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Autonomous motivation and its change among primary healthcare workers in shandong province: A survey based on self-determination theory

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ABSTRACT

Objective: To compare primary healthcare workers' (PHCWs) initial motivation of choosing medicine and current work motivation based on Self-Determination Theory (SDT), reveal changes in autonomous motivation—defined as engaging in an activity out of full volition and personal choice—and analyze the causes and consequences of these changes on work outcomes.

Methods: The participants were PHCWs of Shandong Province of China. A mixed-methods design was adopted. The cluster, multi-stage sampling method was applied for questionnaire survey, and 1200 PHCWs were selected in 36 primary care facilities. The purposive sampling method was used for in-depth interviews and 107 PHCWs among survey participants were selected. The questionnaire was developed by the authors for exploring PHCWs' initial motivation of choosing medicine and current work motivation. The motivations were categorized into autonomous motivation and controlled motivation based on the SDT. The "motivation change" variable was constructed by comparing the dominant types of initial motivation and current motivation. Descriptive statistics, ANOVA, and multiple linear regression were used to analyze survey data, thematic framework method was used to analyze interview data.

Results: The largest proportion of participants maintained their autonomous motivation (36.2 %), followed by those who became more autonomous (27.8 %), those who maintained controlled motivation (23.2 %), and those whose motivation became less autonomous (12.8 %). PHCWs who maintained autonomous motivation showed the most favorable outcomes, including lower turnover intention and job burnout, and higher job satisfaction and work performance, followed by those who became more autonomous. In contrast, PHCWs who maintained non-autonomous motivation and less autonomous motivation demonstrated the poorest outcomes. Interview data indicated that motivation changes were mainly influenced by the fulfillment of three psychological needs: meaning, competence, and relatedness.

Conclusions: Autonomous motivation is associated with better work outcomes among PHCWs. Enhancing autonomous motivation requires a more supportive organizational environment based on enhanced informatics infrastructure, improved training systems, and innovative patient communication mechanisms.

Work motivation refers to the degree of an individual's intrinsic willingness to make continuous efforts toward achieving personal and organizational goals, encompassing intensity, direction, and persistence.[1] With the deepening primary care reform, primary healthcare workers (PHCWs) in China perform as both the "last mile" of policy implementation and the "gatekeepers" of population health, their work motivation relates to the policy initiatives and service involvement, influencing the effectiveness of medical and preventative integrated services, tiered diagnosis and treatment system, and family doctor contracting, as well as quality and accessibility of primary care services.[2]

Previous studies mainly focused on the static level of work motivation among PHCWs at a given point in time and analyzed its antecedent and consequent variables. For example, WANG found weak influence of performance management and promotion mechanisms on PHCWs' motivation, LIU reported direct and indirect effects of work motivation on community health workers' job performance, YU demonstrated that work motivation mediates the relationship between job satisfaction and job performance.[3–5] The researches on heterogeneity of motivation types are limited, especially on the changing mechanism and outcomes.

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Table 1
Work motivation type and measurement.

Type	Definition	Dimension	Dimension description	Corresponding item for initial motivation of choosing medicine	Criterion for current work motivation
Autonomous motivation	Engaging in an activity based on complete willingness and self-determination	Intrinsic Motivation	Performing an activity out of personal interest or enjoyment in the activity itself	Interested in medicine and the medical profession	SDI>0
		Identified/Integrated Regulation	Recognizing the importance of the behavior or aligning it with one's own values	Believes that saving lives and helping the sick is a noble and meaningful career	
Non-autonomous motivation (controlled motivation + Amotivation)	Engaging in a behavior under external pressure or internal burden (controlled motivation), or lacking any motivation at all (amotivation)	Introjected Regulation	Behavior closely tied to self-esteem and self-worth	Becoming a doctor makes me feel like a useful person	SDI≤0
		External Regulation	Performing an action to obtain rewards or avoid punishment	Believes medical professionals have high social status and good reputation; believes medical work is stable and well-paid	
		Amotivation	A state lacking goals, intention, or self-control	Following the advice of family members or people around me	

Traditional motivation theories generally classify work motivation into intrinsic motivation and extrinsic motivation. With the development of Self-Determination Theory (SDT) in recent decades, extrinsic motivation was elaborated into autonomous motivation, controlled motivation, and amotivation according to the degree of self-determination by the continuum model of motivation. (see Table 1 for detailed definitions). Autonomous motivation refers to engaging in an activity out of genuine volition and self-endorsement, characterized by either personal identification with the value of the activity or deriving inherent interest and satisfaction from it.[6] Compared with non-autonomous motivation, autonomous motivation was reported with stronger positive associations with key work outcomes such as job satisfaction, organizational commitment, creativity, and job performance, and is therefore regarded as a higher-quality form of motivation.[7,8] In the context of primary care, autonomous motivation has great significance. Primary care services are public or quasi-public goods, where external financial incentives are limited, and PHCWs face heavy workloads and low remuneration.[9,10] Whether PHCWs recognize the social value of their work and derive intrinsic satisfaction from it largely determines work motivation. Thus, autonomous motivation functions as a crucial internal driving force and psychological resource for ensuring the quality and continuity of primary care service delivery.[11,12]

Autonomous motivation is not a fixed individual trait but a contextually malleable construct.[7] Research indicated that supportive environment characterized by empowerment, constructive feedback, and mutual trust can sustain and enhance autonomous motivation, whereas controlling environments characterized by excessive regulation, limited resources, or inappropriate incentives tend to undermine it.[13] Understanding how and why the autonomous motivation of PHCWs changes, and the outcomes of such changes, has both theoretical and practical significance for optimizing incentive mechanisms and improving service performance in primary care facilities. Guided by SDT, a mixed-methods design was adopted to investigate PHCWs in Shandong Province. This study aims to: (1) identify patterns of change in PHCWs' autonomous motivation; (2) examine how contextual factors within primary care facilities influence these changes through their impact on the satisfaction of basic psychological needs; (3) analyze the potential effects of motivational change on key work outcomes. The findings are expected to offer suggestions for improving incentive mechanisms and fostering a more supportive organizational environment in primary care facilities.

Methods

Theoretical basis

SDT, developed in the 1980s within the framework of positive psychology, is a foundational theory of human motivation that examines how individuals initiate and sustain behaviors through the dynamic interaction between intrinsic psychological needs and their environmental context.[14]

SDT posits that motivation is neither unitary nor static but exists along a continuum of self-determination, ranging from non–self-determined to highly self-determined forms.[6] Within this continuum, autonomous motivation represents the highest level of self-determination, in which behavior arises from personal volition and the internalization of personally valued goals. Controlled motivation, by contrast, is primarily driven by external contingencies such as rewards, punishments, or social pressure. Amotivation reflects a state in which individuals lack both intention and perceived efficacy in their actions.[15] SDT further identifies three basic psychological needs: autonomy, competence, and relatedness.[16] When these needs are satisfied, individuals are more likely to internalize external norms, values, and goals as part of their self-concept, thereby transforming controlled motivation into autonomous motivation. Conversely, when these needs are persistently thwarted, autonomous motivation weakens and may regress into controlled motivation or even amotivation.[15] Therefore, SDT not only refines the types of motivation but also provides a conceptual framework for understanding motivation change within organizational contexts.

Research design

This study adopted a mixed-methods design with strengths of both quantitative and qualitative research, specifically, a convergent parallel design was employed, in which quantitative and qualitative data were collected simultaneously.[17] The two sections were conducted independently in research design, data analysis, and result presentation, and were subsequently integrated in results interpretation.

The quantitative research section aimed to: (1) measure the initial motivation of choosing medicine and the current work motivation of PHCWs, construct a "motivation change" variable based on their comparison that reflects shifts in autonomous motivation; (2) examine the effects of these motivational changes on several key work outcome variables.

The qualitative research section was designed to complement the quantitative results, focused on the specific manifestations of autonomous and controlled motivation within primary care context, and analyzed changing mechanisms in autonomous motivation in the perspective of basic psychological need satisfaction and frustration based on SDT.

Research participants and procedure

A cluster, multi-stage sampling method was applied. Based on geographical location and economic development level, three cities in Shandong Province were selected: Yantai (eastern region), Zibo (central region), and Liaocheng (western region). Within each city, three districts or counties were selected following the principle of geographical dispersion. In each selected district or county, four primary care facilities were selected using the same principle, resulting in a total of 36 facilities serving as survey sites. On the day of data collection, all on-duty PHCWs (physicians, nurses, public health workers, medical technicians, pharmacists, and administrative staff) were investigated by questionnaire. A total of 1271 questionnaires were distributed. After excluding incomplete responses, 1113 valid questionnaires were obtained, yielding an effective response rate of 87.6 %. The participants had a mean age of 38.5 years. Among them, 288 (25.9 %) were male and 825 (74.1 %) were female. By occupation, there were 380 physicians (34.1 %), 268 nurses (24.1 %), 141 public health workers (12.7 %), 139 medical technicians (12.5 %), 87 pharmacists (7.8 %), and 98 administrative or logistic staff (8.8 %). In terms of education level, 111 participants (10.0 %) had a high school education or below, 312 (28.0 %) held an associate degree, and 690 (62.0 %) held a bachelor's degree or higher. Regarding professional titles, 237 (21.3 %) had no title, 406 (36.5 %) held junior titles, 349 (31.3 %) held intermediate titles, and 121 (10.9 %) held senior titles. By institutional type, 407 (36.6 %) worked in community health centres, while 706 (63.4 %) were employed in township health centres.

In addition, purposive sampling was employed to recruit interviewees for in-depth interviews. In each institution, one physician, one nurse, and one public health worker were selected. The interviewees with relevant work experience and strong expression skills were recommended by the heads of their respective institutions. To ensure the quality and confidentiality of the interviews, all sessions were conducted in private, quiet settings. The interviewers were undergraduate and graduate students majoring in health management or related disciplines, and each interview was carried out in a one-on-one format. The interviewers and interviewees were unacquainted prior to data collection, and there were no conflicts of interest or hierarchical relationships between them. Before data collection, all interviewers received comprehensive training from the research team. The training emphasized maintaining objectivity and neutrality, and avoiding leading questions or value-laden expressions during the interviews. Each session lasted 30–60 min and was audio-recorded in full. After excluding one incomplete interview, a total of 107 valid interviews were included in the analysis.

This study was reviewed and approved by the Ethics Committee of Shandong First Medical University (Approval No R202305160130).

Research instruments

Questionnaire

The questionnaire was developed by the research team based on the study objectives and literature review. Except for the self-developed items measuring initial motivation of choosing medicine, other variables were assessed using validated scales. To ensure the applicability, reliability, and validity of the questionnaire, a pilot survey was conducted in 15 primary care facilities in Jinan City, obtaining 437 valid responses, with an average completion time of approximately 30 min. The pilot data indicated good internal consistency reliability and content validity. Consequently, the same questionnaire design was adopted for the formal survey phase.

(1) Initial motivation of choosing medicine

Initial motivation of choosing medicine was measured using a self-developed single-item measure. The item was designed based on literature review[18,19]: "What was your primary reason for choosing a medical career?", six response options were developed based on the dimensions and conceptualization of motivation in SDT. External regulation was categorized into social regulation and material regulation and presented as separate options (Table 1). Considering individuals may have multiple initial motivations of choosing medicine, the initial item was presented as multiple-choice, followed by a single-choice supplementary question: "If you selected multiple reasons, which one was the most important?". Participants who selected "interest in medicine and the healthcare" or "belief that healing and saving lives is a noble and meaningful pursuit" were classified as exhibiting autonomous motivation. All other responses were categorized as non-autonomous motivation.

(2) Current Work Motivation

Current work motivation was measured using the revised version of the Work Motivation Scale developed by ZHAO et al. .[20] The scale comprises 18 items, each rated on a 7-point Likert scale ranging from "completely inconsistent" to "completely consistent." Higher scores indicate higher levels of motivation. The scale includes five dimensions, with the following Cronbach's α coefficients: intrinsic motivation (0.932), identified/integrated regulation (0.887), introjected regulation (0.836), external regulation (0.852), amotivation (0.915). To quantify the degree of self-determination, the Self-Determined Index (SDI)[21] was calculated using the following formula: SDI=3×(Intrinsic Motivation)+1.5×(Identified/Integrated Regulation)−1×(Introjected Regulation)−2×(External Regulation)−3×(Amotivation). An SDI score greater than 0 indicates autonomous motivation as the dominant type, while an SDI score less than or equal to 0 indicates non-autonomous motivation.[22]

(3) Work Outcomes

Four key indicators were selected to assess the work attitudes and behavioral performance of PHCWs based on literature review.[23,24]

Turnover intention was measured using the Chinese version of Mobley's Turnover Intention Scale.[25] The scale comprises four items, rated on a 5-point Likert scale (total score range: 4–20). Higher scores indicate a stronger intention to leave. The Cronbach's α coefficient of the scale was 0.829.

Job burnout was assessed using the Chinese version of the Maslach Burnout Inventory (MBI) .[26] The scale includes 22 items across three dimensions, rated on a 7-point Likert scale. The total burnout score is the sum of the three subscales (maximum = 132), with higher scores reflecting greater burnout. The Cronbach's α coefficients for emotional exhaustion (feeling depleted due to excessive emotional demands), depersonalization (developing indifferent or negative attitudes toward service recipients), reduced personal accomplishment (perceiving diminished value or meaning in one's work) were 0.884, 0.838 and 0.838 respectively.

Job satisfaction was assessed based on comprehensive definition of job satisfaction[27] and was measured by single item. Responses were rated on a 5-point scale, with higher scores indicating greater job satisfaction.

Job performance was evaluated using the Work Performance Scale developed by ZHAO.[20] The scale includes 12 items, rated on a 7-point Likert scale (total score range: 12–84). Higher scores denote better job performance. The Cronbach's α coefficient of this scale was 0.951.

Interview guide

A self-developed interview guide was employed to perform semi-structured interview on interviewees' current work motivation, initial motivation of choosing medicine, and changes in motivation. The preliminary version of the guide was designed based on the study objectives and pilot interview with 24 PHCWs in Jinan City to assess the clarity, comprehensibility, and logical flow of the guide.

Table 2
Description and statistical results of primary healthcare workers' initial motivation of choosing medicine.

Motivation Type	Initial motivation of choosing medicine	Frequency (n)	Percentage (%)
Autonomous Motivation	Interested in medicine and the medical profession	200	18.0
	Believes that saving lives and helping the sick is a noble and meaningful career	345	31.0
Non-autonomous motivation	Becoming a doctor makes me feel like a useful person	86	7.7
	Believes medical professionals have high social status and good reputation	23	2.1
	Believes medical work is stable and well-paid	143	12.8
	Following the advice of family members or people around me	316	28.4

We refined the wording and sequencing of the questions to enhance clarity and coherence based on feedback from the pilot interviews, leading to following core questions in final guide: (1) "What currently motivates you to continue your work?"; (2) "Compared with when you first entered the medical profession, has your mindset changed?" If participants reported changes in their mindset, follow-up questions were used to probe the reasons for such changes.

It is noteworthy that the term "mindset" was intentionally used instead of "motivation" in the interview questions to align with everyday language, facilitating participants' natural expression of their subjective experiences, emotional orientations, and cognitive changes regarding their profession. This wording helped elicit richer qualitative data for subsequent analysis of factors influencing work motivation.

Data analysis

Quantitative data were analyzed using SPSS 22.0. Descriptive statistics, analysis of variance (ANOVA), multiple linear regression and other relevant statistical tests were applied to examine the relationships among variables. Qualitative data were analyzed using the thematic framework method, with MAXQDA 2020 software employed for data coding and organization. The analytical process included the following steps: (1) grasp the core content of the interview to obtain thematic framework based on study objectives and theoretical framework, with autonomous motivation and non-autonomous motivation as analytical themes; (2) extract key sentences from the interview and categorize them under the corresponding themes, code the interview content, summarize the manifestations of motivation or the reasons for the changes in motivation, deriving several sub-themes; (3) compare and analyze themes and subthemes to generate final conclusions.

Results

Initial motivation of choosing medicine

Among all participants, 545 PHCWs (49.0 %) exhibited autonomous motivation, while 568 PHCWs (51.0 %) exhibited non-autonomous motivation. Two response options had relatively high proportions: "Believing that healing and saving lives is a noble and meaningful pursuit" (31.0 %); "Following the advice of family members or people around them" (28.4 %).

Interview findings provided more detailed insights into participants' initial motivation of choosing medicine. Among those with autonomous motivation, participants frequently mentioned expressions such as "interest in medicine," "recognition of the profession's social value," and "having an occupational ideal." In contrast, among those with non-autonomous motivation, commonly cited reasons included "family influence," "earning a stable income to support the family," "job stability," and "higher social status." (Tables 2 and 3)

Current work motivation

The mean SDI score among PHCWs was (0.99±6.572). A total of 713 participants (64.0 %) demonstrated autonomous motivation (SDI > 0), while 400 participants (36.0 %) exhibited non-autonomous motivation (SDI≤0). Interview data showed that among those with autonomous motivation, the most frequently cited theme was "a sense of mission toward patients", reflecting the belief that healing and saving lives constitutes a professional calling and moral duty, this attitude was internalized into their daily work. In addition, many interviewees described feelings of professional accomplishment, interest in medicine, and recognition of the social value of their profession as key motivations. In contrast, participants with non-autonomous motivation most commonly mentioned working to "support their families" or "out of job-related obligation". Other recurring themes included pursuing promotion opportunities, maintaining job stability, and complying with administrative directives, which are shaped by both external reward and control mechanisms (Table 4).

Changes in motivation and causes

By cross-tabulating the variables of initial motivation of choosing medicine and current work motivation, a new variable titled "motivational change" was constructed. Since both initial motivation of choosing medicine and current work motivation were classified as either autonomous or non-autonomous, the "motivational change" variable represents a "2×2" categorical combination, resulting in four types of motivational change. The names and definitions of these four types are presented in Table 5. Statistical analysis showed that the proportion of participants who maintained autonomous motivation was the highest, accounting for 36.2 % of the sample, followed by motivation autonomization (27.8 %), maintained non-autonomous motivation (23.2 %), and motivation de-autonomization (12.8 %).

We analyzed interview data based on SDT in terms of satisfaction or frustration of basic psychological needs, to explore the causes of motivational changes, including motivational autonomization and motivational de-autonomization. According to the theoretical framework, the three basic psychological needs include autonomy, competence, and relatedness. The analysis showed that expressions related to autonomy were rare in primary care facilities, while "need for meaning" appeared frequently and played a critical role in explaining motivational change. The need for meaning refers to PHCWs' desire for their work to generate social value and long-term impact, which can contribute to population health improvement and to foster both professional and self-identity. Based on this observation, the interview data were categorized according to meaning, competence, and relatedness to examine how the satisfaction or frustration of each need influenced motivational change.

(1) Need for Meaning: Many interviewees expressed a strong recognition of the value of primary care work and alignment with national policies and institutional goals, which enhanced their professional identity. However, some interviewees perceived certain tasks as lacking real significance, leading to a gap between expectations and reality.
(2) Need for Competence: Some interviewees reported that as their skills improved and experience accumulated, they felt a stronger sense of control, interest, and accomplishment in their work. Conversely, others complained a mismatch between their educational background and current job responsibilities, low professional identity, or declining enthusiasm due to work overload, work–family conflict, and accountability pressures.

Table 3
Analysis of interview data on primary healthcare workers' initial motivation of choosing medicine.

Motivation Type	Manifestations (Coding Frequency)	Interview Examples
Autonomous Motivation	Interest in medicine (11) Recognition of professional meaning (6) Having professional ideals (6)	Example 1: When I chose to study medicine, it was purely because I liked it. When I filled out my college application, all my choices were in nursing—just because I loved it. (FSQY–Nurse) Example 2: I was very interested in biology when I was in school. I simply liked this job and enjoyed doing this work. (BSJJ–Doctor) Example 3: At that time, I thought medical workers were great. I felt that saving lives was an honorable calling. (SXSZ–Public health worker)
Non-autonomous motivation	Family influence (14) Earning money to support family (4) Job stability (3) High social status (2)	Example 1: My parents decided for me at that time. I didn't really have much say about which major to choose—adults made the decisions. (SXGY–Public health worker) Example 2: At least this job has value. If you've been a doctor, you're definitely someone useful to society. (BSST–Doctor) Example 3: My family was quite poor back then. Nursing was easier to get a job in after secondary school, which could help reduce my family's financial burden. Also, my sister worked in this field, and I thought the job seemed fine. (BSJJ–Public health worker)

Table 4
Analysis of interview data on primary healthcare workers' current work motivation.

Motivation Type	Manifestations (Coding Frequency)	Interview Examples
Autonomous Motivation	Sense of mission toward patients (13) Sense of achievement at work (9) Interest in medicine (8) Recognition of professional meaning (7) Self-improvement (2) Sense of organizational belonging (1)	Example 1: Our public health program offers free checkups for the elderly. Many don't know about their health problems until we screen them. When diseases are detected early and treated in time, they often tell us they're grateful the checkup helped them get treated. That gives me a real sense of accomplishment. (SXSZ–Nurse) Example 2: Maybe it's because the doctor–patient relationship here is quite good. I know my patients, and they know me. Most are regulars in primary care, so familiarity makes communication easier and the work smoother. (BSST–Nurse) Example 3: There was an elderly woman whose condition couldn't be managed by Western medicine for decades. We treated her successfully with traditional Chinese medicine in our clinic. It felt very rewarding. When patients with back or leg pain recover and walk out happily, we're happy too. (LYCX–Doctor) Example 4: I really like being a doctor. I'm happy working in a primary care facility. What I want most is to improve my medical skills so that more patients trust me — that gives me a sense of success. (ZDHT–Doctor)
Non-autonomous motivation	Supporting the family (24) Work responsibility (23) Pursuing promotion (5) Following superiors' orders (4) Job stability (4) Relatively easy workload (3) Good colleague relations (3) Work inertia (3) Waiting for retirement (3) Gaining patient recognition (2)	Example 1: I just do my job. For example, during the pandemic we received normal pay, but everyone was still enthusiastic. We all felt it was simply our duty — nothing to think too much about. (FSQY–Nurse) Example 2: When my leader assigns work, I just do it. I don't see it as extra. For example, during public health campaigns like health poverty alleviation, I'm responsible for following up with low-income patients and giving them health education. (SXST–Doctor) Example 3: I chose this job because it's close to home. It's less tiring here — in big hospitals the workload is much heavier, but here it's more manageable. (HYFC–Nurse) Example 4: Work has become a habit. I don't have big ambitions to change things anymore — I just don't have the energy. Also, many of our programs like health education don't really achieve their intended effects or benefit people as much as they should. (LYMY–Public health worker)

Table 5
Statistical analysis of changes in work motivation of primary healthcare workers.

Type of Motivation Change	Definition	Frequency (n)	Percentage(%)
Maintained Autonomous Motivation	Both the motivation for studying medicine and the current work motivation are autonomous.	403	36.2
Maintained Non-Autonomous Motivation	Both the motivation for studying medicine and the current work motivation are non-autonomous.	258	23.2
Autonomization	The motivation for studying medicine was non-autonomous, but the current work motivation is autonomous.	310	27.8
De-autonomization	The motivation for studying medicine was autonomous, but the current work motivation is non-autonomous.	142	12.8

(3) Need for Relatedness: Some interviewees had established positive relationship with patients, which reinforced their motivation to serve patients. In contrast, others described poor relationship with patients, which led to defensive attitudes and emotional withdrawal.

In summary, the satisfaction of these three needs tended to evoke positive experiences such as identification, interest, and a sense of achievement, thereby facilitating motivational internalization. Conversely, the frustration of these needs led to negative experiences such as disappointment, burnout, and loss of meaning, resulting in motivational externalization. (See Table 6)

Effects of changes in work motivation on work outcomes

ANOVA results revealed statistically significant differences across the four work outcome indicators among different motivation change groups. Subsequent pairwise comparisons using the Least Significant Difference (LSD) test demonstrated a consistent pattern across all indicators.

Participants whose motivation became de-autonomized or maintained non-autonomous motivation scored highest on turnover intention and job burnout, and lowest on job satisfaction and job performance. In

Table 6
Analysis of interview data on reasons for changes in work motivation of primary healthcare workers.

Type of motivation change	Underlying reasons (Coding frequency)	Interview examples
Autonomization	Satisfaction of need for meaning: Identifying with policies and management (2); Feeling personal value (2) Satisfaction of need for competence: Becoming more competent at work (3) Satisfaction of need for relatedness: Closer emotional connection with patients (7)	Example 1: Many patients have become like family. They come to the hospital every month—we actually see them more often than our parents. We've really become one family. (DCDH–Nurse) Example 2: When I first started, I didn't have much aspiration for medicine. I just thought of it as a job—so long as patients got their medicine, it was fine. But as I grew older, I began to feel a real sense of responsibility for saving lives. When you put patients first and work wholeheartedly, they'll recognize your efforts. I've found a strong sense of achievement and meaning in my work now. (ZCLC–Doctor) Example 3: When I first came, we didn't have many patients and work was quite idle. But as our hospital developed, I could see it improving year by year. Knowing that I've contributed to that progress gives me pride. (ZCYZ–Nurse)
De-autonomization	Frustration of need for meaning: Experiencing formalism (2); Feeling expectation gaps (2) Frustration of need for competence: Job–person mismatch (3); High work pressure (3) Frustration of need for relatedness: Strained doctor–patient relationships (1)	Example 1: Maybe it's because I'm no longer in clinical work, but now it's hard to find that same feeling. I rarely feel a sense of accomplishment—there are too many trivial tasks, and I'm just pushed along by work. I'd like to improve public health literacy, but honestly, I don't have the energy. (LYMY–Public health worker) Example 2: I no longer have that sense of achievement I did when I started. Back then, even as a doctor in township health centre, I felt proud when I could treat a wound on night shift. Now everything feels too formalistic—I'm busy, but it all seems meaningless. (ZCCN–Public health worker) Example 3: The doctor–patient relationship is really tense now. If you make one small mistake, they'll call the hotline immediately. It happens almost daily. Patients check everything online, and if what you say differs, they think you're wrong. (DECJ–Doctor)

Table 7
Comparison of scores of changes in work motivation of primary healthcare workers on four indicators of work outcomes.

Type of motivation change	Turnover intention	Job burnout	Job satisfaction	Job performance
Maintained autonomous motivation	6.22±2.894	30.36±16.337	4.06±0.873	73.16±9.687
Autonomization	7.10±3.322	37.50±17.898	3.88±0.839	70.99±9.671
Maintained non-autonomous motivation	9.65±3.700	48.29±18.650	3.36±1.061	66.20±13.620
De-autonomization	9.51±3.535	46.69±16.971	3.46±0.972	66.65±13.202
F-value	74.744**	67.325**	36.735**	25.612**

Note:**p<0.05

contrast, participants who maintained autonomous motivation scored lowest on turnover intention and job burnout, and highest on job satisfaction and job performance. Those whose motivation became autonomized showed intermediate scores across all four indicators (Table 7).

To further examine these associations, multiple linear regression models were constructed for each of the four work outcome indicators as dependent variables, with motivation change as the independent variable and sociodemographic characteristics as control variables. The results showed that, compared with the "maintaining autonomous motivation" group, the other three groups had significantly higher regression coefficients in the turnover intention and job burnout models, and significantly lower coefficients in the job satisfaction and job performance. These findings indicate that individuals who maintained autonomous motivation exhibited overall superior work outcomes, consistent with the ANOVA results. Regarding the control variables, gender and age had significant effects. Female participants demonstrated lower turnover intention and job burnout but higher job satisfaction and job performance compared to males. Age was negatively associated with turnover intention and job burnout, and positively associated with job performance.(Table 8)

Discussion

Highest proportion in autonomous motivation and lowest proportion in de-autonomization

Quantitative results revealed that the proportion of ss driven by autonomous motivation increased from 49 % at the time they entered the medical profession to 64 % at present, indicating a clear upward trend. Among the four types of motivational change, the largest proportion of participants (36.2 %) belonged to the "maintaining autonomous motivation" group. Interview data suggest that PHCWs in this group demonstrated a strong intrinsic interest in medicine or a deep recognition of its social value when choosing a medical career, continued to view improving population health as central vocational goal in professional development, deriving a strong sense of accomplishment and meaning from work. Previous studies showed that such autonomous motivation serves as a critical internal driver for sustaining the public-service orientation of primary care facilities.[28] The second largest group (27.8 %) were motivational autonomization, the PHCWs initially entered the medical field for extrinsic reasons such as job stability or social prestige, but gradually developed a stronger sense of mission toward patients and a deeper appreciation for the intrinsic value of medicine. This transformation occurred progressively through accumulated work experience, personal reflection, and interactions with colleagues and patients, which is consistent with Yu.[2] The third group (23.2 %) consisted of PHCWs who maintained non-autonomous motivation. Their initial motivation of choosing medicine and current work motivation were both extrinsically driven, emphasizing material benefits or external rewards. Consequently, their work enthusiasm depended on organizational mechanisms such as performance appraisals, salary distribution, and promotion systems, reflecting limited intrinsic drive and self-determination. Previous research indicated that such PHCWs exhibit fluctuating performance levels, with enthusiasm likely to decline when external incentives diminish.[29]

The smallest group (12.8 %) experienced motivational de-autonomization. Although they initially possessed strong autonomous motivation when choosing a medical career, their intrinsic drive gradually weakened after entering the workforce due to the crowding-out effect of unfavorable external factors, leading to a shift toward extrinsic rewards, such as financial gain. Existing studies suggest that this crowding-out effect tends to be pronounced for incomplete organizational evaluation and incentive systems.[30]

Table 8
Regression analysis of the impact of motivation change on work outcomes among primary healthcare workers.

Variables	Turnover intention	Job burnout	Job satisfaction	Job performance
Motivation change (Ref: Maintained autonomous motivation)				
Autonomization	0.104**	0.160**	-0.084*	-0.072*
De-autonomization	0.285**	0.259**	-0.190**	-0.161**
Maintained non-autonomization motivation	0.382**	0.369**	-0.304**	-0.225**
Age	-0.132**	-0.110**	0.054	0.204**
Gender (Ref: Male)				
Female	-0.108**	-0.083**	0.073*	0.063*
Occupation (Ref: Doctor)				
Nurse	-0.030	0.018	0.028	0.012
Public health worker	-0.043	0.057	0.006	0.012
Medical technician	-0.082**	-0.074*	0.062	0.107*
Pharmacist	-0.008	0.026	0.033	0.003
Administrative staff	-0.038	0.049	0.038	0.015
Education (Ref: High school or below)				
Junior college	0.039	-0.003	-0.061	-0.045
Bachelor's degree or above	-0.021	-0.035	-0.029	-0.060*
Professional title (Ref: None)				
Primary title	0.004	0.005	-0.007	0.023
Intermediate title	-0.049	-0.014	-0.009	0.024
Senior title	-0.055	-0.087*	-0.003	0.046
Institution (Ref: Community health centre)				
Township health centre	0.006	0.052	-0.016	-0.008
R^2	0.211	0.200	0.104	0.123

Note: All coefficients are standardized regression coefficients. *p < 0.05, **p < 0.01.

Satisfaction of meaning, competence, and relatedness needs influences motivation change

Interview data indicated that changes in the autonomous motivation of PHCWs were influenced by the satisfaction of meaning, competence, and relatedness. Notably, this study found that the need for autonomy emphasized in SDT played a limited role in the primary care context, which may be attributed to the institutional realities of primary care, where workers typically have little discretion or task autonomy, being required to strictly follow policy directives and administrative mandates, so workers' subjective perceptions of whether their work generates social, communal, or personal value become a central determinant of motivation change, related perceptions emphasized in the interviews can be conceptualized as a "need for meaning." The need for meaning is also regarded as a core component in other motivational frameworks, such as the Job Characteristics Model,[31] this study adopts it as a context-specific substitute for the autonomy need, thereby offering a supplement for motivational change among PHCWs, including: (1) Recognition of policy direction, organizational support, and work value fulfills the need for meaning. Interviewees expressed strong recognition of national policies and sustained investment promoting primary care, as well as the value of primary care work being "health gatekeepers".

However, some interviewees reported than formalism and task fragmentation in work undermined need of meaning, such as excessive paperwork, repetitive inspections, and overemphasis on documentation. (2) Enhancement of job competence satisfies the need for competence. Several interviewees recalled feeling uncertain and overwhelmed at the beginning of careers due to unfamiliarity with tasks. Over time, they developed greater confidence, interest, and identification with work by the accumulation of experience and skills, which may be related to improved job competence. Improved job competence enhances work performance,[32] which in turn reinforces intrinsic satisfaction and a sense of accomplishment.[33] Conversely, some interviewees described a mismatch between their educational background and working scope, or felt that their skills exceeded the demands of their current roles, leading to frustration from underutilization of their capabilities.[34]

(3) Good doctor-patient relationships fulfill the need for relatedness. PHCWs tend to develop close relationships with patients by their community-based strength of work,[35] such emotional bonds can gradually transform motivation from externally driven obligations into internalized concern for patient well-being. Many interviewees reported that long-term patient contact enhanced their empathy and emotional engagement with their work. However, a minority noted that poor doctor–patient relationships in some regions diminished morale and frustrated the need for relatedness, especially when institutional mechanisms failed to manage conflicts or complaints.[36]

Sustained autonomous motivation leads to best performance across all work outcome indicators

Participants who maintained autonomous motivation demonstrated the strongest performance across all work outcome indicators, followed by motivational autonomization. In contrast, participants who maintained non-autonomous motivation or experienced motivational de-autonomization showed poor outcomes. These findings are consistent with SDT, which posits stronger and more sustainable positive influence of autonomous motivation on work outcomes compared with controlled or non-autonomous forms of motivation.[37] Specifically, autonomous motivation arises from identification and intrinsic interest of work. Those driven by autonomous motivation tend to display greater initiative, creativity, and persistence, investing more time and energy in their professional duties. They also demonstrate more positive work attitudes, such as higher job satisfaction and lower levels of burnout.[38] These characteristics are crucial in primary care facilities with complex task but limited resources. Furthermore, autonomous motivation not only enhances current job performance but also relieves occupational stress, thereby fostering professional well-being.[7] PHCWs who sustain autonomous motivation are better able to adapt to challenging work environments, develop effective professional habits, and eventually form a positive feedback loop between high motivation and high performance,[39] this virtuous cycle explains PHCWs' best performance across all outcome indicators. By contrast, PHCWs with non-autonomous motivation sometimes effective in stimulating short-term task completion, but relies heavily on external incentives, the overreliance can lead to psychological dependency and a sense of external control, which in turn reduce intrinsic enthusiasm and satisfaction when those incentives diminish. In the current context of primary care system in China, performance-based management functions as a major form of external incentive. However, its effectiveness depends on local fiscal capacity and

institutional management quality, which may affect the performance of PHCWs dominated by non-autonomous motivation.

Policy implications

Effective incentive mechanisms for primary care should prioritize the develop and maintenance of autonomous motivation, which depends on fulfilling PHCWs' needs for meaning, competence, and relatedness. The following three policy directions are recommended based on interview data:

(1) Strengthen digital infrastructure and data management, optimize performance evaluation.
Fulfillment of the need for meaning depends on recognizing work value, which can be impaired by excessive administrative burden. Establishing the integrated data management platform that enables single-entry, multi-use data processing would reduce repetitive reporting and improve efficiency. Evaluation systems should shift from documentation-based evaluations toward performance evaluations centered on service quality and health outcomes, aim to enhance the fairness and motivational impact of evaluations while mitigating the pressure created by compliance checks.
(2) Enhance professional training mechanisms and clarify career development pathways. Satisfaction of the need for competence relies not only on skill improvement but also on the transparency and predictability of career advancement. Position-oriented training systems should be established in primary care facilities to strengthen disciplinary exchange and assistance, and refine the mentorship system extending beyond experience sharing. These measures would help junior staff develop job competence by regular assessment and feedback.
(3) Improve doctor-patient communication mechanisms and strengthen dispute mediation systems. Satisfaction of the need for relatedness depends on effective communication and good relationships between doctors and patients. Patient-participatory health management models can be adopted to encourage patients to participate in health plan development and enhance their relationship with doctors. In managing conflicts, third-party mediation mechanisms should be introduced, such as community-based mediation organizations, collaborative networks linking healthcare facilities, judicial authorities, and community governance bodies. These measures would help reduce professional frustration caused by unresolved doctor–patient disputes.

Research limitations and future research suggestions

First, the measurement of initial motivation of choosing medicine relied on a self-developed single-item question designed as a single-choice format. While this approach was concise and easy to administer, it had two limitations: (1) the reliability and validity of the measurement may be insufficient; (2) the single-choice format could only identify the dominant type of motivation, not capture the relative weight or coexistence of different motivations. Furthermore, although both initial motivation of choosing medicine and current work motivation were classified based on SDT using the same motivational dimensions, their measurement tools were self-developed item and structured scale, respectively. This inconsistency may lead to differences in measurement precision, reliability, and response patterns, potentially affecting the construction logic and interpretive validity of the "motivation change" variable. Future studies could consider developing an initial motivation of choosing medicine scale that captures the hybrid nature of motivation, improves measurement reliability and validity, and ensure consistency in measurement methodology between initial motivation of choosing medicine and current work motivation to enhance the rigor of motivation change assessment.

Second, in data analysis, work motivation was treated as a binary variable (autonomous vs. non-autonomous). Although this approach simplified the analysis, it may lead to information loss, preventing the differentiation of motivation intensity and subtype variations. Future research could treat work motivation as a continuous variable and incorporate the SDI to more accurately represent the continuous distribution and dynamic changes of individual motivation types.

Third, the measurement of work performance was based on self-reported data, which may be subject to common method bias or social desirability bias, potentially leading to systematic overestimation, particularly when theoretical associations exist between motivation and performance, possibly inflating observed correlations. Future studies could incorporate more objective performance indicators or adopt a multi-source approach that combines self-assessment with supervisor or peer evaluations to improve accuracy.

Fourth, the study employed a mixed-methods design combining questionnaire surveys and interviews. While this design integrates the strengths of positivist and interpretivist paradigms, it also introduces methodological tension between them. In practice, the qualitative section was influenced by theoretical assumptions and the quantitative framework; thus, interview data mainly served as non-numeric supplements to quantitative results or as contextual interpretations of theoretical constructs, which limited the independence of inductive reasoning. Future research could adopt two measures: (1) Develop data integration strategies at the analysis stage, for instance, transforming qualitative data through content analysis and quantitative coding to merge it into the quantitative database, thus achieving complementarity and cross-validation. (2) Adopt sequential mixed-methods designs, distinguishing the functional roles of quantitative and qualitative sections to minimize methodological conflict. Such as exploratory sequential designs, where qualitative section first develops theoretical frameworks or measurement tools for motivation change before large-scale quantitative section, or explanatory sequential designs, where quantitative results identify patterns or relationships that are then explored in depth through qualitative section focusing on specific groups or phenomena.

Fifth, due to the cross-sectional design, participants' responses regarding initial motivation of choosing medicine may be affected by recall bias or social desirability effects, the dynamic trajectory of motivational change can not be captured for this design only allows for static comparisons of motivation at two time points. Future research could adopt a longitudinal design, tracking work motivation and its evolution across multiple time points, and combining qualitative methods such as interviews to provide a more in-depth understanding of the mechanisms underlying motivational change.

Declarations

Not applicable.

Authors' contributions

Conceptualization, Z.S.; Methodology, Z.S.; Data curation, H.J., L.Z. and C.H.; Formal analysis, H.J., L.Z. and C.H.; Supervision, W.Y. and Z.S.; Validation, Z.S. and W.Y.; Writing—original draft, Z.S.; Writing—review and editing, W.Y. and Z.S. All authors have read and agreed to the published version of the manuscript.

Ethical approval and consent to participate

The study received approval from Ethics Committee of Shandong First Medical University (Approval No R202305160130).

Consent for publication

PeriodicalNot applicable.

Availability of data and materials

Not applicable.

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Declaration of competing interest

All authors declare that there are no competing interests.

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