RESEARCH

A Longitudinal Approach to Changes in the Motivation of Dutch Pharmacists in the Current Continuing Education System

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Objective. To explore the changes in motivation of Dutch pharmacists for Continuing Education (CE) in the Dutch CE system.

Methods. Pharmacists' motivation was measured across three time points with the Academic Motivation Scale, based on the Self-Determination Theory of motivation. The Latent Growth Modelling technique was used to analyze these data.

Results. Over a period of 21 months, Controlled Motivation had increased and Relative Autonomous Motivation of Dutch pharmacists had decreased. Traineeship was the only demographic factor with a significant influence on the change in motivation. No subgroups with different trajectories could be identified.

Conclusion. Relative Autonomous Motivation of Dutch pharmacists for CE decreases over time. This indicates a loss of Autonomous Motivation ("good" motivation) in favor of Controlled Motivation ("bad" motivation). Further research needs to be conducted to gain a better understanding of the association between pharmacist motivation and the features of the current CE system.

Keywords: continuing education, continuing professional development, motivation, pharmacists, self-determination theory

INTRODUCTION

Pharmacists and other health care professionals need to maintain and develop their knowledge and competencies by engaging in lifelong learning. Historically, research and improvements in the teaching-learning environment of higher education have been focused mainly on the training of health care professionals before they start their professional career and not on postgraduate or continuing education. Because of this, little is known about the learning outcomes and the quality of models, approaches and lifelong learning systems for the health care workforce.[1]

Continuing Education (CE) and Continuing Professional Development (CPD) enable health care professionals to pursue lifelong learning. CE involves structured learning activities like conferences, workshops or e-learning modules. CE is mainly knowledge- and competency-based. CPD is an ongoing structured cycle of learning wherein self-directed learning skills are crucial for success.[2-4] CE is often included in the cyclical CPD process.

With the establishment of The International Forum for Quality Assurance of Pharmacy Education in 2001, the quality assurance and promotion of excellence in pharmacy education for undergraduate students has received international attention.[5] A global Quality Assurance Framework for Pharmacy Education was adopted to stimulate the development and training of quality pharmacists to face the critical shortage of the pharmacy workforce.[5]

In 2014, the International Pharmaceutical Federation (FIP) published a report emphasizing the need for lifelong learning through CE/CPD with the goal to create stronger policies and programs for lifelong learning in pharmacy.[6] Several international case studies have reported about the substantial differences in CE/CPD requirements for pharmacists within and across countries.[6-8] Only 31 countries have requirements to maintain registration and 11 countries have formal systems like competency frameworks for advanced practice to monitor the quality of CE activities. Consequently, knowledge about the characteristics

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of an effective CE/CPD model is lacking. Published case studies found that an annual CE/CPD credit requirement can support pharmacist participation in CE/CPD, but some pharmacists are motivated by the number of credits rather than the relevance of the learning activity for practice.[6]

Studies of pharmacist participation in and attitudes toward CE/CPD also emphasize motivation both as a facilitator and a barrier.[8-12] Motivation was found to be a positive predictor for pharmacist participation in CE.[13] Studies grounded in the Self-Determination Theory (SDT) of motivation underscore the importance of motivation in learning.[13-17] Therefore, pharmacist motivation for CE/CPD participation should be taken into account when planning and designing a CE/CPD model that is meant to stimulate conceptual understanding, persistence and good professional performance.[15,16]

Motivation can function as either an independent or dependent variable: independent when it influences learning outcomes, dependent when it is influenced by factors in the learning environment, like teaching methods, teacher skills and curricula.[18,19] Longitudinal studies conducted in high schools, colleges and universities report fluctuations in student motivation across time in response to classroom activities and during a transitional academic year.[20-22] Although motivation is known to be dynamic, is susceptible to learning environment influences , and influences educational outcomes, research on motivation as a dependent variable is limited.[19,23-25]

To our knowledge this is the first study that investigates pharmacist motivation in CE as a dependent variable across time. This study explores the changes in pharmacist motivation for CE in the Dutch CE system. The study research questions were: does pharmacist motivation for CE change over time, how do these changes occur and what demographic factors influence these changes?

METHODS

Historically, pharmacy education has been offered in four universities in the Netherlands. Dutch pharmacists have participated in CE activities since 1995. Accredited CE activities like lectures, e-learning sessions, workshops and peer sessions were provided by different commercial organizations, including pharmaceutical companies. In 2001, the Netherlands Centre for Post-Academic Education in Pharmacy was founded by the universities as an independent body that organizes training courses for hospital, industrial and community pharmacists and offers a broad range of independent, accredited CE activities.

The ability to renew a practice license was introduced for hospital pharmacists in 2009 and community pharmacists in 2012.[26,27] Both hospital and community pharmacists are required to participate in 200 hours of accredited CE activities and work for at least 16 hours/week in practice for five consecutive years. Since January 2015, community pharmacists are required to participate in 200 accredited CE hours/year, of which 190 hours must come from predetermined CanMEDs competencies such as collaboration and communication.[28] The remaining 10 hours must come from reflective CE methods like learning through peer review and submission of case reports.

The (mandatory) current CE system in the Netherlands is expected to stimulate CE participation at the expense of the right type of motivation.

Self-Determination Theory distinguishes two types of motivation: autonomous motivation (AM) and controlled motivation (CM).[13,14,18,19] AM is determined from different types of regulation that are generated from within an individual and are called intrinsic (activity done out of genuine interest), integrated (activity backed by a person's own beliefs) and identified regulation (consciously valuing an activity). CM is determined from regulations that are generated from external factors and are called introjected (activity not fully accepted as one's own and originating from internal pressure) and external regulation (activity carried out because of external demands or for rewards).[14] These regulations are placed on a continuum (Figure 1) wherein intrinsic motivation is the most autonomous type of motivation and external is the least, with the other states in between.[14]

Autonomous motivation (AM) is associated with better learning outcomes and positive well-being, unlike CM, which is associated with poor academic performance and burnout.[14-17] Hence, AM is more desirable than CM. SDT demonstrates that satisfying three basic psychological needs: autonomy (experiencing volition), perceived competence (feeling capable of mastering a task) and relatedness (connecting with peers) can contribute to AM. Thwarting these needs results in AM changing to CM. Autonomy-supportive teaching style refers to coordinating learning activities with a learner's preferences and sense of competence and avoiding external regulators such as incentives and deadlines. Small group teaching and problem-based learning are examples of student-centered education, which, in principle, incorporate an autonomy-supportive educational style. They encourage the active participation of learners and shift the responsibility of learning to the learners themselves. Autonomy-supportive teaching has been reported to produce optimal learning outcomes.[29-31]

An effective CE/CPD model requires pharmacists to have self-regulation skills and to spend time and effort in continuing to update their knowledge.[3,4] As motivation seems to affect all stages of self-regulated learning, an
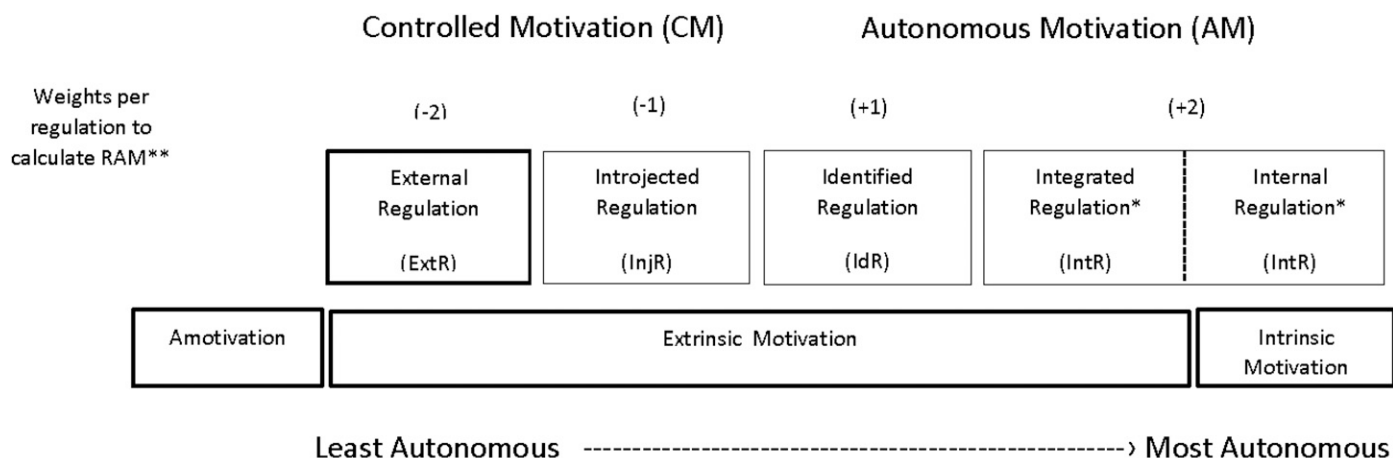
Figure 1. Self-Determination Continuum with Main Types of Motivation: Autonomous Motivation (AM), Controlled Motivation (CM), and Relative Autonomous Motivation (RAM)[14]

Figure from Deci EL, Ryan RM. *Handbook of Self-Determination Research*. Rochester, NY: University of Rochester Press; 2002.

effective CE/CPD model needs to stimulate and foster the AM of pharmacists.

Both AM and CM measure the independent effects of the two primary types of motivation of SDT. A single variable that represents the overall self-determined motivation in a person was needed for this study. Hence, the relative autonomy index/relative autonomous motivation (RAI/RAM or RAM for this article) was used. RAM indicates how AM and CM are related to each other within an individual by combining and weighing the autonomous regulations positively and the controlled regulations negatively. Higher scores for RAM indicate more AM (which is desirable) whereas lower scores indicate more CM (which is undesirable).

The use of RAM has been validated in several studies.[13,15-17] In the Netherlands, the learning environment of pharmacists is a mandatory quantity-based (number of credits) CE system. Health insurance companies and the government offer financial incentives to encourage pharmacists to participate in CE. According to SDT, these extrinsic rewards are likely to increase controlled motivation (CM). This study's investigators hypothesized that pharmacists' CM will increase and RAM will decrease across time because RAM will be undermined by extrinsic rewards.

In earlier studies, different motivational profiles are associated with differences in gender distribution, type of pharmacy school, number of years of work experience,

and being or not being a trainee. These demographic factors seem to play a role in CE participation.[13,32] The investigators wanted to explore if these demographic variables could also predict how pharmacists' RAM develops over time.

This is a prospective longitudinal study with Dutch pharmacists who participated in face-to-face CE activities organized by the Netherlands Centre for Post-Academic Education in Pharmacy. The pharmacists completed a paper-based questionnaire between September 2013 and January 2014 (T0) and signed an informed consent form informing them that they will be approached for further research. The participants were emailed the same questionnaire after nine months (T1: between June and September 2014) and after 21 months (T2: between July and September 2015). Four reminders were sent.

Pharmacist motivation for CE was measured with the Academic Motivation Scale (AMS).[33] The AMS is based on SDT and has been used in different context (eg, secondary schools, universities and medical schools).[34] For this study, a Dutch version of the AMS was translated and constructed, following the steps specified by the adaptation guidelines for questionnaires.[35] AMS validation was conducted via factor analysis on T0 scores and after the reliabilities of all the subscales were computed.

Pharmacists answered the statements using a five-point Likert scale (1=strongly disagree and 5=strongly agree). With these scores, the Autonomous Motivation

(AM=the average of Intrinsic Motivation and Identified Regulation), Controlled Motivation (CM=the average of Introjected Regulation and External Regulation) and Relative Autonomous Motivation [RAM = (Intrinsic Motivation x 2) + (Identified Regulation x 1) + (Introjected Regulation x -1) + (External Regulation x -2)] were calculated.[15,16] Demographic details like gender, working environment, pharmacy school and work experience were also collected.

For the statistical analyses, SPSS version 23 (IBM, Armonk, NY) was used. The Missing Completely At Random (MCAR) test was used to determine to what extent the missing items were a random subset of the data. Data imputation with an average of the three items/factors when the fourth was missing was applied.

Mplus version 7.4 (Muthén & Muthén, Los Angeles, CA) was used to perform Latent Growth Modelling and Latent Class Growth Analysis.[45,46] Latent Growth Modelling is a technique that makes it possible to describe changes over time, using individual developmental trajectories in longitudinal growth curves.[36,37] Latent Class Growth Modelling is said to be the most suitable method for capturing inter-individual differences in intra-individual change after accounting for any unobserved heterogeneity within a larger population.[37] Longitudinal development is measured as the slope function (represented as "s") and assumes a linear trend during the measurement period (for this study, 1.75 years). The basal variable value (represented as intercept or "i") is assumed to have the same value at T0, T1 and T2.[36,37]

To determine the fit of the model, the following model fit indices were used with the specified criteria: Chi-square test (p>.05), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) (both <.08), Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) (both >.9).[38,39]

Latent Class Growth Analysis was used to explore if subgroups (eg, based on demographics) could be formed based on differences in individual growth trajectories. To do this, models were tested with 4, 3 and 2 classes with Lo-Rubin Adjusted Test (LRT).[36,37]

Ethical approval was obtained from the Ethical Review Board of the Netherlands Association for Medical Education.

RESULTS

The response rates were 57.5% (n=432) at T0, 29.6% (n=128) at T1 and 24.8% (n=107) at T2. The MCAR test revealed random missing data (less than 1.1%) at T0. After imputation of the missing data, 425 cases could be used at T0. The percentage of pharmacists who completed the questionnaire at all three time points was 16.7% (n=72). The study investigators decided not to apply missing data imputation at T1 or T2 because the missing data consisted of completely missing questionnaires. A complete sample of 72 cases was used for analysis. This final sample demonstrates reasonable representativeness of the larger sample at T0 (Table 1).

Autonomous Motivation (AM) and Controlled Motivation (CM), as measured during the study period, both increased from mean 3.35 (SD 0.55) and 1.87 (0.64) at T0 to 3.45 (0.65) and 2.23 (0.81) at T2, respectively (Table 2, upper part). The increase from T0 to T1 seemed larger than the increase from T1 to T2. RAM decreased from 4.33 (1.84) at T0 to 3.63 (1.92) at T2.

Two different models were analyzed using both AM and CM as dependent variables (to observe any possible independent effects of the two primary types of motivation within SDT) and RAM as a dependent motivation variable. Slope variances were fixed to zero in both models. Fit indices for both models 1 and 2 were good. Model 1 had the following indices: χ^2(df)=13.16 (15), p=.36; RMSEA=0.04; SRMR=0.12; CFI>1.00; TLI=0.99. Model 2 had the following indices: χ^2(df)=3.67 (6), p=.30; RMSEA=0.06; SRMR=0.04; CFI=0.99; TLI=0.99.

The modeled intercept for AM was 3.36 and for CM 1.89 (Table 2, lower part). These values represent the initial (model) value of the AM and CM scores at the beginning (T0) of the developmental trajectory. The modeled intercept for RAM was 4.20. The modeled slope from T0 to T2 was 0.07 for AM, 0.20 for CM and -0.38 for RAM. AM increased from T0 to T2 by 0.07/year, CM increased by 0.20/year and RAM decreased by 0.38/year. Figure 2 shows a diagram of model 1.

Because there were only five pharmacy owners in our dataset, the ownership versus pharmacy employees as a possible predictor was removed. Gender, working environment, work experience, traineeship and pharmacy school were tested as predictors for the development of pharmacists' RAM over time. Among the demographic factors, only traineeship had a statistically significant effect on the development of pharmacists' RAM over time. This group starts with a lower RAM (-1.22) and with a slope of 0.85 their RAM increases over time. Of the pharmacists (n=20) who were in training at T0, 11 were reached by email and phone. Six were still in training and five had finished their training before participating at T1 or T2. Table 3 shows the values of the different possible predictors and their effects on the pharmacists' RAM over time. Among the demographic factors, only traineeship (pharmacists who have been in training for the past two years) significantly influenced the growth trajectory of RAM (intercept - 1.22 with p=.02; slope 0.85 with p=.01).

Table 1. Demographics of Pharmacists Who Completed All Three Questionnaires (complete cases; N=72) and Pharmacists Who Completed the Questionnaire at T=0 (larger sample; N=425)

Factor Variable		Complete Cases n (%)	Larger Sample n (%)
Gender	Female	50 (69.4)	245 (57.6)
	Male	22 (30.6)	147 (34.6)
	Unknown	0	33 (7.8)
Pharmacy school	Utrecht	44 (61.1)	220 (51.8)
	Groningen	22 (30.6)	165 (38.8)
	Other or unknown	6 (8.4)	41 (9.6)
Work environment	Community Pharmacy	34 (47.2)	220 (51.8)
	Hospital Pharmacy	33 (45.8)	193 (45.4)
	Other or unknown	5 (7)	12 (2.8)
Work experience	>10 years	27 (37.5)	160 (37.6)
	<10 years	44 (61.1)	260 (61.2)
	Unknown	1 (1.6)	5 (1.2)
Traineeship (for the past 2 years)	Not in training	47 (65.3)	285 (67.0)
	In training	20 (27.8)	118 (27.8)
	Unknown	5 (6.9)	22 (5.2)
Employment	Owner	5 (6.9)	44 (10.4)
	Employee	62 (86.1)	355 (83.5)
	Unknown	5 (6.9)	26 (6.1)

Based on the earlier findings about motivational profiles (subgroups based on the combination of AM and CM within an individual), the researchers wanted to explore if they could also find different groups with different growth patterns using Latent Class Growth Analysis. On the LRT, the model with one class showed the best fit, which meant that no subgroups were found.

In conclusion, this study's results showed that pharmacists' RAM significantly decreased (slope - 0.38; p=.002), mostly because CM increased steeply (slope 0.20; p<.001) over time in the current CE system. No statistically significant subgroups could be found based on differences in RAM development.

DISCUSSION

Pharmacists' motivation for CE changes over a two-year period. This study's results supported the hypothesis that pharmacists' RAM for CE would decrease over time. It is difficult to ascribe the decrease of RAM only to the characteristics of the mandatory credit-based Dutch CE

Table 2. Means and Standard Deviations of Autonomous Motivation (AM), Controlled Motivation (CM), and Relative Autonomous Motivation (RAM) at T0, T1, and T2[a]

Variable	AM Mean (SD)	CM Mean (SD)	RAM Mean (SD)
	Observed variable values		
T0	3.35 (0.55)	1.87 (0.64)	4.33 (1.84)
T1	3.46 (0.53)	2.13 (0.64)	3.79 (1.59)
T2	3.45 (0.65)	2.23 (0.81)	3.63 (1.92)
	Modeled variable values		
Intercept (significance)[b]	3.36 p<.001)	1.89 (p<.001)	4.20 (p<.001)
Slope (significance)[b]	0.07 (p=.029)	0.20 (p<.001)	-0.38 (p=.002)

[a]T0: collected from September 2013 to January 2014 (at 0 months)
T1: collected from June 2014 to September 2014 (at 9 months)
T2: collected from July 2015 to September 2015 (at 21 months)
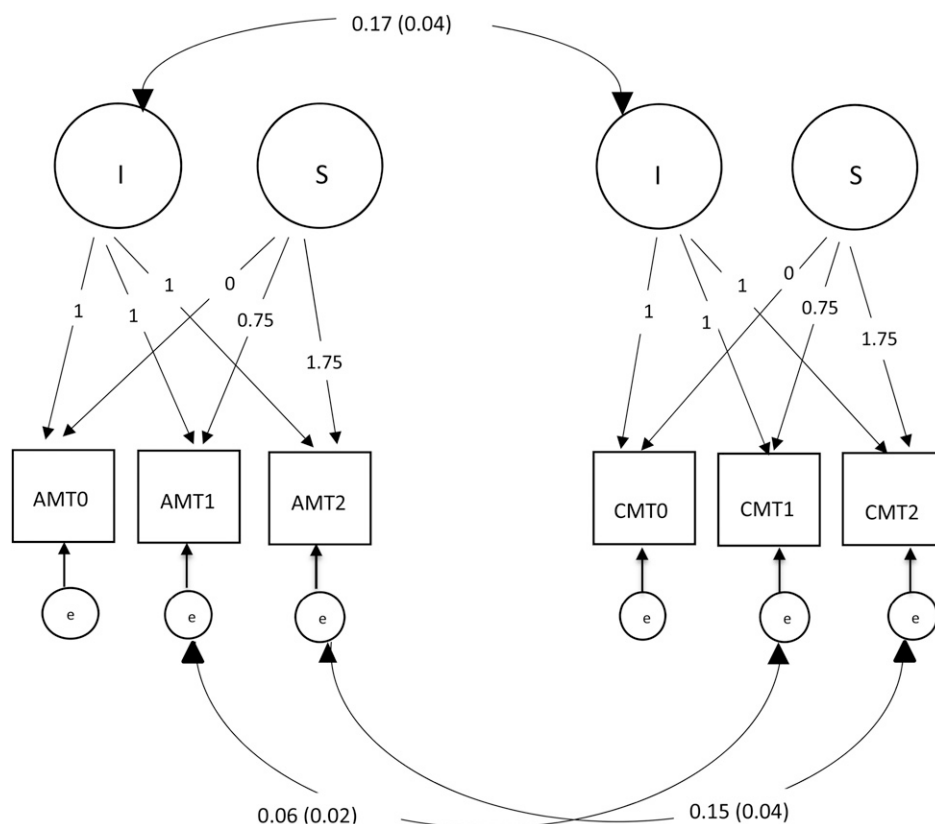[b]p<.05 is significant

Figure 2. Latent Growth Model Diagram of Pharmacists' AM and CM (Model 1) and Relative Autonomous Motivation (RAM) Across Three Time Points

Model 1 AMT0, AMT1, AMT2 represent Autonomous Motivation on T0, T1 and T2, respectively and CMT0, CMT1, CMT2 represent Controlled Motivation on T0, T1 and T2, respectively. I and S represent Intercept (constant for the group at each time point, hence, the fixed values are 1 for factor loadings on the repeated measures) and Slope (represents the development over time). Loadings on the slope factor represent the scales of time (0, 0.75, 1.75). Intercepts of AM and CM covary (0.17) with standard error 0.04. AMT1 and CMT1 covary (0.06) with standard error 0.02 and AMT2 and CMT2 covary (0.15) with standard error 0.04. "e" refers to the error variance.

system because factors like a high workload, personality traits and life events could also influence motivation. The motivation of higher education students has been reported before to have changed from intrinsic to extrinsic. This is probably due to the teaching and learning environment and major transitions in lifestyles and relationships.[21]

The higher increase of AM and CM from T0 to T1 in comparison with the increase from T1 to T2 could be caused by a ceiling effect. This means that a maximum effect could have been reached at T2. Only traineeship (pharmacists who have been in training at any time during the study in the past two years) had a statistically significant effect on the development of pharmacists' RAM over time. The change during the study from "the trainee" to "the trained" can increase RAM due to a decrease in CM or an increase in AM, because they perceive more autonomy as a trained pharmacist. Despite this paradoxical effect seen in this particular subgroup, the data fit well into a single class (group) with Latent

Growth Modelling (LGM). This particular group did not emerge as a separate subgroup in the LGM.

In an earlier study, study investigators found that pharmacists' RAM was associated with CE participation.[13] A decrease in RAM could be associated with a decrease in CE participation, which is expected to decrease lifelong learning in pharmacists. Therefore, a likely consequence of the current CE system is that pharmacists may only engage in the minimal CE participation that is required to maintain their license.

Self-determined motivation like AM has been positively associated with enhanced psychological functioning and leads to positive educational outcomes like psychological adjustment, concentration and satisfaction with academic life.[15,17] However, CM has been associated with burnout, a higher dropout rate and surface learning.[15,17]

In 2014 and 2015, a quick scan about vitality and stress in the job was conducted among Dutch health care professionals (eg, general practitioners, veterinarians and

Table 3. Multiple Regression with Demographic Effects on the Initial Value and Growth of RAM

Predictor Variable	Intercept			Slope		
	B Mean (SE)	t	p	B Mean (SE)	t	p
Constant	3.97 (0.46)	8.58	<.001	-0.66 (0.29)	2.28	.02
Traineeship (for the past 2 years) (label = 1: In training, 0: Not in training)	-1.22 (0.50)	2.41	.02	0.85 (0.32)	2.67	.01
Gender (label = 1: Male, 0: Female)	-0.08 (0.47)	0.16	.87	0.22 (0.29)	0.75	.45
City (label = 1: Utrecht, 0: Other)	0.54 (0.46)	1.18	.24	-0.28 (0.29)	0.96	.34
Work experience (label = 1: >10 years, 0: <10 years)	0.24 (0.48)	0.50	.62	0.04 (0.30)	0.14	.89
Working environment (label = 1: Hospital, 0: Community	0.46 (0.42)	1.10	.27	-0.08 (0.26)	0.29	.77

B=unstandardized regression coefficient, SE=standard error of the regression coefficient, t=estimate-value divided by SE, *p*=statistical significance of the regression coefficient

pharmacists).[41] Learning and development was one of four important factors that influenced the motivation of the health care professionals. Pharmacists had the highest percentage of burnout (32.3% in 2014 and 25% in 2015) among all health care professionals.[41]

Burnout could be caused by increased bureaucracy (eg, administration of patient care and negotiating with health insurance companies). The incentives (CE credits and financial rewards) of the current CE system could also play a role in producing burnout by undermining self-determined motivation for CE.

Globally, contemporary health care demands a highly functioning CE/CPD system so health care professionals can improve and maintain their competencies. Regardless of the system chosen by a country, the key components for an effective CE/CPD system are clear regulations and an independent accreditation structure that monitors the CE/CPD system output. The findings of this study advocate for an educational intervention in the current CE system of the pharmacists in the Netherlands. The study investigators suggest developing a CE/CPD system that focuses on fostering RAM instead of stimulating CM. For example, identifying the learning needs of the health care professionals and providing opportunities for charting personal learning journeys within the CE/CPD structure can help nurture the self-determined motivation of pharmacists.[29-31,42]

The findings of this study imply that in the current CE system and in pharmacy practice, the self-determined motivation of pharmacists to participate in CE activities is decreasing. Because traditional CE does not seem to meet professional development needs adequately, a CPD approach is being implemented in a growing number of countries like Canada, Australia and the United Kingdom. Additional research is needed to develop an effective CPD system wherein the self-regulating skills of pharmacists and thus self-determined motivation is nurtured.

The stimulation and maintenance of self-determined motivation can be achieved through autonomy-supportive educational formats.[29-31,42] Recently, five pillars (context, structure, process, outcomes and impact) and three foundations (science, practice and ethics) of quality for CE in pharmacy were described.[43] Pharmacy regulators and CE providers were alarmed about the responsibility they would have to take in the engagement and future of CE and CPD. Defining skills, competencies and conditions needed for self-directed, lifelong learning could help to fulfill their obligation. Based on SDT and the findings in this study, using an autonomy-supportive educational approach to develop self-regulated lifelong learning is a viable solution. This can be achieved by fulfilling the three basic psychological needs of autonomy, competence and relatedness not only in the construction of a teaching-learning environment, but also in the design and appraisal of regulations for renewal of the license to practice.[29-31,42]

Regulatory bodies should assess CE courses not only on themes of knowledge and competencies, but also on the didactic structure and the autonomy-supportive attitude of the trainers.[37-39,52] Moreover, they could review and audit outcomes of the CE activities according to the accreditation guidelines. These new assessment points would lead to a more consistent and structured CE system and an improvement in the quality of CE activities. These changes would make it possible to monitor the exact impact of the CE system on pharmaceutical care. In turn, CE providers could improve the didactic structures (eg, connecting the learning activity to consistent guidelines and to the participant's personal goals) of the activities and train their trainers in autonomy-supportive teaching skills.[29-31,42]

The factors that play a role in the change of pharmacists' motivation in CE remain unknown. Answers to questions like "what may influence or increase AM?" and "what may influence or decrease CM?" could help design a sustainable and motivating CE system. More research on how pharmacists' motivation in CE is related with their work motivation, vitality and professional performance is needed. Further research is also required to determine if the current CE system is able to fulfill the basic psychological needs of pharmacists for CE, and if and how learning outcomes like professional performance and vitality are related.

This study was conducted at a time when pharmacists in the Netherlands experienced a serious amount of pressure from increasing bureaucracy and decreasing budgets from the government and health insurance companies. This could have had a significant effect on raising the pharmacists' scores on CM. This study focused on the change of pharmacist motivation for almost two years at three time points; however, a fourth time point and a period of five years would have given more information about the development of motivation across time. Short-term effects such as temporary time constraints and new regulations from policymakers could be corrected by having data over a longer time span.

Although the response rates were low, extrapolation of the findings to the larger group seems justifiable because of the demonstrated representativeness of the sample of 72 cases. These response rates seem acceptable for electronic surveys.[40] Further longitudinal research with larger cohorts is recommended.

Further research with actual professional and learning outcomes recorded through performance management tools and objective assessments is also recommended.

CONCLUSION

The Relative Autonomous Motivation (RAM) of Dutch pharmacists for CE decreases over a 21-month period. High scores on RAM indicate a high amount of Autonomous Motivation (AM) and a low amount of Controlled Motivation (CM). According to SDT, AM originates from within an individual and is the desirable type of motivation in contrast to CM, which originates from external factors and is the undesirable type of motivation. Therefore, a decrease of RAM is inexpedient because it indicates a loss of AM in favor of CM. Further research should be conducted to determine the exact role of the current CE system in these changes.

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