.01), long-term cumulative experience (≥ 20 h) yielded no incremental benefit to satisfaction levels ($p = 0.940$). Training adequacy showed a positive but imprecise association with top-box satisfaction, and volunteers who reported at least one major difficulty during service were markedly less likely to be in the top satisfaction category, emphasising that unresolved challenges may selectively erode exceptional satisfaction even when average satisfaction levels remain high. Female volunteers and medical majors were somewhat less likely to report top-box satisfaction than male and non-medical volunteers, mirroring patterns seen in the ordinal models. Adjusted odds ratios are summarized in Table 7 and visualized in Fig. 6.

As a sensitivity check, we estimated additional models using alternative specifications (reported in the Supplementary Materials) and observed similar overall patterns of association.

4. Discussion

This study examined a predominantly student volunteer programme in a Chinese tertiary hospital and identified factors associated with firm continuation intention and very high overall satisfaction. Across models, perceived organisational support emerged as the most consistent correlate, indicating that modifiable organisational factors—such as feedback mechanisms and role structure—may be more salient correlates of engagement than fixed individual traits^{30, 32, 33}.

4.1. Programme Structure as a Management Signal: Correlates of Role Clarity and Volunteer Engagement

One of the most salient patterns in this study was the strong association between perceived organisational support (POS) and the top-box outcomes. Volunteers who rated the management system as highly structured and comprehensive had substantially higher odds of reporting top-box satisfaction and a definite intention to continue. In the primary models, organisational support was operationalised using this single-item global rating, which captures perceived programme structure and support pathways. Separately, perceived organisational support (POS) was measured using a three-item scale (Q22) and analysed in sensitivity analyses (Supplementary Table S3). A plausible mechanism is that these management signals crystallize role boundaries for student volunteers, thereby mitigating the ambiguity often encountered in high-acuity clinical environments. Importantly, psychological safety was not directly assessed; therefore, the present findings should not be framed as evidence about safety climate. Rather, they support a practice-oriented interpretation that perceived structure and support are cross-sectionally associated with exceptionally high satisfaction and continuation intention within an active volunteer cohort. Given the active-sample design, these patterns may reflect an 'upper-bound' or 'best-case' appraisal among those who remained engaged during the study period.

In a busy tertiary teaching hospital, "structure" may be experienced by student volunteers as clearer role boundaries, visible supervision, and predictable help-seeking pathways. These features could plausibly co-occur with greater role clarity and confidence when interacting with patients and clinical teams, and this cluster of perceptions may be aligned with higher satisfaction ratings and stronger self-reported intention to continue. At the same time, reverse causation and residual confounding are plausible: volunteers who are more resilient, better prepared, or more satisfied may be more likely to appraise the programme as structured and supportive. Accordingly, we interpret these organisational-support measures as excellence-related correlates within an active cohort rather than as evidence that enhancing perceived structure is linked to exceptionally high satisfaction; longitudinal data are required to establish temporal precedence.

4.2. Understanding High-Level Commitment and Sustained Participation Under Ceiling Effects

Across items, self-reported continuation intention and satisfaction clustered at the upper end of the scale, consistent with a ceiling effect that is common in service-experience surveys⁵¹. We interpret this pattern as indicating a stable core workforce—a subgroup that is currently engaged and therefore most informative for understanding perceptions within the currently active volunteer workforce. In this context, the prespecified top-box outcomes (100% vs. <100% on the 0–100 scales) provide a stringent threshold that distinguishes volunteers who report unequivocal commitment from those who are broadly satisfied but less certain about continuing⁵².

Within this active workforce, the strongest and most consistent associations involved programme structure, perceived organisational support, and perceived meaningfulness of the role. These cross-sectional associations should not be interpreted causally; rather, they may help prioritise domains for further evaluation and iterative service improvement (e.g., clarifying role boundaries and help-seeking pathways, strengthening communication and recognition, and balancing clinical exposure with psychological support to mitigate transient emotional strain, even among generally satisfied volunteers).

4.3. Academic-major Differences: Lower Top-box Continuation Intention Among Medical-major Volunteers

A notable pattern emerged by academic major. In the primary model, logistically-oriented service roles were associated with lower odds of endorsing the top category of continuation intention (100% on the 0–100 scale; ‘definitely continue’) among non-medical volunteers. However, medical-major volunteers had lower odds of definite continuation overall (aOR 0.46 in the top-box model), and the additional association of logistically-oriented service roles within this subgroup was weaker and closer to the null (major × post interaction). Therefore, the interaction should be read as effect modification: the association between logistically-oriented service roles and top-box intention was present in non-medical volunteers, but was not similarly observed among medical majors in this active sample. Because we did not directly measure academic workload, scheduling constraints, or expectations about early clinical socialisation, these remain plausible unmeasured drivers rather than established mediators. Medical students demonstrated lower odds of definite retention intention (aOR 0.46) regardless of their specific role. Interestingly, the interaction analysis revealed that while non-medical students were significantly less likely to remain if assigned to wayfinding roles, medical students were resilient to this specific role effect. This suggests that while medical students may have a higher baseline attrition rate—possibly due to academic demands or a general mismatch between the volunteer scope and their clinical learning expectations—they do not perceive logistical tasks as negatively as non-medical students, perhaps viewing any hospital exposure as professionally relevant. Nevertheless, in the absence of direct measures for academic workload or pre-service expectations, this interpretation remains hypothesis-generating and necessitates prospective validation using mixed-method designs. This effect-modification pattern should be regarded as hypothesis-generating given the cross-sectional design and potential self-selection into posts.

Interpretation of the interaction. The significant interaction suggests heterogeneity in how role type relates to retention intent across academic majors, rather than a uniform association. Importantly, this pattern should not be interpreted causally: role assignment and intention were measured contemporaneously, and volunteers may self-select into posts based on preferences or constraints. Thus, the estimates are best viewed as hypothesis-generating signals for program design rather than evidence that changing assignments would necessarily increase retention. Because academic major was only available for student volunteers, interaction analyses reflect the student subgroup (n = 505) and may not generalize to non-student volunteers.

These findings do not provide evidence that assignment to logistically-oriented service roles accounts for the observed lower self-reported commitment among medical students. However, medical-major volunteers had lower odds of reporting a definite intention to continue overall, and the explanations underlying this pattern remain unclear. Because we did not directly measure academic workload, scheduling constraints, or expectations about early clinical socialisation, such explanations should be treated as potential unmeasured confounders rather than established mediators. Future longitudinal and mixed-method studies are needed to test these possibilities.

Taken together, the data suggest a nuanced pattern of skill–task alignment. Wayfinding/navigation roles were associated with lower top-box continuation intention among non-medical volunteers, but the direction of influence cannot be determined in this cross-sectional design (e.g., role preferences and prior commitment may shape post selection). Accordingly, role-design changes should be framed as testable program hypotheses rather than assumed solutions. Future prospective or mixed-method studies could pilot refinements to logistical roles (e.g., improving role clarity, feedback, and perceived meaning) and evaluate whether these changes improve retention and experience.

4.4. Implications for Institutionalised Service-Learning

The results are consistent with an institutionalised service-learning model but also highlight its vulnerabilities. The tension between instrumental motives (credits, hours) and altruistic values appears to be shaped by programme quality, echoing recent work on how public-spirited and self-oriented motives jointly shape the wellbeing of Chinese volunteers^{17, 53}. Taken together with prior literature, the observed patterns are consistent with higher satisfaction being reported alongside clearer structure and more meaningful training experiences; when structure was perceived as limited, volunteering was more often appraised as transactional—primarily serving formal educational requirements rather than a meaningful learning experience^{4, 7, 10, 31}.

Management of such programmes may therefore need to move beyond simple tracking of service hours (a legacy of quantitative credit systems) towards more active management of volunteers’ experiences. Educational administrators from both universities and upper-secondary schools, together with youth leadership bodies, could focus on quality assurance of the learning component to ensure that the service provided creates genuine educational value for students and fulfils the pedagogical aims of service-learning^{31, 54–57}.

4.5. Limitations

Several limitations merit note. First, this cross-sectional survey estimates associations and cannot establish causal pathways. Furthermore, the potential for reverse causality cannot be excluded; for instance, volunteers with higher inherent commitment or satisfaction may be more predisposed to appraise the hospital’s organizational support and training systems more favorably. Second, participants were active registered volunteers; individuals who had already discontinued were not sampled, so absolute levels of satisfaction and intention may be overestimated, and inferences should be limited to retention within the current volunteer workforce. Consequently, the reported associations may represent an ‘optimal’ perceived programme climate among those who remained active, rather than the baseline experience of the broader initial volunteer intake. Third, measures were self-reported and may be influenced by social desirability or common-method variance^{58–60}. Finally, findings from a single tertiary hospital may not generalise to other programme designs or healthcare settings.

For transparency, we report both the prespecified top-box models (primary) and the complementary ordinal models (sensitivity) in the Supplementary Materials. Across specifications, the direction of associations was broadly consistent, although unmeasured drivers may still contribute to decisions to continue volunteering. In particular, we did not measure academic workload (e.g., examinations, clinical placements/rotations, or timetable conflicts) or students' expectations regarding early clinical exposure; these factors could plausibly differ by major and may be correlated with the top-box intention outcome.

Second, several multi-item measures—most notably the 3-item perceived organisational support scale (Cronbach's $\alpha = 0.956$)—exhibited ceiling-level internal consistency ($\alpha > 0.95$), suggesting a high degree of item overlap^{37, 38}. While this confirms the unidimensionality of the scales within this cohort, it also implies that the instruments may benefit from further refinement to reduce redundant phrasing and broaden content coverage in future studies. However, sensitivity analyses showed that the magnitude and direction of the association between organisational support and the key outcomes were highly consistent under full-form versus short-form scoring (e.g., OR 2.77 vs 2.64 for top-box intention), supporting the robustness of the core finding (Supplementary Table S3).

Third, our sample combined university students and junior/senior high-school students within a single "student volunteer" category. Although both groups operated within institutionalised social-practice frameworks, the specific mechanisms of instrumental motivation (for example, credit-bearing university modules versus school-based comprehensive quality assessment systems) are not identical. We did not stratify regression analyses by educational level, and our measures of instrumental motivation are likely to map more directly onto the university subgroup than onto upper-secondary school volunteers. As a result, inferences about "credit-linked" motivations and their associations with satisfaction and intention to continue should be interpreted as applying to a mixed student cohort rather than to university students alone. Future studies with larger samples should explicitly compare upper-secondary and tertiary student volunteers to examine whether the patterns observed here are consistent across educational stages.

5. Conclusion

In this large, student-dominated cohort, perceived organisational support and role-related factors were more strongly associated with volunteers' outcomes than any analyzed socio-demographic factors, including age and sex. In summary, the findings indicate that perceived organisational support and role-related experiences co-occurred with higher satisfaction and stronger self-reported continuation intention in the active volunteer cohort, highlighting organisational support as a domain warranting further evaluation in programme development.

Collectively, the results describe correlates of high-level commitment among current volunteers and should be treated as hypothesis-generating. Some patterns—particularly differences by academic major—may reflect unmeasured constraints, competing demands, or expectations rather than established mechanisms, and warrant prospective study.

Future research that links perceived organisational support with longitudinal continued participation data and that experimentally evaluates specific management interventions would help to clarify causal pathways and inform the design of hospital volunteer programmes in similar institutionalised service-learning contexts.

Declarations

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Institutional Review Board Statement:

The study was approved by the Ethics Committee of the First Hospital of Hebei Medical University. The study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Informed Consent Statement:

Informed Consent Statement: For participants aged ≥ 18 years, completion and submission of the questionnaire were considered implied informed consent. For participants aged < 18 years, written informed consent was obtained from a parent or legal guardian, and adolescent assent was obtained prior to participation.

Data Availability Statement:

The data presented in this study are available from the corresponding author upon reasonable request. The data are not publicly available due to institutional restrictions and ethical considerations regarding participant privacy.

Public Involvement Statement:

The public was not involved in the design, conduct, reporting, or dissemination plans of this research.

Guidelines and Standards Statement:

This manuscript was drafted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies ⁴¹.

Conflicts of Interest:

The authors declare no conflict of interest.

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Author Contribution

Conceptualization, Mandi Guo, Yaqin You, Daofeng You and Caili Han; methodology, Mandi Guo and Chuan Zhang; formal analysis, Chuan Zhang; investigation, Mandi Guo and Yaqin You; data curation, Mandi Guo and Chuan Zhang; writing—original draft preparation, Mandi Guo; writing—review and editing, Yaqin You, Chuan Zhang, Daofeng You and Caili Han; supervision, Daofeng You and Caili Han. All authors have read and agreed to the published version of the manuscript. Mandi Guo and Yaqin You contributed equally to this work and share first authorship.

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Figures

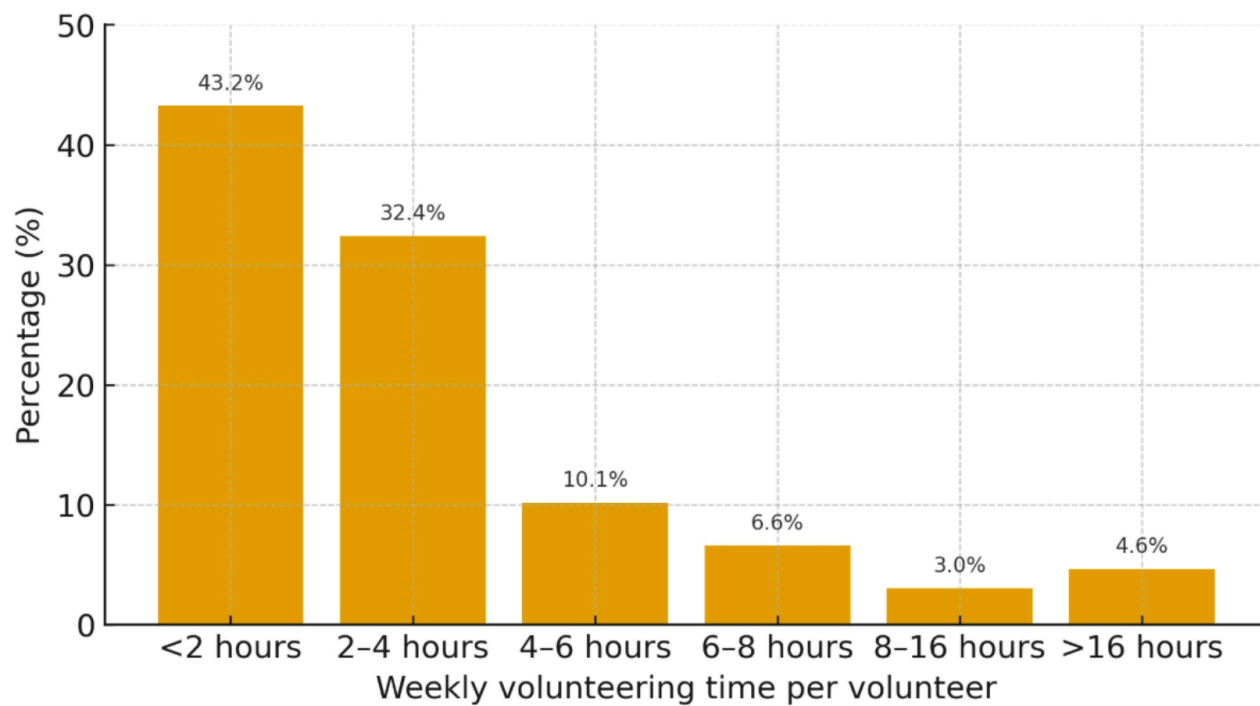


Figure 1

Weekly volunteering time per volunteer (n = 562)

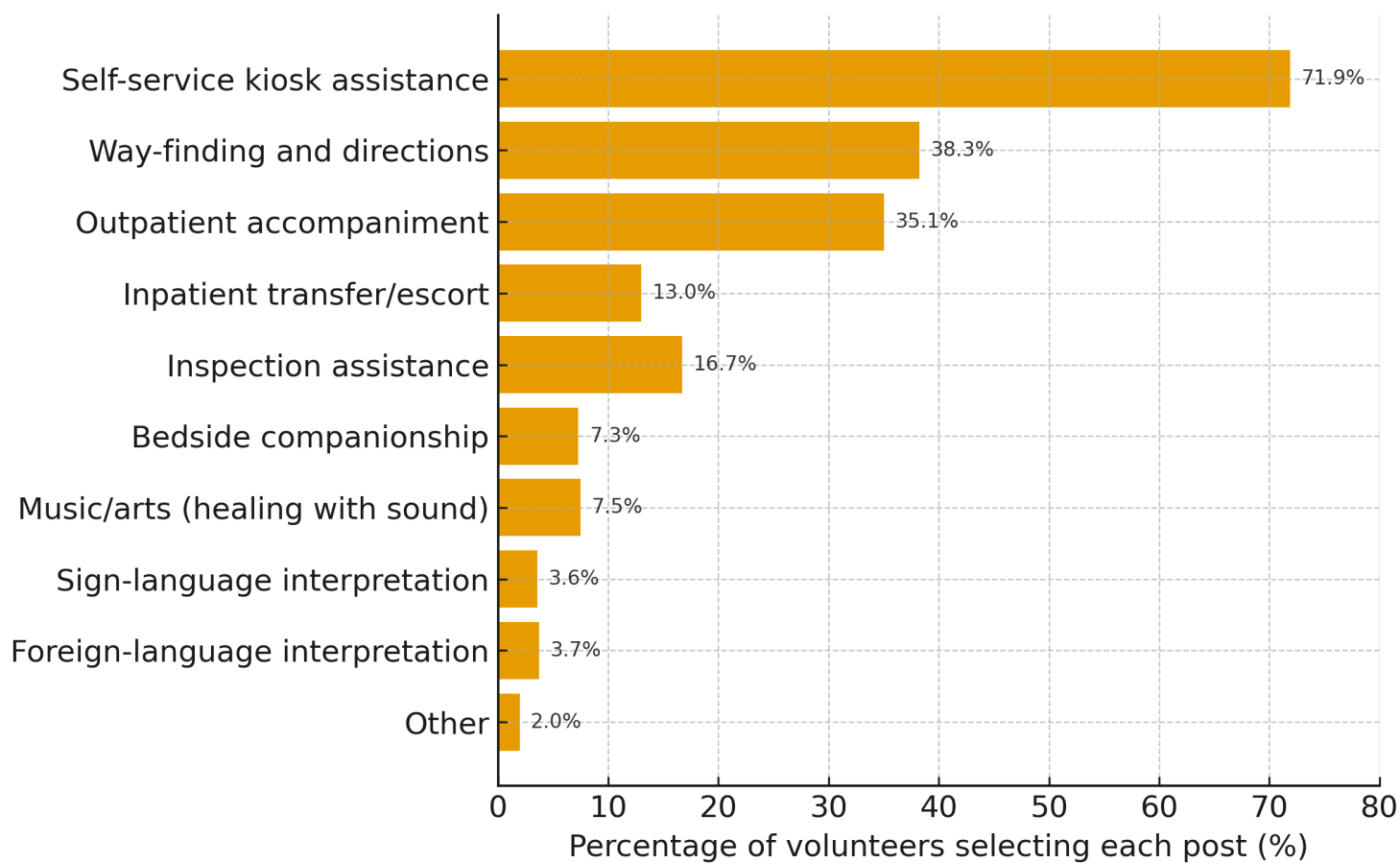


Figure 2

Distribution of current service posts among volunteers (n = 562). Percentages refer to the proportion of respondents selecting each option; totals exceed 100% because multiple responses were allowed.

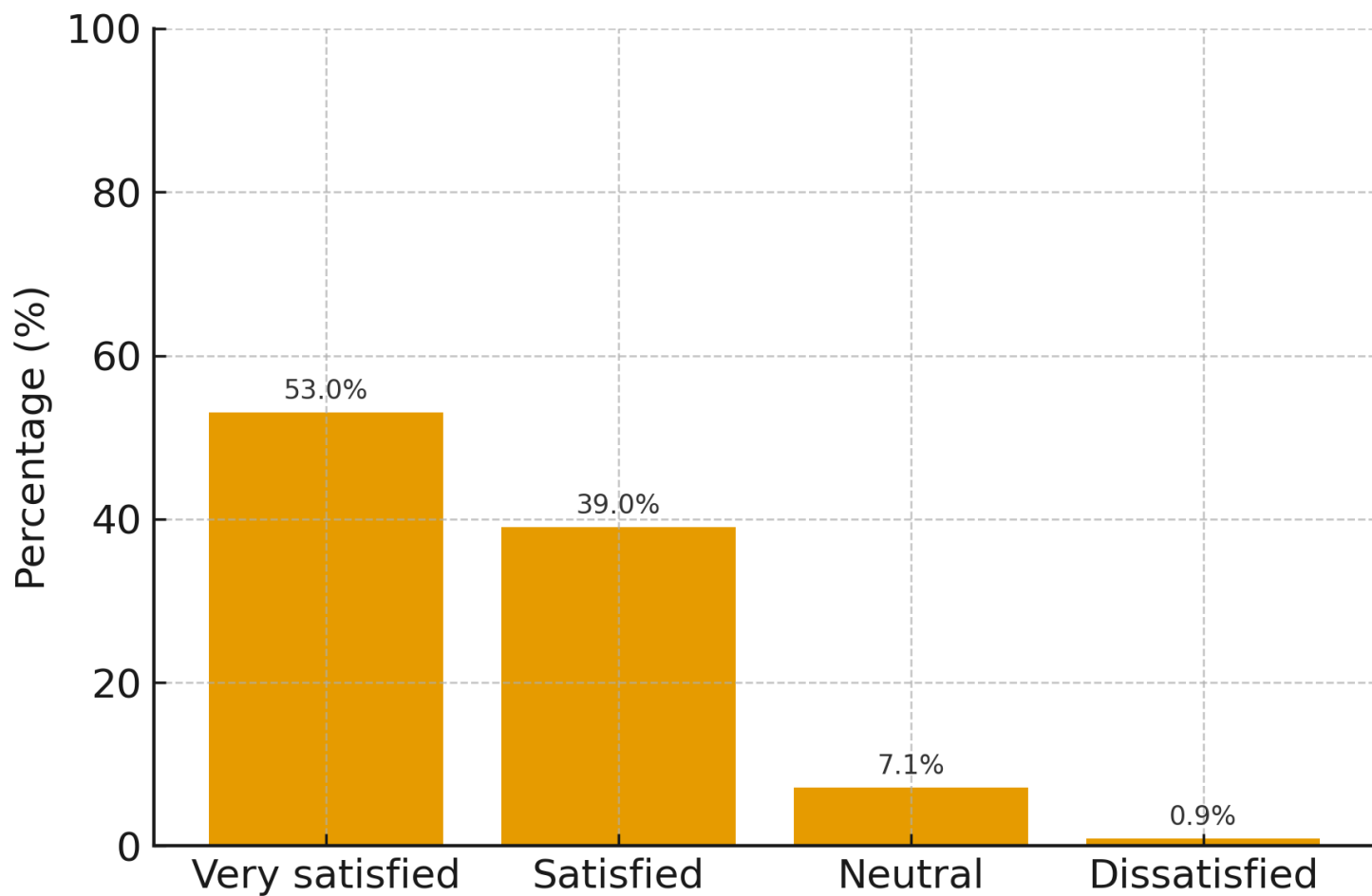


Figure 3

Overall satisfaction with the volunteer programme (Q36).

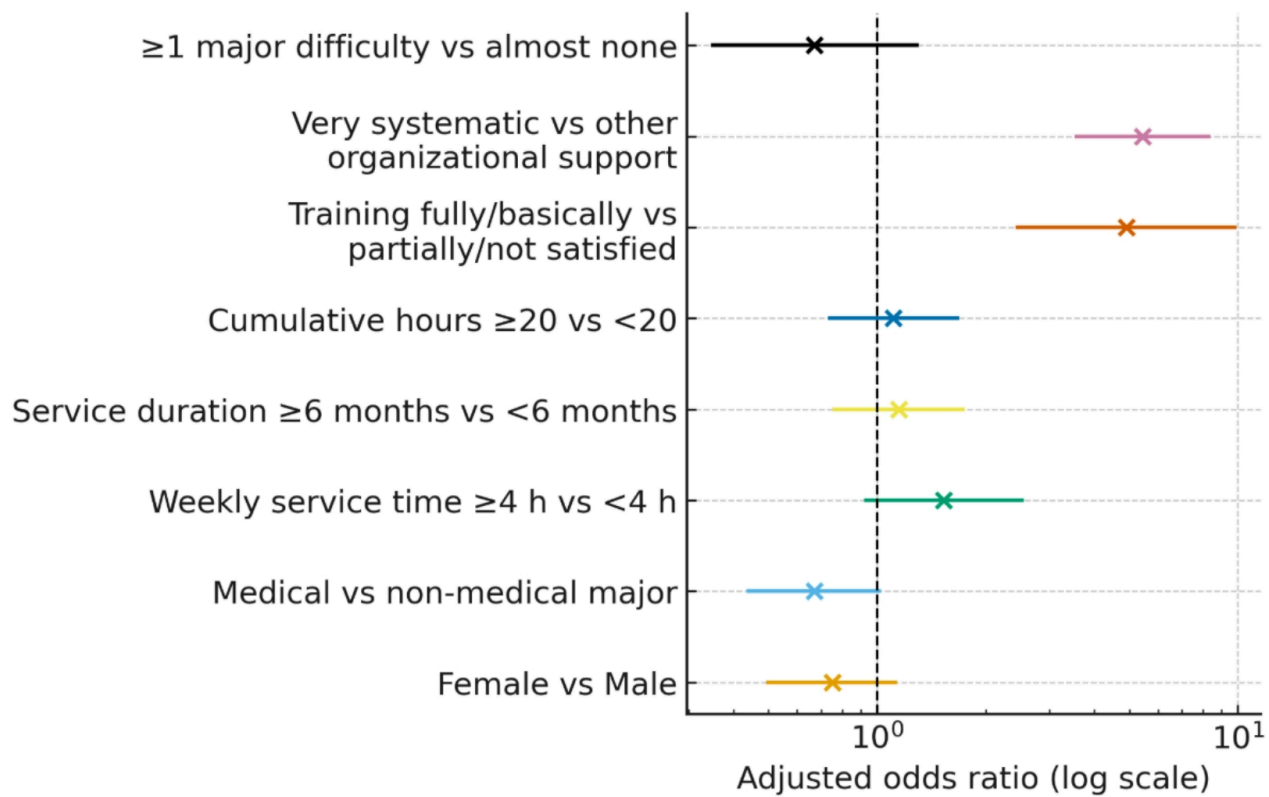


Figure 4

Adjusted odds ratios (ORs) and 95% confidence intervals from the proportional-odds ordinal logistic regression model for overall satisfaction with the volunteer program (complete cases, n = 505).

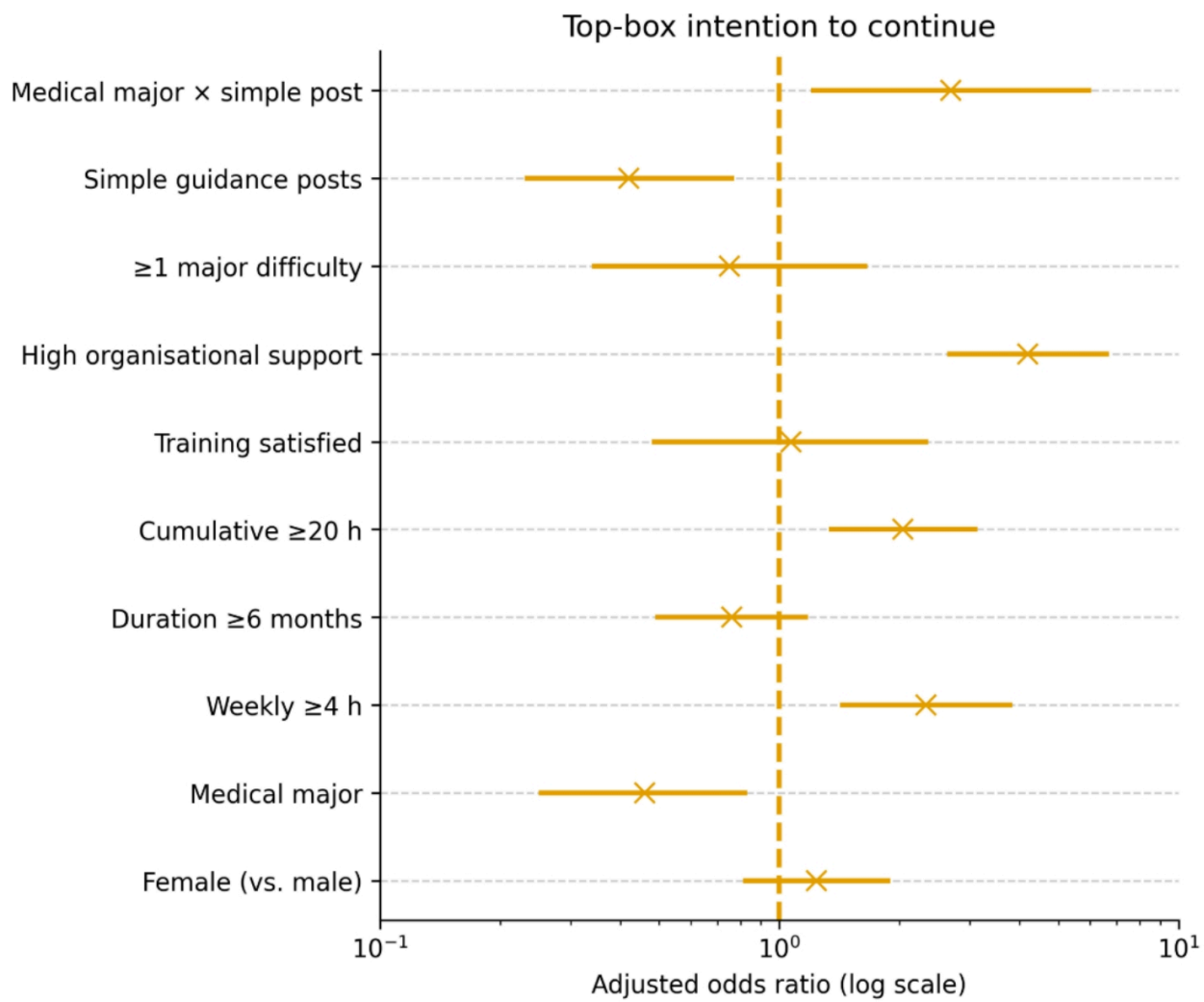


Figure 5

Forest plot of adjusted odds ratios (ORs) and 95% confidence intervals from the binary logistic regression model for top-box intention to continue volunteering (complete cases, $n = 505$). The x-axis is logarithmic; the vertical reference line indicates $OR = 1$.

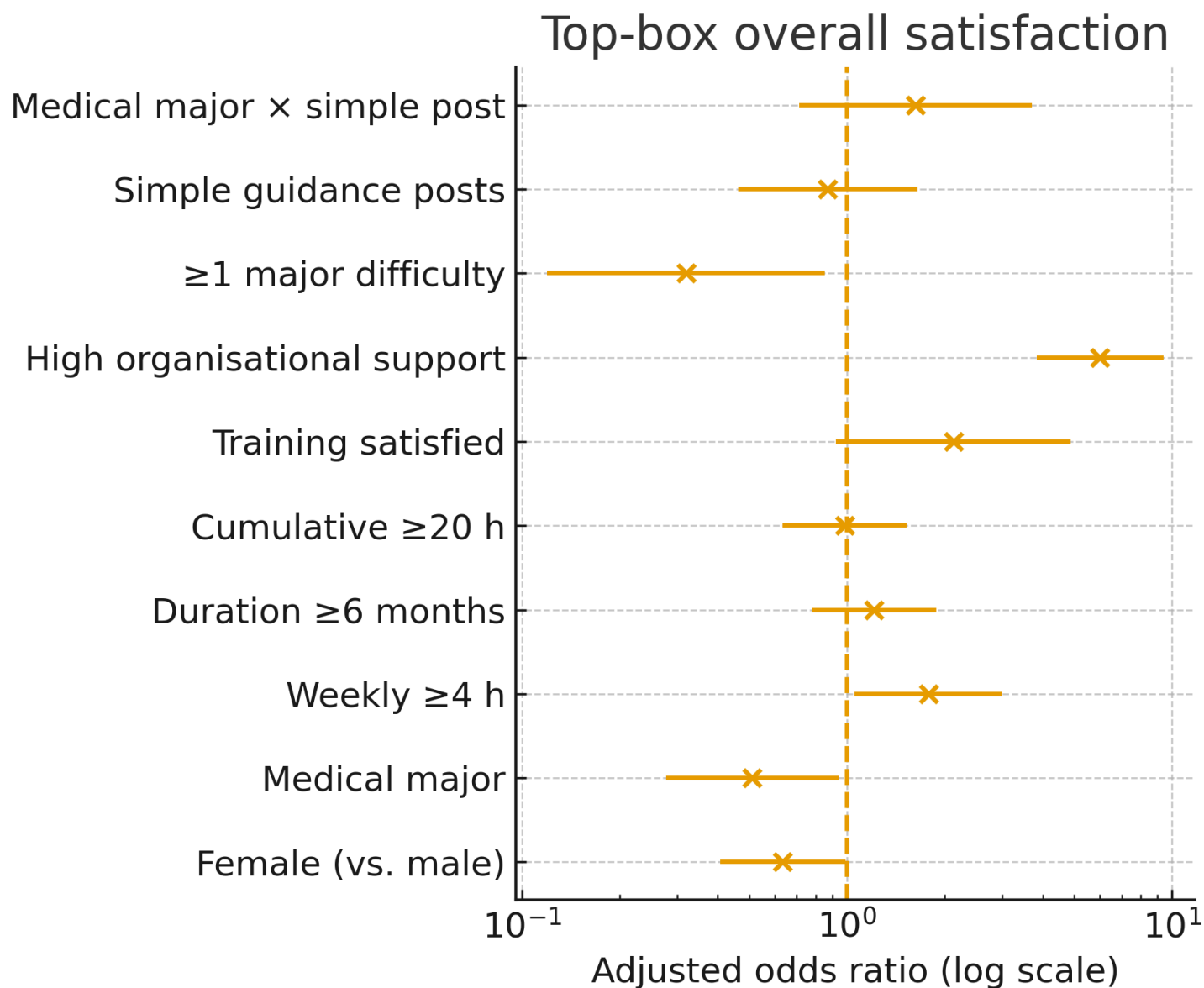


Figure 6

Forest plot of adjusted odds ratios (ORs) and 95% confidence intervals from the binary logistic regression model for top-box overall satisfaction (complete cases, n = 505). The x-axis is logarithmic; the vertical reference line indicates OR = 1.

Supplementary Files

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