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Home-care nursing staff in self-directed teams are more satisfied with their job and feel they have more autonomy over patient care: A nationwide survey.

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ABSTRACT

Aims: (1) To examine whether working in a self-directed team is related to home-care nursing staff's job satisfaction; (2) To assess the mediating effect of self-perceived autonomy over patient care; (3) To investigate the moderating effect of educational level on the association between autonomy over patient care and job satisfaction.

Background: Self-directed teams are being introduced in home care in several countries. It is unknown whether working in a self-directed team is related to nursing staff's job satisfaction. It is important to gain insight into this association since self-directed teams may help in retaining nursing staff.

Design: A cross-sectional study based on two questionnaire surveys in 2014 and 2015.

Methods: The study involved 191 certified nursing assistants and registered nurses employed in Dutch home-care organisations (mean age of 50). These were members of the Dutch Nursing Staff Panel, a nationwide panel of nursing staff working in various healthcare settings.

Results: Self-direction is positively related to nursing staff's job satisfaction. This relationship is partly mediated by autonomy over patient care. For certified nursing assistants and registered nurses with a bachelor's degree, a greater sense of autonomy over patient care in self-directed teams is positively related to job

satisfaction. No significant association was found between autonomy over patient care and job satisfaction for registered nurses with an associate degree. Conclusion: The current study suggests that home-care organisations should consider the use of self-directed teams as this increases nursing staff's job satisfaction and may therefore help to retain nursing staff in home care.

Why is this research or review needed?

- It is important to retain nursing staff in home care since many Western European countries face current or future shortages of home-care staff.
- The use of self-directed teams may help in retaining nursing staff in home care.
- It is unknown whether the positive association between self-direction and job satisfaction that is found in other sectors also applies to nursing staff in home care.

What are the key findings?

- Home-care nursing staff in self-directing teams are more satisfied with their work.
- The positive relationship between self-direction and job satisfaction is partly due to the fact that nurses in self-directed teams experience more autonomy over patient care.
- For certified nursing assistants and registered nurses with a bachelor's degree, self-perceived autonomy over patient care is positively related to job satisfaction. This does not apply to registered nurses with an associate degree.

How should the findings be used to influence policy / practice / research / education?

- Home-care organisations should consider changing to self-directed teams.
- Future research is recommended to investigate what additional characteristics of self-directed teams explain the increased job satisfaction of nursing staff in these teams and to consequently reveal the key elements of self-direction.
- Future studies should focus on possible unintended consequences of self-direction.

INTRODUCTION

In home care, there is a shift towards self-directed teams. At the same time, a process of professionalisation is occurring in nursing (Wynd 2003). This paper explores the interrelationship between these developments. It addresses the question of whether working in a self-directed team contributes to nursing staff's job satisfaction because of greater individual autonomy, an essential element of professionalism (Hall 1968, Pavalko 1971).

Background

In 2007, self-directed work teams were introduced in Dutch home care by the Buurtzorg organisation (Monsen & De Blok 2013). Since then, the number of self-directed teams has risen sharply in the Netherlands and many home-care organisations have incorporated elements of the Buurtzorg model of self-directed teams. Moreover, this model is being introduced in several other countries, including Japan, Norway, Sweden, the United Kingdom and the United States (Gray et al. 2015).

A self-directed team is: ‘A permanent group of employees who work together on a daily basis, who, as a team, share the responsibility for all interdependent activities necessary to deliver a well-defined product or service to an internal or external customer. The team is, to a certain degree, responsible for managing itself and the tasks it performs, on the basis of a clear common purpose. In order to do so, the team has access to relevant information, possesses relevant competences and other resources and has the authority to independently make decisions with regard to the work process (e.g. solving problems).’ (Tjepkema 2003, p. 6-7). Other labels are also used for the concept of self-directed teams, including ‘self-managing teams’, ‘empowered teams’, ‘self-governing teams’ and ‘autonomous work groups’ (Tjepkema 2003, Yeatts & Cready 2007, Gray et al. 2015), but the most commonly used terms are ‘self-directed work teams’ and ‘self-managing work teams’ (Tjepkema 2003). In home care, a self-directed team can be described as a team of nursing staff that organises the care for a group of clients independently, although the team is often facilitated in a demand-driven way and receives external, demand-driven coaching. The team itself determines the objectives, methods and contributions of the individual team members with the aim of tailoring the care to fit the needs of clients. The team as a whole is responsible for the results.

Remarkably little is known about the job satisfaction of nursing staff in self-directed teams as literature on self-directed teams in health care is scarce. Self-directed work teams were first used in manufacturing (Yeatts & Seward 2000) and previous research in this field has tended to focus on this industry (Yeatts et al. 2004).

It is of interest to examine whether working in a self-directed home-care team is related to nursing staff’s job satisfaction since many Western European countries face current or future shortages of home-care nursing staff (Genet et al. 2012). Besides attracting new nursing staff, it is therefore important to retain current nursing staff in home care. Self-directed teams may help achieve this as a literature review of self-directed teams and psychological well-being in other sectors showed that working in a self-directed team is positively related to job satisfaction (Van Mierlo et al. 2005). However, it remains unclear whether this association also applies to nursing staff in home care. Therefore, the first objective of this paper is to clarify this.

In initiating self-directed teams, Buurtzorg wanted to foster autonomous nursing by nursing teams that provide and organise comprehensive, holistic care with limited external regulation and few management restrictions (Monsen & De Blok 2013, Gray et al. 2015). It would be of interest to know whether this team autonomy is accompanied by enhanced nursing staff autonomy over patient care, i.e. greater individual authority and freedom to make decisions concerning the content of patient

care (Weston 2008). In that case, the introduction of self-directed teams will strengthen the professionalisation of nursing staff in home care, as autonomy is viewed as a core characteristic of professionalism (Hall 1968, Pavalko 1971). Professions differ from occupations where the employer, manager or consumer controls the work, that is, determines which tasks are to be performed, by whom, under which conditions and how (Freidson 1999). Van Mierlo et al. (2006) found a positive relationship between team autonomy and the individual autonomy of team members in healthcare organisations. Therefore, it can be expected that working in a self-directed team enhances nursing staff's autonomy over patient care.

Since the autonomy of nurses in Dutch home care has been severely reduced over the past decades, the introduction of self-directed teams may contribute to a process of re-professionalisation. Until the 1990s, Dutch home-care nurses in the many small-scale, local care organisations had a wide range of tasks and an independent role and responsibility with regard to patients (Van der Boom 2008). Yet in the years that followed, nurses were incorporated into large, bureaucratic organisations where managers primarily determined the content and allocation of nursing tasks and responsibilities and nursing staff were increasingly required to account for their activities. Home-care nursing tasks, responsibilities and work areas were increasingly standardised and divided up between different categories of nursing staff (Van der Boom 2008). The assessment of care needs was transferred from home-care nurses to regional assessment organisations, which further increased the external regulation of home-care nursing tasks (Algera et al. 2003). According to Van der Boom (2008), the reduced autonomy led to a great deal of discontent among home-care nurses in the Netherlands.

The introduction of self-directed teams, which are expected to give nursing staff more autonomy over patient care, may help to alleviate this discontent. Several literature reviews and meta-analyses have shown that autonomy is associated with nurses' job satisfaction (Blegen 1993, Irvine & Evans 1995, Zangaro & Soeken 2007, Hayes et al. 2010). Moreover, several studies suggest that autonomy is especially important to nurses in home care (Anthony & Milone-Nuzzo 2005, Ellenbecker et al. 2006, Tummers et al. 2013). Therefore, the second objective of this paper is to ascertain whether increased autonomy over patient care can explain the hypothesised greater job satisfaction of nursing staff in self-directed teams.

Furthermore, the expected greater autonomy over patient care of nursing staff in self-directed teams may improve the job satisfaction of registered nurses with a bachelor's degree in particular. In general, these nurses experience more autonomy in their work than home-care nursing staff with a lower level of education (Maurits et al. 2015). Hence, registered nurses with a bachelor's degree can be characterised by a greater degree of professionalism than nursing staff with a lower level of educational attainment. Therefore, it is likely that they will attach more value to having control over the content of their work. The third objective of this paper is to provide insight into the possible moderating effect of nursing staff's educational level on the association between autonomy over patient care and job satisfaction.

THE STUDY

Aims

The aim of the study was to test the following hypotheses:

- 1) Home-care nursing staff in teams with a greater degree of self-direction are more satisfied with their job.
- 2) The positive relationship between self-direction and work satisfaction is mediated by the self-perceived autonomy over patient care.
- 3) The positive relationship between self-perceived autonomy over patient care and job satisfaction is stronger for registered nurses with a bachelor's degree than for nursing staff with a lower level of education.

Design and setting

The hypotheses were tested in a cross-sectional design, using a secondary analysis of two datasets:

(1) a questionnaire survey containing questions about self-direction and autonomy over patient care, with data collection in November and December 2014 (response rate of 68%);

(2) a questionnaire survey containing questions about job satisfaction, with data collection in April and May 2015 (response rate of 66%).

Data were collected among home-care registered nurses and certified nursing assistants in the Netherlands. The services provided by Dutch home-care organisations include support with daily living activities (i.e. personal care), nursing care and psychosocial care. All of these services are delivered mainly by registered nurses and certified nursing assistants. Home care can be just for a short period, for example after a discharge from hospital, but it often lasts much longer. Dutch certified nursing assistants receive three years of vocational training after leaving secondary school. This is different from the situation in most other countries, where vocational training for nursing assistants is often less than one year. Dutch registered nurses have had at least four years of professional training and are educated to two different levels: associate degree level (equivalent to a UK foundation qualification) and bachelor's degree level.

Participants

A total of 191 nursing staff working in home care (48%) completed both questionnaires. Respondents belonged to an existing survey panel, the Nursing Staff Panel. This comprises a nationwide group of nursing staff in various healthcare settings who deliver direct patient care and have expressed their willingness to complete questionnaires about topical issues in health care (Maurits et al. 2015). Recruitment for the Nursing Staff Panel is based on a random sample of Dutch healthcare employees provided by the Dutch Employee Insurance Agency. This agency, which is responsible for social security payments, keeps a register of all employees in the Dutch healthcare sector. Employees in the random sample were invited to take part in healthcare research for various purposes. Nursing staff who agreed to this request and who deliver direct patient care in any of the main healthcare sectors (i.e. hospitals, the mental health sector, the care for disabled people, home care, nursing homes and homes for the elderly) were asked to join the Nursing Staff Panel. This procedure helps create a panel that is representative in terms of age, sex, region and employer. Participation in the Nursing Staff Panel is voluntary and on an anonymous basis (Maurits et al. 2015).

DATA COLLECTION

Respondents could complete the first questionnaire online or on paper. The second questionnaire could only be filled in on paper. The data from the two questionnaires were linked using the unique respondent ID. Reminders were sent at fortnightly intervals to panel members who had not yet responded (with a maximum of two reminders). This procedure helped to increase the response rate. The questionnaires used an existing scale for measuring job satisfaction and also contained self-developed questions.

MEASURES

Job satisfaction

Job satisfaction was measured using the MAS-GZ scale (Maastricht Work Satisfaction Scale for Healthcare) developed by Landeweerd et al. (1996). This instrument comprises 21 items covering seven dimensions of job satisfaction: 'supervisor', 'quality of care', 'contacts with colleagues', 'contacts with patients', 'possibilities for promotion', 'opportunities for self-actualisation/growth' and 'clarity of tasks and rules'. Each item was rated on a five-point Likert scale ranging from 1 = 'very dissatisfied' to 5 = 'very satisfied'. Overall job satisfaction was calculated as the mean score of all 21 items.

Self-direction

The questionnaire asked nursing staff to what extent their team is self-directed. The responses were on a five-point Likert scale ranging from 1 = 'not at all' - 5 = 'fully'. To ensure respondents would interpret the concept of self-directed work teams appropriately, they were first shown the following definition of a self-directed team in health care:

A self-directed team in home care is a permanent team of caregivers. This team organises the care for a group of clients professionally and independently. The team optimally tailors the care to the needs of the client, without the assistance of, or appealing to, a central manager. Yet there is often someone who coaches and facilitates the team. Self-directed teams have a great degree of control and arrange contacts themselves with internal and external stakeholders. Support services facilitate the teams in a demand-driven manner. The team itself determines the objectives, methods and contributions of all the individual team members. The team as a whole is responsible for the results and reports to higher management. (InVoorZorg 2013, English translation by the first author).

Autonomy over patient care

Self-perceived autonomy over patient care was assessed using the following two questions: (1) 'Do you experience freedom to make decisions about the type of care you provide to patients?'; and (2) 'Do you experience freedom to make decisions about the amount of care you provide to patients?' Both items were scored on a five-point Likert scale ranging from 1 = 'not at all' - 5 = 'to a very large extent'. Overall

self-perceived autonomy over patient care was calculated as the mean score of the two items.

Respondent characteristics

The respondent characteristics that were recorded were age, educational level, work experience in health care and number of working hours per week. The 'educational level' was defined as the highest completed nursing qualification: certified nursing assistant, registered nurse with an associate degree, registered nurse with a bachelor's degree or registered nurse with a master's degree. Because the group of respondents who had completed a master's degree after their bachelor's degree was too small to analyse separately, they were included in the category of 'registered nurses with a bachelor's degree'. A respondent's 'work experience' was defined as the number of years they had spent working as a registered nurse or certified nursing assistant.

ETHICAL CONSIDERATIONS

This study was based on questionnaires completed by nursing staff; no patients were involved. As all the research participants were competent individuals and no participants were subjected to any interventions or actions, no ethical approval was needed under Dutch law on medical research (Medical Research Involving Human Subjects Act, <http://www.ccmo.nl>). Study participation was voluntary. The questionnaire data were stored and analysed anonymously, in accordance with the Dutch Personal Data Protection Act (http://www.privacy.nl/uploads/guide_for_controller_ministry_justice.pdf). Privacy regulations are available for the Nursing Staff Panel.

DATA ANALYSIS

Since the hypothesised associations can be affected by the individual characteristics of the nursing staff, we controlled for educational level, work experience and number of working hours per week. As age was highly correlated with work experience, this individual characteristic was not included in the analyses. To test Hypothesis 1, a multiple regression analysis was conducted with self-direction and the respondent characteristics as the explanatory variables and job satisfaction as the outcome variable. The mediating effect of autonomy over patient care (Hypothesis 2) was assessed using multiple regression analysis and mediation analysis. First, a multiple regression analysis was performed with self-direction and the respondent characteristics as the explanatory variables and autonomy over patient care as the outcome variable. Then, a multiple regression analysis was done with self-direction, autonomy over patient care and the respondent characteristics as the explanatory variables and job satisfaction as the outcome variable. Finally, a mediation analysis was performed with self-direction as the explanatory variable, autonomy over patient care as the mediator and job satisfaction as the outcome variable. The three regression models described by Baron and Kenny (1986) were used: (1) regressing the mediator on the explanatory variable; (2) regressing the outcome variable on the explanatory variable; and (3) regressing the outcome variable on both the explanatory variable and the mediator. The size and significance of the direct and indirect effects were estimated by bootstrapping (Preacher & Hayes 2008). To assess the moderating effect of educational level on the association between autonomy over

patient care and job satisfaction (Hypothesis 3), interaction terms for the interaction between educational level and autonomy over patient care were added to the multiple regression model.

Data were analysed using STATA 14.0 (StataCorp 2015). The level of statistical significance was fixed at $\alpha=0.05$. Respondents with missing values for one or more variables were excluded from the analyses that included those variables. Table 1 shows the proportion of missing data for each variable. Model assumptions for multiple regression were verified (i.e. linearity, absence of multicollinearity, homoscedasticity and normally distributed errors). No violations of assumptions were found.

VALIDITY AND RELIABILITY

The MAS-GZ scale has been shown to be valid and reliable (Landeweerd et al. 1996). The self-developed questions were assessed by a nurse and a policy maker in the field of the healthcare labour market. They considered the relevance, completeness and comprehensibility of the questions. Suggestions for amendments were implemented.

RESULTS

DESCRIPTIVE STATISTICS

The respondents' characteristics are shown in Table 1. The mean age of 50 (standard deviation or SD 9.6) was higher than the average age of employees working in the long-term care sector in the Netherlands, which was 44 in 2014 (AZW 2016). 45.0% of the respondents were certified nursing assistants, while 27.5% had an associate level degree in nursing and 27.5% had a bachelor's degree. As the corresponding proportions in the Dutch home-care sector were 69%, 17% and 14% in 2014 (Van der Windt & Bloemendaal 2015), certified nursing assistants were under-represented and registered nurses were over-represented in the study population. Respondents had 23 years of experience in nursing on average (SD 11.0) and an average working week of 23 hours (SD 7.0).

The mean score for job satisfaction was 3.67 (SD 0.47; range 1-5), the mean score for self-direction was 3.44 (SD 1.11; range 1-5) and the mean score for autonomy over patient care was 3.17 (SD 1.02; range 1-5). The internal consistency (Cronbach's alpha) of the job satisfaction scale ($\alpha = 0.91$) and autonomy over patient care scale ($\alpha = 0.88$) was good as Cronbach's alpha met the criterion of at least 0.80 (Table 1).

HYPOTHESIS 1 ASSOCIATION BETWEEN SELF-DIRECTION AND JOB SATISFACTION

Hypothesis 1 is supported. Multiple regression analysis (Table 2, column 2) showed that self-direction is significantly related to job satisfaction. None of the individual respondent characteristics were associated with job satisfaction.

HYPOTHESIS 2 MEDIATION BY AUTONOMY OVER PATIENT CARE

As can be seen in Table 2 (column 1), multiple regression analysis showed that self-direction is positively related to autonomy over patient care. When autonomy over patient care was added as an explanatory variable to the multiple regression model with self-direction and the individual characteristics as explanatory variables and job satisfaction as the outcome variable (Table 2, column 3), both self-direction and autonomy over patient care were significantly related to job satisfaction. This indicates that mediation was not complete, but the separate effect of self-direction was reduced. In other words, autonomy over patient care does not account for all of the effect of self-direction on job satisfaction. Mediation analysis also showed only partial mediation. Both the direct effect and the indirect effect were significant (Table 3). The proportion of the total effect that was mediated was 29%. Therefore, Hypothesis 2 is only partially confirmed.

HYPOTHESIS 3 MODERATING EFFECT OF EDUCATIONAL LEVEL

Hypothesis 3 stated that the effect of autonomy over patient care on job satisfaction would be stronger for registered nurses with a bachelor's degree than for nursing staff with a lower level of education. As can be seen from Table 3 (column 4), a significant interaction effect was found between autonomy over patient care and educational level. In Figure 1, the relationship between autonomy over patient care and job satisfaction is plotted for certified nursing assistants, registered nurses with an associate degree and registered nurses with a bachelor's degree. For certified nursing assistants and registered nurses with a bachelor's degree, the relationship between autonomy over patient care and job satisfaction is positive. For registered nurses with an associate degree, no significant relationship was found between autonomy over patient care and job satisfaction. Since the effect of autonomy over patient care on job satisfaction is stronger for both certified nursing assistants (who have a lower level of education than registered nurses with an associate degree) and registered nurses with a bachelor's degree (who have a higher level of education), Hypothesis 3 is rejected.

DISCUSSION

MAIN FINDINGS

This study found a significant positive association between self-direction and job satisfaction among certified nursing assistants and registered nurses in home care. This implies that nursing staff in teams that have a greater degree of self-direction are more satisfied with their job than nursing staff in teams that are self-directing to a lesser extent. This association can be partly explained by the higher degree of autonomy over patient care perceived by nursing staff in self-directed teams. However, no significant association between autonomy over patient care and job satisfaction was found for registered nurses with an associate degree. This indicates that the higher degree of self-perceived autonomy over patient care increases job

satisfaction in particular for certified nursing assistants and registered nurses with a bachelor's degree in teams that have a greater degree of self-direction.

The results of this study show that the positive relationship between self-directed teamwork and job satisfaction that was found in other sectors (Van Mierlo et al. 2005) also applies to nursing staff in home care. Therefore, it is likely that the use of self-directed teams will help to retain nursing staff in home care and thereby tackle staff shortages.

The current study found partial mediation by autonomy over patient care of the relationship between self-direction and job satisfaction. The association between self-direction and self-perceived autonomy over patient care found in this study implies that working in a self-directed team enhances home-care nursing staff's professionalism since autonomy is considered to be an essential element of professionalism (Hall 1968, Pavalko 1971). This suggests that the large rise in self-directed teams in Dutch home care is being accompanied by a process of re-professionalisation of nurses. This process is bolstered by the fact that registered nurses with a bachelor's degree have recently regained responsibility for the assessment of care needs.

Since the analyses showed only incomplete mediation by autonomy over patient care, other types of autonomy may also be of relevance. As self-directed teams in home care generally organise the care for their clients independently and set their own objectives and methods, nursing staff in such teams may also experience more control over the context of practice, i.e. organisational autonomy (Weston 2008). Furthermore, as nursing staff in self-directed teams do not have to give an account to managers, they may also experience more freedom and discretion in work scheduling, i.e. work autonomy (Weston 2008).

In addition to autonomy, other characteristics of self-directed teams in home care may also help explain the greater job satisfaction of nursing staff in these teams. A qualitative study by Yeatts and Seward (2000) of self-directed work teams in nursing homes suggests that team cohesion and cooperation may play a role.

Surprisingly, this study found a positive association between autonomy over patient care and job satisfaction for both certified nursing assistants and registered nurses with a bachelor's degree but not for registered nurses with an associate degree. A possible explanation is that nurses with an associate degree are used to working under the supervision of a nurse with a bachelor's degree and therefore attach less value to autonomy. Both nursing assistants and nurses with a bachelor's degree work rather independently. However, the type of autonomy over patient care that certified nursing assistants experience differs from that experienced by registered nurses with a bachelor's degree since the home-care services delivered by certified nursing assistants are restricted to personal care. Nursing assistants are not allowed to provide technical nursing care. Yet the freedom to make decisions concerning the content of individual patient care still seems to be of relevance for their job satisfaction, as it is for nurses with a bachelor's degree.

IMPLICATIONS

The findings of this study support the use of self-directed work teams in home care, since self-direction enhances nursing staff's job satisfaction and may thereby help in retaining nursing staff in home care. Self-direction may particularly suit nursing staff

in home care since they usually work rather independently, without direct supervision (Narayan et al. 1996). As mentioned in the introduction, some home-care organisations are choosing to incorporate elements of self-direction. To increase the job satisfaction of certified nursing assistants and registered nurses with a bachelor's degree, organisations are advised to focus on autonomy over patient care decisions. However, organisations should also focus on other elements of self-direction to increase the job satisfaction of registered nurses with an associate degree.

Individual autonomy in self-directed teams may also have negative outcomes. A study among self-directed teams of MBA students suggests that when a self-directed team is characterised by both a high level of individual autonomy and a high level of trust, team members may be reluctant to monitor each other, which can lead to performance loss (Langfred 2004). Furthermore, self-direction may not suit every nurse or nursing assistant. Narayan et al. (1996) have described the important characteristics for successful self-directed teams in home-care, including shared leadership among the team members, a climate of trust and mutual respect, effective communication, commitment and a cooperative spirit. Not all nursing staff may have the necessary skills. Even so, time, training and encouragement may help them to master these skills.

LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Some limitations to this study need to be acknowledged. First, the degree to which the teams were self-directing was estimated by nursing staff themselves rather than being measured objectively. However, their assessment of self-direction was guided by including a definition of self-direction in the questionnaire. Secondly, causal inferences regarding the relationships tested cannot be made as the data were cross-sectional. Another relevant issue is that there are differences between countries in how home care is organised and provided (Genet et al. 2012). The study results can be considered applicable to those other countries that are similar to the Netherlands, where home care takes the form of formal nursing services and personal care provided by nursing staff in clients' own homes.

Future longitudinal studies could be helpful in unravelling the causes and effects in relationships. It is recommended that future studies also include other characteristics of self-directed teams that could be related to job satisfaction. As home-care organisations may only adopt certain elements of self-direction rather than using fully self-directed teams, it is important to gain further insight into the elements that are vital to nursing staff job satisfaction. Furthermore, future research could examine individual characteristics, e.g. work experience and communication skills, that may be associated with the job satisfaction of nursing staff in self-directed home-care teams. In addition, future research could focus on possible unintended consequences of self-direction. Lastly, by using objective data on a home-care team's degree of self-direction, future studies can improve the validity of the findings presented in this paper.

CONCLUSIONS

This study shows that nursing staff in teams with a high degree of self-direction are more satisfied with their job. This can partly be explained by the higher degree of self-perceived autonomy over patient care. However, other characteristics of self-directed teams also appear to play a role. The current study suggests that home-care organisations should consider the use of self-directed teams as this increases nursing staff's job satisfaction and may therefore help in retaining nursing staff in home care.

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Competing interests

The authors declare that they have no competing interests.

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Author Contributions

All authors have agreed on the final version and meet at least one of the following criteria (recommended by the ICMJE*):

- 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
- 2) drafting the article or revising it critically for important intellectual content.

* <http://www.icmje.org/recommendations>

TABLES

Table 1 Descriptive statistics (n=191)

	% or mean (S.D.)	Missing data (%)	Cronbach's α
Job satisfaction (range 1-5)	3.67 (0.47)	1.1%	0.91
Self-direction (range 1-5)	3.44 (1.11)	0.5%	N/A
Autonomy over patient care (range 1-5)	3.17 (1.02)	1.1%	0.88
Respondent characteristics			
Educational level		1.1%	N/A
Certified nursing assistant	45.0%		
Registered nurse, associate-level	27.5%		
Registered nurse, bachelor's degree	27.5%		
Age (years)	50.22 (9.62)	0.0%	N/A
Work experience (years)	22.59 (10.96)	0.5%	N/A
Working hours per week	23.27 (6.97)	0.0%	N/A

a N/A: not applicable

Table 2 Multiple regression analyses

	Autonomy over patient care		Job satisfaction					
	n=185		n=186		n=184		n=184 a	
	b	β	b	β	b	β	b	β
Self-direction (1-5)	0.309	0.330*	0.193	0.447*	0.136	0.312**	0.128	0.294*
Autonomy over patient care (1-5)	-	-	-	-	0.197	0.423**	0.278	0.596*
Educational level								
Certified nursing assistant	ref. 0.373	ref. 0.164*	ref. 0.046	ref. 0.044	ref. -	ref. -	ref. 0.001	ref. 0.001
Registered nurse, associate-level degree	0.760	0.334*	-	-0.026	0.024	0.022	-	-
Registered nurse, bachelor's degree		*	0.028		-	-	0.225	0.213*
Autonomy over patient care x educational level								
Certified nursing assistant							ref. -	ref. -
Registered nurse, associate-level degree							0.261	0.270*
Registered nurse, bachelor's degree							-	*
Registered nurse, bachelor's degree							0.028	-0.036
Work experience (years)	-	-0.024	-	-0.101	-	-	-0.005	-
	0.002		0.004		0.004	0.086		0.110
Working hours per week	0.023	0.150*	0.002	0.031	-	-	-0.003	-
					0.002	0.032		0.038
Test of model	R ² =0.260, Model F(5,179)=12.56**		R ² =0.199, Model F(5,180)=8.97**		R ² =0.332, Model F(6,177)=14.67**		R ² =0.379, Model F(8,175)=13.34**	

- Variable is not included in the analysis

* Statistically significant with $p < 0.05$

** Statistically significant with $p < 0.01$

a In this analysis with interaction terms, the values of autonomy over patient care were centred around the median, to ensure that the interpretation of the effect of educational level will occur at a meaningful value of autonomy over patient care (the median).

Table 3 Mediation analysis with ‘self-direction’ as the explanatory variable, ‘autonomy over patient care’ as the mediating variable and ‘job satisfaction’ as the outcome variable (n=186) 1 2

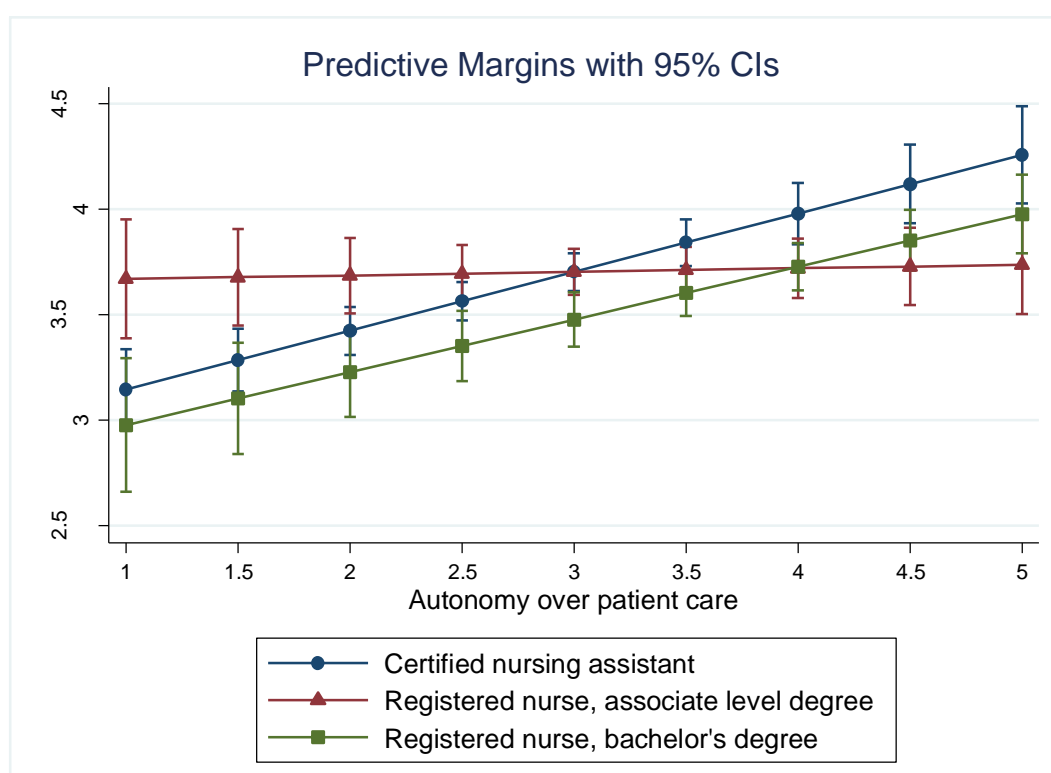
Total effect Coefficient (95% C.I.)	Total indirect effect Coefficient (95% C.I.)	Direct effect Coefficient (95% C.I.)
0.189 (0.132-0.246)*	0.054 (0.024-0.091)*	0.135 (0.075-0.197)*

1 Mediation effects estimated by bootstrapping (1000 replications)

2 Indirect effect and direct effect: percentile confidence intervals (no bias correction)

* Statistically significant with $p < 0.05$.

Figure 1 Visualisation of the moderating effect of educational level on the association between self-perceived autonomy over patient care and job satisfaction



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