RESEARCH

Exploring changes in the motivation of Dutch pharmacists with respect to the current continuing education system: a longitudinal approach

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ABSTRACT

Objectives. Pharmacists' motivation to pursue Continuing Education (CE) and Continuing Professional Development (CPD) plays a pivotal role in the quality of learning outcomes and patient care. Understanding the dynamics of their motivation and what influences them could enable us to design a CE/CPD system that fosters the right type of motivation for CE and CPD.

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 (undesirable) Controlled Motivation had increased and (desirable) 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.

Conclusions. Relative Autonomous Motivation of Dutch pharmacists for CE decreases over time. This indicates a loss of Autonomous Motivation (the "good" motivation) in favor of Controlled Motivation (the "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, Lifelong learning, motivation, pharmacists, Self-Determination Theory

INTRODUCTION

After graduation, pharmacists and other healthcare professionals must 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 healthcare professionals before they start their professional career and not on postgraduate or continuing education. Therefore, not much is known about learning outcomes and the quality of models, approaches and lifelong learning systems for the healthcare workforce.[1]

Continuing Education (CE) and Continuing Professional Development (CPD) are ways for healthcare 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 defined as 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 undergraduates 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 shortages of the pharmacy workforce.[5]

It was not until 2014 that the International Pharmaceutical Federation (FIP) presented a report emphasizing the need for lifelong learning through CE/CPD and the intent to create stronger policies and programs for lifelong learning in Pharmacy.[6] International case studies demonstrate 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 of an effective CE/CPD model is lacking. An important finding of the published case studies was that an annual CE/CPD credit requirement can support pharmacists' CE/CPD participation, but some pharmacists are motivated by the number of credits rather than the relevance of the learning activity for practice.[6]

Earlier studies of pharmacists' participation in and attitudes towards CE/CPD also emphasize motivation both as a facilitator and a barrier.[8-12] Moreover, motivation was found to be a positive predictor for pharmacists' participation in CE.[13] Studies grounded in the Self-determination Theory (SDT) of motivation emphasize the importance of motivation in learning.[13-17] Therefore pharmacists' 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 pharmacists' motivation in CE as a dependent variable across time. We aim to explore the changes in pharmacists' motivation for CE in the Dutch CE

system. Our research questions were: does pharmacists' motivation for CE change over time, how do these changes occur and what demographic factors influence these changes?

METHODS

Setting

Historically, pharmacy education has been provided in 4 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 are 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 a total of 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.

Theoretical background

SDT distinguishes two types of motivation: 1) autonomous motivation (AM) and 2) 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]

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: 1) autonomy (experiencing volition), 2) perceived competence (feeling capable of mastering a task) and 3) 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 learners' 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 for learning to the learners themselves. Autonomy-supportive teaching has been reported to produce optimal learning outcomes.[29-31]

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

AM and CM measure the independent effects of the two primary types of motivation of SDT. We needed a single variable that represents the overall self-determined motivation in a person. Hence we used the relative autonomy index/relative autonomous motivation (RAI/RAM). In the rest of the article we will refer to RAI/RAM as RAM. 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 can be characterized as a mandatory quantity-based (number of credits) CE system. Moreover, a trend is observed wherein financial incentives are provided by health insurance companies and the government in order to stimulate pharmacists' participation in CE. According to SDT these extrinsic rewards in the current CE system are likely to increase CM. We hypothesize that pharmacists' controlled motivation (CM) will increase and therefore relative autonomous motivation (RAM) will decrease across time in the current CE system because RAM will be undermined by extrinsic rewards.

In earlier studies we have found that 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] We, therefore, wanted to explore if these demographic variables could also predict how pharmacists' RAM develops over time.

Study design

We conducted a prospective longitudinal study with Dutch pharmacists. Pharmacists were invited to join this study while they were participating in face-to-face CE activities. These CE activities were organized by the "Netherlands Centre for Post Academic Education in Pharmacy". The participating pharmacists completed a paper-based questionnaire between September 2013 and January 2014 (T0) and signed an informed consent form which gave us permission to approach them for further research. We approached the participants to complete the same questionnaire electronically after nine months (T1: between June and September 2014) and 21 months (T2: between July and September 2015). Four reminders were sent.

Instrument and variables used

Pharmacists' motivation for CE was measured with the Academic Motivation Scale (AMS)[33]. The AMS is based on SDT and has been used in different contexts like secondary schools, universities and medical schools.[34] For the current study, we translated and constructed a Dutch version of the AMS, following the steps specified by the adaptation guidelines for questionnaires.[35] We validated the AMS by conducting factor analysis on T0 scores and computing the reliabilities of all the subscales.

Pharmacists could score the statements on a five-point Likert scale (1-strongly disagree and 5-strongly agree. With these scores we calculated 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)).[15,16] We also collected demographic details like gender, working environment, pharmacy school and work experience.

Data analysis

For the statistical analyses we used SPSS version 23. The MCAR (Missing Completely At Random) test was used to determine to what extent the missing items were a random subset of the data.. Data were imputed with an average of the three items/factor when the fourth was missing.

Mplus version 7.4 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 (in our case 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 our model, we used the following model fit indices with the specified criteria: Chi-square test (p-value > 0.05), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) (both < 0.08), Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) (both >0.9).[38,39]

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

Ethical approval

Ethical approval was obtained from the Ethical Review Board of the Netherlands Association for Medical Education (NVMO) - (file 262).

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 imputing 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). We decided not to impute missing data at T1 or T2 because the missing data consisted of completely missing questionnaires. Consequently we used a complete sample of 72 cases for analysis. This final sample demonstrates reasonable representativeness of the larger sample at T0 (See Table 1).

Latent Growth Modelling

AM and CM, as measured during the study period, both increased from 3.35 (± 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.

We analyzed two different models using: 1) both AM and CM as dependent variables (to observe any possible independent effects of the two primary types of motivation within SDT) and 2) RAM as a dependent motivation variable. Slope variances were fixed to zero in both models. Fit indices for both model 1 and model 2 were good. Model 1 had the following indices: χ^2(df) = 13.159 (15), p = 0.358; RMSEA = 0.037; SRMR = 0.120; CFI > 0.995; TLI = 0.994. Model 2 had the following indices: χ^2(df) = 3.666 (6), p = 0.300; RMSEA = 0.056; SRMR = 0.041; CFI = 0.990; TLI = 0.990.

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. The model diagram of model 1 is shown in Appendix 1.

Because we only had five pharmacy owners in our dataset, we decided to remove ownership versus pharmacy employees as a possible predictor. Consequently we tested gender, working environment, work experience, traineeship and pharmacy school 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. 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 that have been in training for the past two years) significantly influenced the growth trajectory of RAM (intercept - 1.22 with p = 0.02; slope 0.85 with p = 0.01).

Based on our earlier findings about motivational profiles (subgroups based on the combination of AM and CM within an individual), we wanted to explore if we could also find different groups with different growth patterns using Latent Class Growth Analysis. On the LRT, the model with 1 class showed the best fit, which means that no subgroups were found.

In conclusion, our results showed that pharmacists' RAM significantly decreased (slope - 0.38 ; p = 0.002), mostly because CM increased steeply (slope 0.20 ; p < 0.001) over time in the current CE system. No statistically significant subgroups could be found based on differences in RAM development.

DISCUSSION

We found that the pharmacists' motivation for CE changes over a two-year period. Our hypothesis that the pharmacists' relative autonomous motivation (RAM) for CE would decrease over time was supported by our results. It is difficult to ascribe the decrease of RAM only to the characteristics of the mandatory credit-based Dutch CE 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 that 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. 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, we were able to reach 11 by email and phone. Six were still in training and five had finished their training before participating at T1 or T2. We can imagine 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 sub-group, we found that our data fit well into a single class (group) with LGM. This particular group did not emerge as a separate sub-group in the LGM.

In an earlier study, we found that pharmacists' RAM is associated with CE participation.[13] A decrease in RAM could therefore 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] On the other hand, 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 healthcare professionals (e.g., general practitioners, veterinarians and pharmacists).[41] Learning and development was one of four important factors that influenced the motivation of the healthcare professionals. Pharmacists had the highest percentage of burnout (32.3% in 2014 and 25% in 2015) among all healthcare professionals.[41]

Burnout could be caused by the increased bureaucracy, like administration of patient care and negotiating with health insurance companies. We think that 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 healthcare demands a highly functioning CE/CPD system for healthcare professionals in order to improve and maintain their competencies. Regardless of the system chosen by a country, the key components for an effective CE/CPD system remain clear regulations and an independent accreditation structure that monitors the CE/CPD system output. Our findings advocate an educational intervention in the current CE system of the pharmacists in the Netherlands. We suggest developing a CE/CPD system that focuses on fostering RAM instead of stimulating CM. For example, identifying the learning needs of the healthcare 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]

Implications for practice

Our findings 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 the 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 our findings in this study, we would like to suggest using an autonomy-supportive educational approach to develop self-regulated lifelong learning. 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]

We suggest that regulatory bodies 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 uniform 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]

Recommendations for future research

The factors that play a role in the change of pharmacists' motivation in CE are not yet known. Answers to the questions like 'What may influence or increase AM?' and 'What may influence or decrease CM?' could help designing a sustainable and motivating CE system. We recommend research on how pharmacists' motivation in CE is related with their work motivation, vitality and professional performance. 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.

Limitations

The 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. We studied the change of pharmacists' 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 for by having data over a longer time span.

Although the response rates (T1: 29.6% and T2: 24.8%) were low, extrapolation of the findings to the larger group seems justifiable because of the demonstrated representativeness of the sample of 72 cases. Also these response rates seem acceptable for electronic surveys (around 20%).[40] Further longitudinal research with larger cohorts is recommended.

Since we used self-report questionnaires, we recommend further research with actual professional and learning outcomes recorded through performance management tools and objective assessments.

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 this 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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TABLE 1. Demographics of the pharmacists who participated in all three questionnaires (complete cases; N = 72) in comparison with the pharmacists who completed the questionnaire at T=0 (larger sample; N = 425)

Factor variable		Complete cases n (%)	Larger sample n (%)
Gender	Females	50 (69.4%)	245 (57.6%)
	Males	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%)

TABLE 2. Means and standard deviations of autonomous motivation (AM), controlled motivation (CM) and relative autonomous motivation (RAM) at T0, T1 and T2*

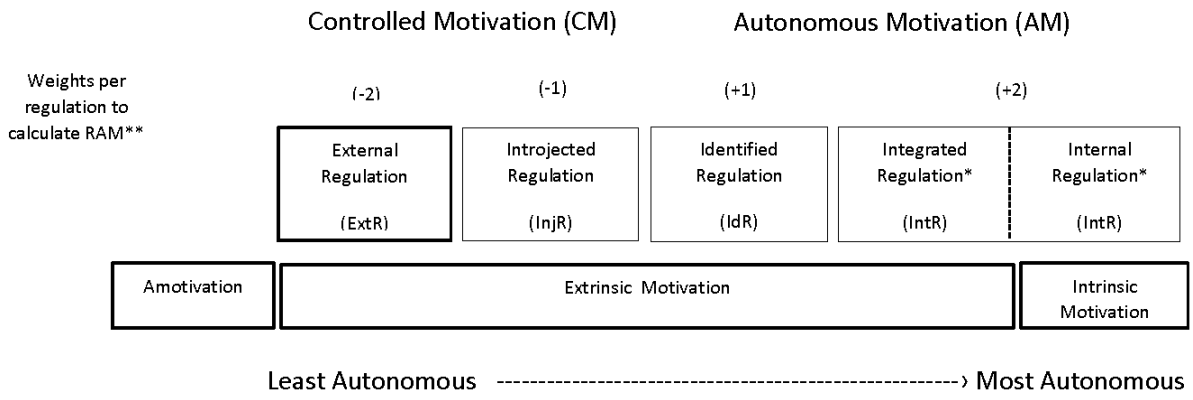
Variable	AM (SD)	CM (SD)	RAM (SD)
	Observed variable values		
T0	3.35 (0.55)	1.87 (0.64)	4.33 (1.84)
T1	3.46 (0.53)	2.13 (0.64)	3.79 (1.59)
T2	3.45 (0.65)	2.23 (0.81)	3.63 (1.92)
	Modeled variable values		
Intercept	3.36	1.89	4.20
(significance)**	(p < 0.001)	(p < 0.001)	(p < 0.001)
Slope	0.07	0.20	-0.38
(significance)**	(p = 0.029)	(p < 0.001)	(p = 0.002)

*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).
** p<0.05 is significant.

TABLE 3. Multiple Regression with demographic effects on the initial value and growth of RAM

	Intercept			**Slope**		
Predictor variable	B ± SE	t	p	B ± SE	t	p
Constant	3.97 ± 0.46	8.58	<0.001	-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;						

FIGURE 1. The Self-Determination Continuum from Deci and Ryan with the main types of motivation: Autonomous Motivation (AM) and Controlled Motivation (CM) and Relative Autonomous Motivation (RAM).

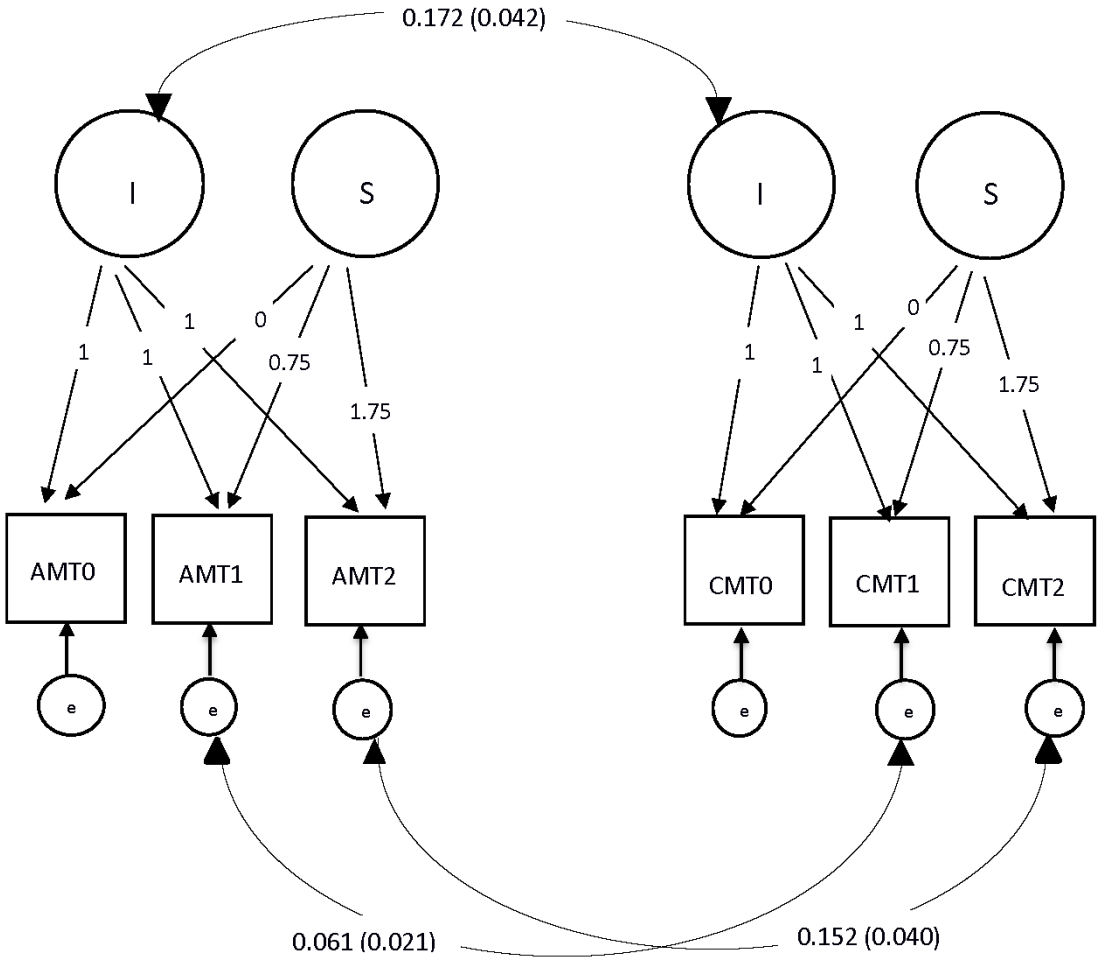


*Integrated and Internal Regulation share the same quality in practice, therefore these two types of regulations are measured together.

**Relative Autonomous Motivation (RAM) = -2x ExtR + -1xInjR + 1x IdR + 2 x IntR

Appendix 1. Latent Growth Model diagram of pharmacists' AM and CM (model 1) across three time points.

MODEL 1



Legend: 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 represents 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 (0.172) with standard error 0.042. AMT1 and CMT1 covary (0.061) with standard error 0.021 and AMT2 and CMT2 covary (0.152) with standard error 0.040. "e" refers to the error variances.