

Effect of an online continuing professional development course on physicians' intention to approach a colleague in difficulty: a mixed-method convergent study

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Abstract

Background: Burnout and psychological distress are prevalent among physicians and can compromise patient safety. Peer support seems to play a protective role against psychological distress, especially among young physicians. However, little is known about training to motivate physicians to approach peers in difficulty, as its effects are often overlooked or evaluated with non-validated tools.

Objective: We assessed the effects of an online continuing professional development (CPD) course aiming to increase physicians' intention to approach a colleague in difficulty.

Methods: Physicians who completed a one-hour asynchronous online continuing professional development course on approaching a colleague in difficulty between March 2022 and May 2024 were invited to participate in this mixed-method convergent study. This e-learning course was designed to increase physicians' confidence in approaching colleagues in difficulty through recognizing signs of psychological distress, offering support, and referring them to appropriate resources. We collected data on participant characteristics and measured their behavioral intention to approach a colleague in difficulty and its determinants pre- and post-course using the validated CPD-REACTION tool. We assessed differences in pre-post mean intention scores using paired t-test ($n=466$) and identified factors associated with post-course intention through multivariate analysis ($n=466$). Four months later, we calculated the proportion of physicians who reported adopting the behavior ($n=61$). Qualitative responses to open-ended questions were analyzed thematically using behavior change models. We also identified behavior change techniques used in the course. Qualitative results were triangulated with quantitative results. We report results following STROBE (quantitative) and SRQR (qualitative) guidelines.

Results: Of the 792 participating physicians, 466 (58.8%) completed questionnaires pre- and post-course. Average age of participants was 48 ± 12.4 years, 43.5% were women, and 86.0% practiced in a specialty. Average pre-course intention was 3.88 ($SD=1.73$) and average post-course intention was 4.92 ($SD=1.40$), for a mean difference of 1.04 (95% CI: 0.91; 1.17, $p<.0001$). Factors associated with intention post-course were beliefs about abilities, social influences, and moral norm ($R^2=0.22$; $p<0.05$). Four months later, 41.0% (95% CI: 28.6% to 54.3%) of participants reported having approached a colleague in difficulty. The three most frequently reported themes as sources of change in intention were belief about abilities, belief about consequences, and knowledge of behavior. Quantitative and qualitative results converged on beliefs about abilities but diverged on beliefs about

consequences. Seven behavioral change techniques were found in the online CPD course: 1) Goal Setting, 2) Increasing Competence, 3) Planning, 4) Persuasive Communication, 5) Behavior-Related Information, 6) Modeling/Demonstration by Others and 7) Behavioral Experiments.

Conclusions: This online CPD course increased physicians' intention to approach a colleague in difficulty. Results highlight beliefs about capabilities as a key determinant of this behavioral intention. The study suggests that online learning has strong potential to raise awareness about peer support and ultimately build a culture of care among healthcare workers.

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Original Manuscript

Effect of an online continuing professional development course on physicians' intention to approach a colleague in difficulty: a mixed-method convergent study

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Abstract

Background: Burnout and psychological distress are prevalent among physicians and can compromise patient safety. Peer support seems to play a protective role against psychological distress, especially among young physicians. However, little is known about training to motivate physicians to approach peers in difficulty, as its effects are often overlooked or evaluated with non-validated tools.

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4.92 (SD=1.40), for a mean difference of 1.04 (95% CI: 0.91; 1.17, $P<.001$). Factors associated with intention post-course were beliefs about capabilities, social influences, and moral norm ($R^2=0.22$; $P<.05$). Four months later, 25 out of 61, 41.0% (95% CI: 28.6% to 54.3%) of participants reported having approached a colleague in difficulty. Frequently reported reasons for intention to adopt behavior were beliefs about capabilities, beliefs about consequences, and knowledge. Quantitative and qualitative results converged on belief about capabilities but diverged on belief about consequences. Seven behavioral change techniques were found in the online CPD course: 1) Goal Setting, 2) Increasing Competence, 3) Planning, 4) Persuasive Communication, 5) Behavior-Related Information, 6) Modeling and 7) Behavioral Experiments.

Conclusion: This online CPD course increased physicians' intention to approach a colleague in difficulty. Results highlight beliefs about capabilities as a key determinant of this behavioral intention. The study suggests that online learning has strong potential to raise awareness about peer support and ultimately build a culture of care among healthcare workers.

Keywords: physicians; continuing professional development; education, medical, continuing; education, distance; helping behavior; psychological well-being; peer support; social support; burnout, professional; occupational stress.

Introduction

Burnout is prevalent among physicians [1-4]. In 2021, the Canadian Medical Association (CMA) reported that half of Canadian physicians experienced at least one symptom of burnout on a weekly basis or more frequently [1]. Burnout impacts physicians' health and can have consequences on patient safety, satisfaction, and physician retention [5, 6]. The "second victim" phenomenon, or healthcare providers' distress after a patient adverse event, can lead to burnout [7, 8]. A patient adverse event is an unexpected but often preventable event which results in consequences for the patient of varying seriousness, including prolonging treatment, causing discomfort, disability, or death [8]. The well-being of healthcare and social service workers is one element of the Quintuple Aim framework, whose goals are to improve population health, enhance care experiences, reduce costs, improve clinician wellbeing, and improve health equity [9].

A 2022 scoping review showed that peer support, informally or formally provided by healthcare providers with similar work conditions and experiences, can help healthcare providers after a distressing patient adverse event [10, 11]. Furthermore, physicians themselves appear to find it the

best form of support [12, 13]. A 2024 trial found a peer support program protected healthcare providers younger than 30 years old from psychological distress, although the effect was not significant overall for all age categories [14]. In another study, a peer support program reduced psychological distress among anesthesia professionals [15].

Components of a peer support conversation, include initial outreach, listening, reflecting, reframing, eliciting the peer's personal coping mechanisms, closing the discussion, and referring the peer to available resources [16]. Experts recommend that peer supporters should receive training on listening skills, psychological first aid, and information about referral options, in order to fulfill their role adequately [17]. Many peer support programs and courses for peer supporters are available [12, 18-26]. However, evaluation of the effect of these courses is often omitted in program evaluations or else assessed using cross-sectional surveys with non-validated measures [12, 18-26]. Furthermore, most courses studied are in-person workshops rather than online continuing professional development (CPD) courses [12, 18-26]. Therefore, we sought to assess the effect of an online CPD course on the intention of physicians to approach a colleague in difficulty using a mixed-method convergent research design and validated measures. We also analyzed why participants considered approaching a colleague in difficulty by conducting thematic analyses of qualitative data and triangulating these findings with quantitative results.

Method

Study Design

We used a mixed-method convergent research design to triangulate results obtained from quantitative and qualitative methods [27]. Quantitative analysis involved a quasi-experimental before-and-after study design to evaluate the effect of an online CPD course, which is part of the CPD program of the Fédération des médecins spécialistes du Québec (FMSQ). In this design, measurements before the CPD course served as comparators for the same measurements taken after the CPD course for the same participants [27]. We analyzed open questions with a qualitative thematic deductive approach to understand why participants considered integrating the targeted behavior into their professional practice [27]. For both quantitative and qualitative analyses, we used Godin's integrated model for predicting health professionals' behavior as a conceptual framework [28], and we used Michie's Behavior Change Techniques conceptual framework to explore our qualitative data in detail [29]. As shown in Figure 1, these frameworks share the concept that behavioral determinants lead to behavior adoption [28-30]. Both originate from Ajzen's Theory of Planned Behavior and have many behavioral determinants in common [28-30]. Michie et al. also propose that behavior change

techniques (BCTs) can influence and target behavioral determinants which in turn translate into behavior change [29]. Details on these two models are available in Multimedia Appendix 1. We obtained ethical exemption from a hospital ethics committee (Comité d'éthique de la recherche sectorielle en santé des populations et première ligne – CIUSSS de la Capitale-Nationale under project #2025-3127). We reported results following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline for quantitative results [31] and used the Standards for Reporting Qualitative Research (SRQR) for qualitative results [32].

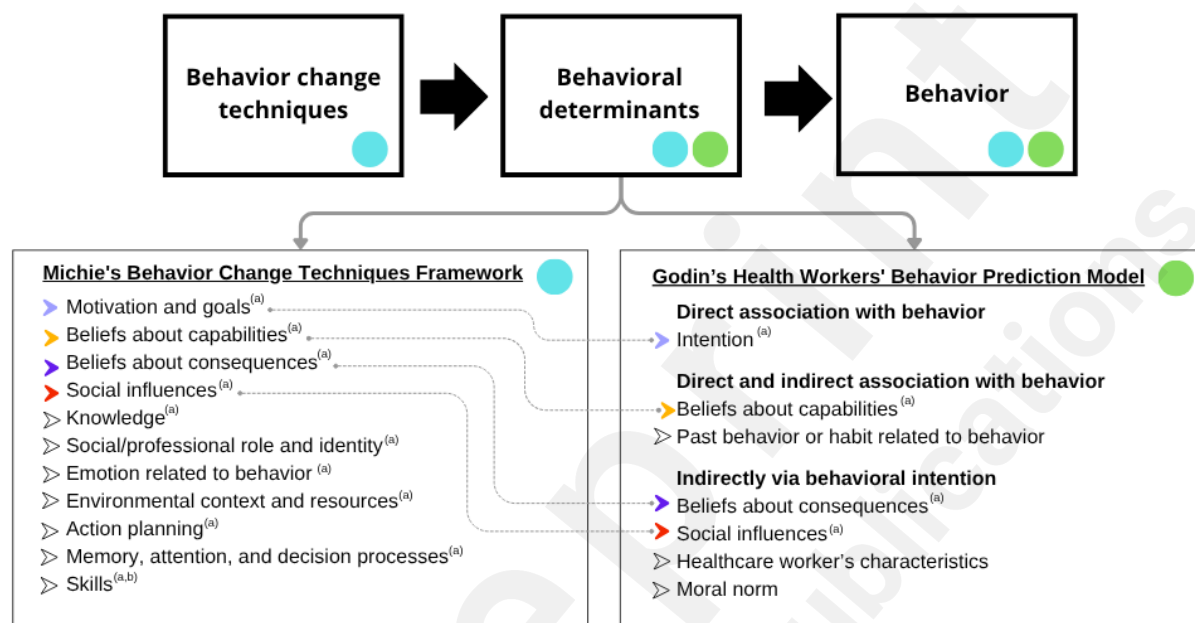


Figure 1. Framework combining Godin's integrated model for predicting health professionals' behavior and Michie's Behavior Change Techniques Framework [29, 30]

- (a) Possible domains targeted by behavioral change techniques (BCTs) (e.g. Planning, Persuasive Communication).
 (b) Skills are not measured in this study as we did not directly observe physicians' behavior

Participants and Recruitment

Targeted participants were mainly specialists from the FMSQ membership. However, general practitioners who subscribe to the FMSQ's online learning platform MÉDUSE could also participate in the study. The study population was physicians who registered for the course from March 1, 2022 to June 20, 2024 and who completed an online consent form. After registering, participants were informed about the study via a system-generated message displayed at the beginning of the online course. Physicians volunteered to participate and received no financial compensation. The CPD course was not mandatory but was recognized by the Royal College of Physicians and Surgeons of Canada as a one-hour group learning credit (Section 1)[33]. This convenience sampling was based on time constraints and access to MÉDUSE. Inclusion criteria were being a licensed physician in Quebec and participating in the online CPD course. There were no exclusion criteria.

Intervention

We describe the intervention according to the Template for Intervention Description and Replication (TIDieR) guidelines [34]. The intervention was a one-hour asynchronous online CPD course developed by the FMSQ to help physicians approach colleagues in difficulty (e.g. burnout, psychological distress, second victim symptoms) as form of peer support. The term “colleague” included anyone in the health and social services sector, including administrative staff. The scientific committee was comprised of three physicians, two of whom had peer support experience through their work with the Québec Physicians’ Health Program (QPHP). The QPHP organization also helped with course design. A scenario-based video, filmed with professional actors, illustrates the QPHP’s 5-Step Caring Approach; 1) Becoming Aware of Context and Stressors 2) Recognizing the Warning Signs 3) Initiating a Conversation with the Colleague 4) Providing Compassionate Support 5) Respecting Your Own Limits and Practicing Self-Care [35]. Approaching a colleague in difficulty corresponds to Tier 1 of the Scott Three-Tier Model of Support which includes immediate team members of a healthcare worker experiencing distress [36]. A CPD expert with more than 10 years of experience (MT) used Godin’s integrated model for predicting health professionals’ behavior [28] for the instructional design to increase participants’ willingness to approach a colleague in difficulty. For instance, the model was used to increase participants’ beliefs in the consequences of approaching a colleague in difficulty. In the first module of the course, viewers are shown how a compassionate approach, which enables a colleague to share emotions related to stressful situations, can help mitigate the impact of these sources of stress. In the second module, physicians are shown the negative consequences that may occur if a colleague in difficulty is not helped or if help is delayed. Participants completed an intervention plan during the CPD course to use when approaching a colleague at their workplace. Other educational strategies include a narrated module, knowledge-check questions, additional readings, and reflective writing, which often refers back to the scenario shown in the video. During the online course, physicians were also provided with a self-evaluation tool to identify when they, or a colleague, may need help. The tool provides individual strategies to maintain or improve mental health at each step along the continuum from being healthy to having critical mental health [37]. During the course, participants have the option of downloading ten summaries (ranging from one to three pages) of course content or supplementary materials [35, 37-44]. Bloom’s taxonomy defined the course’s learning objectives [45]. The CanMEDS role targeted by this course was the professional role, specifically with the objective of emphasizing the commitment to physicians’ health and well-being which will ultimately promote optimal patient care

[46]. The CanMEDS framework highlights essential skills throughout medical practice, providing guidance for medical education and ongoing professional development for practicing physicians, all within a competency-based approach [46]. The course was made available on MÉDUSE, the FMSQ's online CPD platform [47]. Physicians completing the course were sent an automated reminder after 2 weeks of inactivity and the unfinished course remained available on the physicians' dashboard on MÉDUSE as a reminder for them to complete it.

Outcomes

The main outcome was the intention of physicians to approach a colleague in difficulty. Godin defined intention, from the work of Ajzen and Fishbein on the Theory of Reasoned Action, as the motivation to adopt a specific behavior [28]. In our study, this targeted behavior is approaching a colleague in difficulty.

Intention to adopt a behavior is a precursor of behavior adoption in the integrated behavior change model for health professionals model [28]. Although intention is not a perfect proxy for future behavior, directly observing peer support behavior among healthcare workers is neither feasible nor ethical, as these conversations are sensitive and confidential. Using self-reported behavioral intention as a proxy allowed for a practical and more timely evaluation of the CPD course [48]. Self-reported behavior four months after course completion was also measured but not used as a primary outcome because there is often a loss to follow-up when measures are not taken soon after course completion [49].

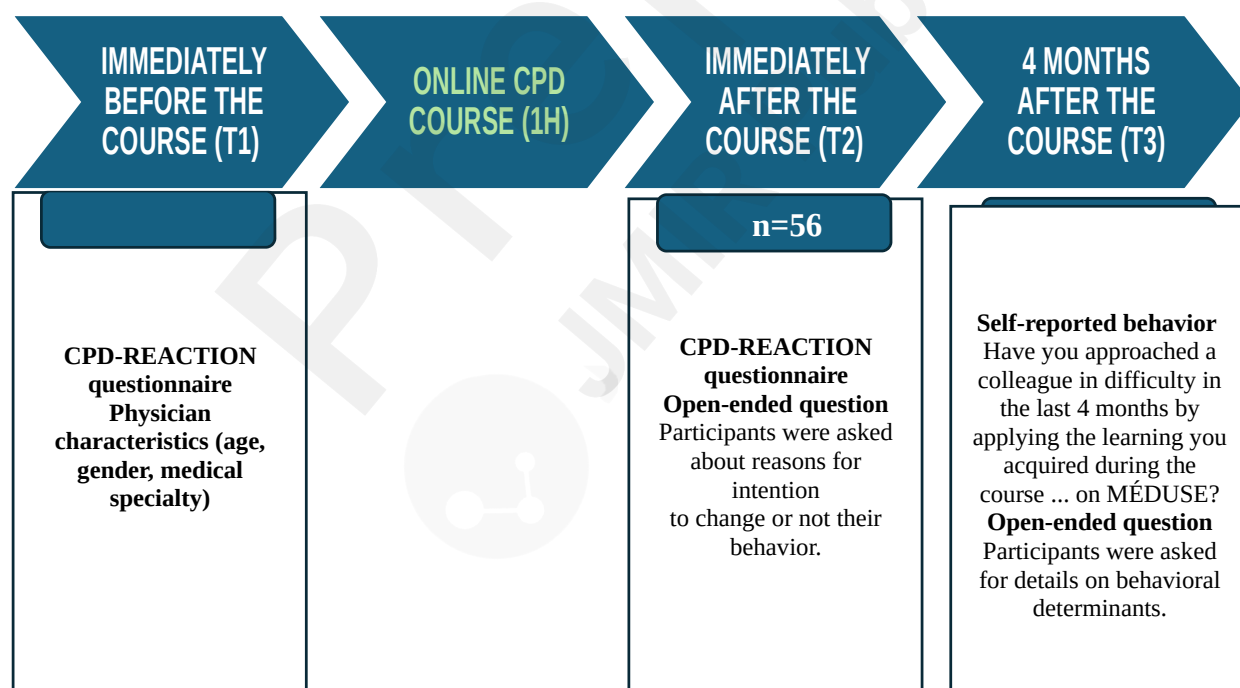
Data Sources and Measurements

Our data came from three sources: 1) quantitative data, 2) qualitative data, and 3) access to course content (Figure 2). The FMSQ collected physicians' responses on the MÉDUSE platform from March 1, 2022, to June 20, 2024. Physicians filled in online self-administered questionnaires immediately before the course (T1), immediately after the course (T2), and four months after the course (T3) (Figure 2). Questionnaires at T1 and at T2 were administered via a system-generated message displayed at the beginning of the online course and questionnaire at T3 was sent automatically by email by the MÉDUSE online platform. These questionnaires are available in Multimedia Appendix 2. Before each questionnaire, a consent form detailed the objective and intended use of the collected data for research. We measured physicians' intention to approach a colleague in difficulty (dependent variable) and the determinants of this intention before and immediately after the CPD course (T1 and T2). At T1, we also collected data on the age, gender, and

medical specialty of participants using an online questionnaire developed by the FMSQ. At T2, we asked participants open-ended questions on why they intended or not to make a change to their practice. Finally, we measured their self-reported behavior of approaching a colleague in difficulty four months after course completion (T3) and collected open-ended responses about perceived barriers to adoption of behavior.

We used the French version of CPD-REACTION, a tool whose constructs were developed through a systematic review and whose items were validated using factor analysis. Based on Godin's integrated model for predicting health professionals' behavior, the instrument measures intention to adopt a behavior and four determinants of intention [30, 50, 51]. It comprises 12 items grouped into five constructs: intention to adopt a behavior (2 items) and four determinants of intention: 1) moral norm (2 items), 2) beliefs about capabilities (3 items), 3) beliefs about consequences (2 items), and 4) social influence (3 items) [51]. Each construct is determined by averaging 2 or 3 items from the instrument [51]. The Cronbach's alpha coefficients for each construct range from 0.79 to 0.89 [51], indicating good reliability [52].

Figure 2. Data Sources and Collection



Data Analysis

For both quantitative and qualitative analyses, we used Godin's integrated model for predicting health professionals' behavior as a conceptual framework [28]. In addition, we used Michie's

Behavior Change Techniques conceptual framework to explore our qualitative data in detail [29].

Participants' Intention and its Determinants to Approach a Colleague in Difficulty, Pre- and Post-Course

First, we performed descriptive statistics for all variables, including participant characteristics. Then, we calculated the difference between the pre- and post-intention mean for each participant using paired *t*-tests, assuming normality given our large sample size [53]. To confirm the robustness of the results we also calculated the statistical significance of intention difference using a non-parametric Wilcoxon signed-rank test [54]. We did the same for each of the four determinants of intention to adopt new behavior (social influences, beliefs about capabilities, beliefs about consequences, and moral norm). Finally, we verified that the results did not differ according to participants' survey response pattern or participant characteristics (gender, age, and domain of practice). We adopted the age categories used by the CMA in their survey on the wellness of Canadian physicians and medical learners, to facilitate comparison and potentially help explain certain findings. We adopted the age categories used by the CMA in their survey on the wellness of Canadian physicians, as these categories reflect different stages of a medical career [55]. We calculated Cohen D values to estimate effect size (clinical significance) by dividing the mean by the combined standard deviation to measure the effect size [56].

Predicting Intention Post-Course

To predict intention to approach a colleague in difficulty after the course, we built a multiple linear regression model [57]. Behavioral intention was the dependent variable, while the four determinants of this intention and three socio-demographic characteristics (age, gender, domain of practice) were independent variables. We included age as a categorical variable since that variable did not respect the postulate of linearity. Using the full model approach [58], we included all candidate variables based on Godin's model [28]. Using the stepwise selection method, variables with a coefficient *P*-value greater than .05 were successively eliminated for a more parsimonious model [59]. Sensitivity analyses were performed at critical alpha values of .10 or .20 to verify if different choices changed the predictive performance of our model or the variables included in the final model. We checked for collinearity, normality of residuals, homoscedasticity and linearity of residuals.

Most participants were already recruited so the sample size could not be changed. Therefore, we performed a post-hoc power analysis. Based on two studies examining the effect of CPD courses on physicians' intentions to adopt new behaviors, we should have been able to detect a mean difference

of at least 0.5 in intention before versus after the course [49, 60]. The statistical power of our paired *t*-test for the primary outcome (mean difference in intention) was 99.9% at a significance level of $\alpha = .05$ to detect this mean difference of at least 0.5. This indicates that the sample size used in this study was sufficiently large to detect a meaningful effect. We analyzed all quantitative data with SAS 9.4 software. We performed verification with non-parametric tests using R software.

Physicians' Reasons for Intention to Adopt the New Behavior from Qualitative Data

Through open-ended questions, physicians were asked about reasons for intention to adopt the new behavior as well as factors influencing non-adoption of the behavior four months later. The answers were analyzed using a thematic deductive approach [27]. We created an initial codebook by integrating two conceptual frameworks: Godin's integrated model for predicting health professionals' behavior [28] and Michie's Behavior Change Techniques with their respective behavioral domains [29]. Using the Nvivo 15 software, two researchers (FLIZ and EL) organized 10% of the data into themes, adding a few emergent themes inductively to the framework. We documented these choices in a journal held by FLIZ. The two reviewers (FLIZ and EL) then coded data independently for greater credibility of the results and compared their analyses [27, 61]. To obtain consensus on results, any coding differences between the two reviewers were resolved through discussion with a third whose main expertise was qualitative analysis (RDC).

Triangulating Quantitative and Qualitative data

We triangulated quantitative and qualitative data to enhance the credibility and validity of the research findings and offer practical theory-based recommendations for CPD course development on peer support [27, 62]. We compared four determinants of intention, measured with CPD-REACTION and obtained using quantitative methods, to the reasons for intention to adopt the new behavior or not obtained using qualitative methods [27, 62]. We observed where results converged, diverged, or provided additional information [62].

Self-reported Behavior Adoption Four Months After CPD Course

We calculated the proportion of physicians who self-reported approaching a colleague in difficulty four months after the online CPD course. We compared the mean intention of those who adopted the behavior with those who did not, using Wilcoxon rank tests due to the small sample sizes of the data at T3 and verified the results using paired *t*-tests.

Identifying Behavioral Change Techniques Present in Course

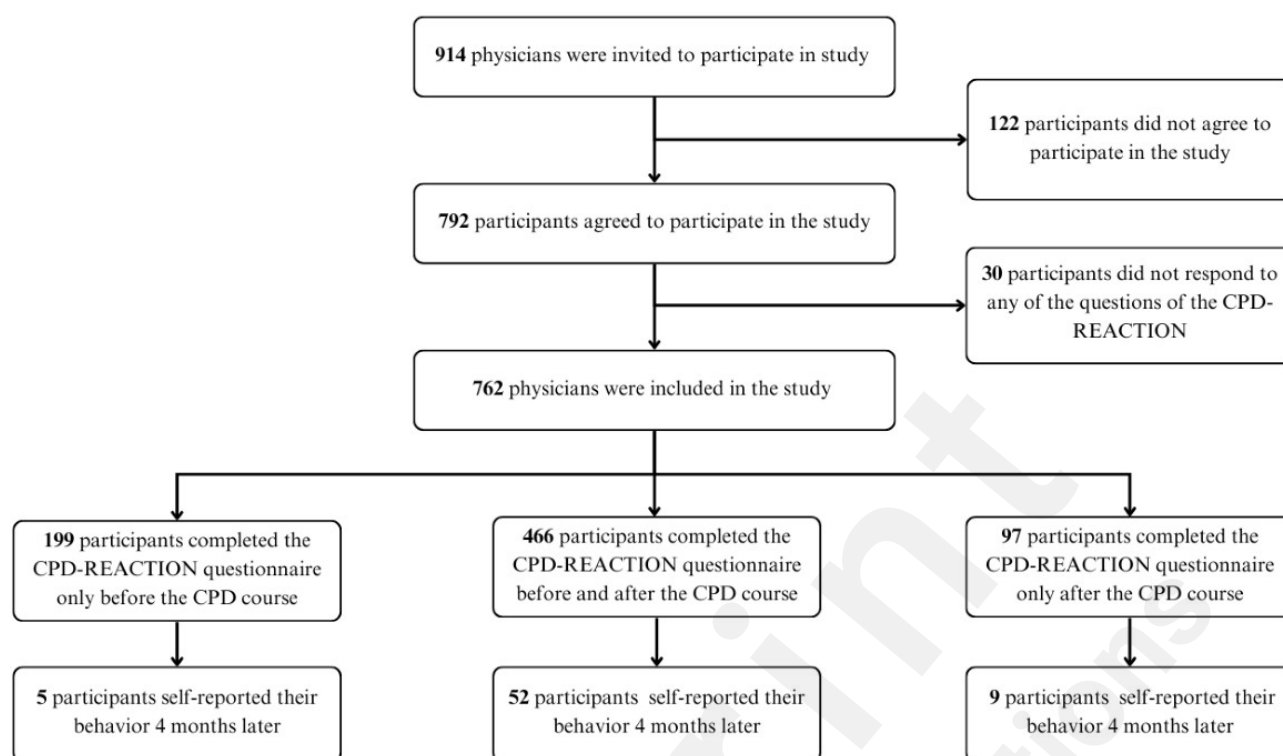
We developed an observation grid (see Multimedia Appendix 3) from the conceptual framework by Michie et al[29]. Using this grid, two independent reviewers (FLIZ and EL) identified behavioral change techniques (BCTs) present in the online CPD course. We analyzed whether the behavioral domains targeted by the BCTs identified in the course were the same as the determinants of intention that had significantly changed after the CPD course. This analysis explored which components of the course might be the active ingredients in changing physicians' behavioral intentions.

Results

Participant Flow and Characteristics

During the 28-month study period, 914 physicians were invited, of whom 792 (87%) agreed to participate (Figure 3). Thirty participants were excluded as they did not answer a single CPD-REACTION questionnaire item. We performed analyses on the 466/762 (61%) participants who completed the CPD-REACTION questionnaires before and after the course (T1 and T2). Finally, frequency of self-reported behavior was calculated on the 61/762 (8%) participants who completed both the self-reported behavior change questionnaire four months after the course (T3) and the CPD-REACTION questionnaire immediately after the CPD course (T2). We excluded five participants who did not complete the post-course survey (T2) from the analysis of data at T3, as it was only at T2 that we could verify their completion of the course.

Figure 3. Study flow chart



Among the participants, the female-to-male ratio was approximately one-to-one, and the majority of physicians (655 out of 762, or 86%) were specialists (Table 1). The average age of participants was 48 ± 12.4 years, 43.5% were women, and 86.0% practiced in a specialty. Physicians who responded both before and after the course ($n=466$) had similar socio-demographic characteristics. We do not have the socio-demographic characteristics of the 97 physicians who responded only to the T2 questionnaire without responding to the T1 questionnaire.

Table 1. Characteristics of participants

Socio-demographic characteristics of physicians	Total (n= 762)	Participants who completed the CPD-REACTION questionnaire before and after the CPD ^a course (n=466)
Gender	n (%)	n (%)
Female	332 (43.5)	241 (51.7)
Male	325 (42.7)	222 (47.6)
Other/non-binary/prefer not to disclose	8 (1.1)	3 (0.7)
Missing	97 (12.7)	0 (0)
Domain of practice	n (%)	n (%)
Surgical specialty	293 (38.5)	208 (44.7)
Laboratory specialty	102 (13.4)	71 (15.2)
Medical specialty	246 (32.3)	169 (36.3)
General practitioner	10 (1.3)	9 (1.9)
Non-specified specialty	14 (1.8)	9 (1.9)

Missing	97 (12.7)	0 (0)
	Mean (SD ^b)	Mean (SD)
Age (in years)	Total = 665	n= 466
	48.1 (12.4)	48.6 (12.3)

^a CPD: Continuing professional development
^b SD: Standard deviation

Participants' Intention (and its Determinants) to Approach a Colleague in Difficulty, Pre- and Post-Course

Intention means increased from 3.88 (SD=1.73) before to 4.92 (SD=1.40) after the course, as measured on a scale of 1 to 7. This mean difference increase of 1.04 ($P<.001$) is statistically significant (Table 2). This one-point increase was also clinically significant, with a Cohen D value of .72 representing a moderate effect size. Bivariate analyses of changes in the four determinants of intention (social influences, beliefs about capabilities, beliefs about consequences and moral norm) were all statistically significant ($P<.05$). Determinants of intention (beliefs about capabilities, social influences, and beliefs about consequences) increased by statistically significant mean differences ranging from 0.14 to 0.85. Moral norm decreased by a statistically significant mean difference of 0.30 ($P<.001$). Lower extreme values after the CPD course did not explain the decrease in moral norm. The mean differences for social influences and beliefs about capabilities had moderate effect sizes. The effect size on the decrease in moral norm was small, and the effect size on beliefs about consequences was not clinically significant (Table 2). Mean intention and determinants of intention were similar whether participants had responded to both questionnaires (T1 and T2) or to only one questionnaire (Multimedia Appendix 4).

Table 2. Comparison of behavioral intention before and after the CPD course

CPD-REACTION constructs ^a	Before CPD ^b course		After CPD ^b course	Before versus after CPD ^b course			
	n	Mean (SD ^c)	Mean (SD ^c)	Mean Difference (CSD ^d)	CI 95%	P-value ^e	Cohen d ^f
Intention	455	3.88 (1.72)	4.92 (1.40)	1.04 (1.45)	0.91; 1.17	<.001	.72
Beliefs about capabilities	459	4.65 (1.17)	5.49 (0.74)	0.85 (1.11)	0.74; 0.95	<.001	.77
Moral norm	462	6.09 (1.04)	5.79 (0.77)	-0.30 (1.06)	- 0.40; -0.21	<.001	.28
Social influences	464	3.36 (0.99)	3.81 (0.99)	0.45 (0.74)	0.38; 0.52	<.001	.61

Beliefs about consequences	465	5.53 (1.04)	5.67 (0.65)	0.14 (0.90)	0.06; 0.22	<.001	.16
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^a Response scale of CPD-REACTION questionnaire ranging from 1 to 7

^b CPD: Continuing professional development

^c SD: Standard deviation

^d CSD: Combined Standard deviation

^e Paired *t*-test, *P*-value in bold = significant (at alpha of .05)

^f Estimates of effect size, <0.2 = no significant effect, 0.2 to 0.5 small effect size, 0.5 to 0.8 medium effect size, > 0.8 large effect size (52)

The increase in the mean difference of intention was approximately one point and was statistically significant for all categories of gender, age, and domain of practice (laboratory, surgical and medical domains) with at least ten participants (Multimedia Appendix 5). We did not interpret subcategories containing fewer than ten participants (e.g. general practitioners). Results of the multiple linear regression model confirmed that the intention difference was not modified by gender, age, or domain of practice when all variables were included in the same model (Multimedia Appendix 6).

Predicting Intention Post-Course

After manual backward stepwise selection, we excluded age, domain of practice and gender from the final model due to *P*-values greater than .05 globally in each category. In the final multivariate regression analysis model, beliefs about capabilities ($\beta=0.52$, $P<.001$), social influences ($\beta=0.27$, $P<.001$), and moral norm ($\beta=0.26$, $P<.03$) predicted physicians' intention to approach a colleague in difficulty (Table 3). Our model accounted for 22% of the variance of intention after course. The full model is available in Multimedia Appendix 7. As shown, statistical significance regarding beliefs about consequences changed depending on other included variables (Multimedia Appendix 7). Sensitivity analyses verified the stability of the other variables and showed consistent results if we also included physicians who had not responded to the CPD course questionnaire (Multimedia Appendix 8).

Table 3. Predictive factors of physicians' intention to approach a colleague experiencing difficulties

Determinants of intention	n	β	CI 95%	<i>P</i> -value
$R^2=0.22$				
Beliefs about capabilities	457	0.52	0.28; 0.75	<.001
Social influence	457	0.27	0.15; 0.39	<.001
Moral norm	457	0.26	0.03; 0.48	.03

Postulates of independence of observations and homoscedasticity were respected. Postulates of

normality and linearity of residuals were not respected. We verified the correlations between the independent variables and found they did not explain our model's low predictive capacity (Multimedia Appendix 9).

Physicians' Reasons for Intention to Adopt the New Behavior from Qualitative Data

Of the 251 open-ended responses related to behavioral intentions (T2), 153 verbatims expressed clear behavioral intentions (e.g., "I will help my peer"), 10 showed hesitation (e.g., "I will try to"), 89 described reasons for intention to approach a colleague in difficulty (e.g., "I realize more fully my ability to act"), and 8 referred to other related behaviors. The above categories are not mutually exclusive. Physicians most frequently intended to 1) be more attentive to their colleagues' signs of distress, 2) approach a colleague with kindness or to help or support a colleague and 3) be more available or listen more to colleagues (Multimedia Appendix 10). The reasons for intention to change behavior physicians most frequently were beliefs about capabilities, beliefs about consequences, and knowledge of the behavior (Table 4).

Table 4. Reasons for intention to adopt new behavior of approaching a colleague in difficulty

Reasons for intention to adopt new behavior	Representative excerpts of quotations.	n
Beliefs about capabilities	"I realize more fully my ability to act."	41
	"I have more tools to approach a colleague in difficulty."	
	"I feel more comfortable doing it."	
Beliefs about consequences	"This limits the consequences for the colleague and the team."	16
	"To improve the collegiality of my department."	
	"I think that the current context of healthcare depends on the support we provide to our colleagues, so it is essential to do it."	
Knowledge	"Better knowledge of how to detect a colleague's distress	11

	and how to intervene in such cases."	
	"Better understanding of the approach."	
	"I will better assess where my colleague stands on the distress scale."	
	"Necessary with my hospital duties."	
Social/professional role and identity	"Feeling more legitimized to approach a colleague in difficulty."	6
	"Better understanding and responsibility of collegiality."	
	"I like the idea that doing nothing is not an option."	
Moral norm	"Not acting is not an option."	5
	"...understanding that some approaches may be better than others, but anything is better than doing nothing."	
Past behavior or habit related to behavior	"It has provided me with new tools to continue supporting colleagues in difficulty."	
	"I already apply many similar principles."	4
	"Continue to approach my colleague when they seem to be having difficulties."	
	"Being more willing to get uncomfortable."	
Emotion related to behavior	"It reassures me."	3
	"I feel more equipped and reassured about my reflections."	
Environmental context and resources	"Colleague to help."	2
	"Frequent problem."	
Action planning	"Do not procrastinate."	2
	"Do not hesitate to create opportunities outside of work."	
Memory, attention, and decision processes	"Because I realize that often, I get too absorbed in my professional or personal concerns to look around me."	1

Being a witness allows for perspective and a new outlook."

The reasons physicians gave for not wanting to change their practice were mostly related to their past behavior, for example, that they were already helping a peer and thus had already adopted the behavior (Multimedia Appendix 11). Other reasons for not intending to change behavior were their environmental context (e.g., "I'm now in solo practice") and that helping a peer was unrelated to their medical practice. Four months after the CPD course, the behavioral determinants most frequently given for not approaching a colleague in difficulty were having had no occasion to adopt the behavior, having no colleagues in difficulty and not being actively in practice or not being in full-time practice (Multimedia Appendix 12).

Triangulated Quantitative and Qualitative Data

Qualitative and quantitative results showed most physicians were motivated to approach a colleague in difficulty following the online CPD course. Both qualitative and quantitative results pointed to beliefs about capabilities as being an important determinant of intention. Beliefs about consequences was an important theme in the qualitative data, but it was not an important determinant of post-course intention to approach a colleague in difficulty. Sensitivity analysis of the 251 physicians who provided open-ended responses related to behavioral intentions (T2) also showed a divergence regarding beliefs in consequences between qualitative and quantitative results.

Self-reported Behavior Adoption Four Months After CPD Course

Among the 66 physicians who completed the self-administered questionnaire at T3, 61 had completed CPD-REACTION immediately after the course. Of these, 25 out of 61, 41.0% (95% CI: 28.6 to 54.3%) physicians reported approaching a colleague in difficulty in the four months following the CPD course. Those who adopted the behavior had a mean intention after the CPD course of 5.40 (SD=1.01) and those who did not adopt the behavior had a mean intention of 5.00 (SD=1.40). This 0.4 (SD=1.26, $P=.24$) mean behavioral intention difference is not statistically significant.

Behavioral Change Techniques Identified as Present in the Course

Seven behavioral change techniques (BCT) were found in the online CPD course: 1) Goal Setting, 2)

Increasing Competence, 3) Planning, 4) Persuasive Communication, 5) Behavior-Related Information, 6) Modeling/Demonstration by Others and 7) Behavioral Experiments (Table 5). Of these BCTs, four were related to behavioral intentions, three involved competence, two involved behavioral regulation and two were related to beliefs about consequences (Multimedia Appendix 13). Beliefs about capabilities, knowledge, social influences, and memory, attention, and decision processes were each targeted by one BCT.

Table 5. Behavioral change techniques identified in the CPD course

Behavioral Change Technique	Definition	Domains targeted
Goal setting	Clearly indicate the targeted behavior.	Competence, Behavioral Intention, Behavioral Regulation
Increasing Competence	Problem-solving, decision-making, goal setting.	Competence, Beliefs about Capabilities, Behavioral Intention
Planning	Identify the components of the behavior and establish a plan to execute each of them or consider when and where a behavior will be performed, i.e., schedule behaviors.	Memory, Attention, and Decision Processes, Behavioral Regulation
Persuasive Communication	A credible source presents arguments in favor of the behavior. Note, there must be a presentation of arguments; general pro-behavior communication does not count.	Beliefs about Consequences, Behavioral Intention
Behavior-Related Information	Provide information about the antecedents or consequences of the behavior, or about the connections between them, or about behavior change techniques.	Knowledge, Beliefs about Consequences, Behavioral Intention
Modeling/Demonstration by Others	Observe the behavior of others.	Competence, Social Influences
Behavioral Experiments	Ask individuals to test hypotheses about the behavior, its causes, and its consequences by collecting and interpreting data. Includes personal experiences.	No consensus on targeted domains

Discussion

Principal Findings

We assessed the effect of an online CPD course on physicians' intention to approach a colleague in difficulty and analyzed why participants considered integrating this peer support approach or not into their practice. Mean behavioral intention increased significantly after the course. Post-course, significant determinants of intention were social influences, beliefs about capabilities, and moral norm. Most frequently stated reasons for intention to change behavior were beliefs about capabilities, beliefs about consequences, and knowledge of behavior. Triangulation showed an alignment of our quantitative and qualitative results on beliefs about capabilities as a key factor but diverged slightly on beliefs about consequences. In the four months following the CPD course, 25 out of 61 or 41.0% of physicians reported approaching a colleague in difficulty. There was no significant difference in the intention to approach a colleague in difficulty between physicians who adopted this behavior at the 4-month follow-up and those who did not. Those who did adopt the behavior had a non-statistically significant higher intention after the CPD course than those who did not. Finally, we identified seven behavioral change techniques (BCTs) in the online CPD course: 1) Goal Setting, 2) Increasing Competence, 3) Planning, 4) Persuasive Communication, 5) Behavior-Related Information, 6) Modeling/Demonstration by Others, and 7) Behavioral Experiments. These results lead us to make the following observations.

Comparison of Participants' Behavioral Intention Pre- and Post-Course With Prior Work

First, we found that, on average, physicians reported a stronger intention to approach a colleague in difficulty after completing the CPD course compared to before. This one-point intention increase was statistically significant and also clinically significant, having a moderate effect size. This suggests that the CPD course motivated physicians to approach colleagues in difficulty. Enhancing peer support among physicians through CPD courses is particularly important as it can play a protective role regarding psychological distress in physicians [14, 15].

Also, to the best of our knowledge, this one-point intention increase represents a greater increase in intention than what has been observed in most studies using the CPD-REACTION to evaluate changes in health professionals' intentions following an intervention [49, 60, 63-72]. The before-after difference of intention was more than double the difference observed in a study by Ayizi-Vinz's and al. who evaluated intention before and after nine online CPD courses taken by Quebec physicians, all on other topics than this one [60]. The confidence intervals of difference in intention between their

study and ours do not overlap [60]. Thus, the observed difference between the two studies is statistically significant. An important difference is that Godin's integrated model for predicting health professionals' behavior was used by the senior instructional designer (MT) to design the course, while the 9 courses in Ayizi-Vinz's and al.'s study were developed by physicians who may not have used behavior change models in course design. This may give support to the importance of using theory to produce CPD courses. Another explanation is that pre-intervention intention among the Quebec physicians in Ayivi-Vinz's & al.'s study was already high at 5.5 out of 7 [60], while in ours it was 3.9 out of 7, and thus there was more room for improvement. Overall, this result suggests that there are benefits of using behavior change theories, especially for CPD courses targeting behaviors that physicians are initially less inclined to adopt. It also suggests that it is possible to increase behavioral intention in physicians using online training formats.

Change in Determinants of the Intention to Approach a Colleague in Difficulty

Social influences, beliefs about capabilities, and beliefs about consequences increased, while moral norm decreased. Moral norm had the highest mean among the four determinants of intention both before and after the intervention, indicating that participants already felt a moral obligation to adopt the targeted behavior and thus there was little room for improvement. Also, the apparent decrease has a small effect size which may not translate into clinical significance. Nevertheless, further qualitative data analysis is needed to explore this result. Analyzing which behavior change techniques target moral norm would also be important as this is not studied by Michie and her collaborators [29].

No Modifying Effect of Age, Gender or Domain of Practice on Main Outcome

Second, we also examined whether participant characteristics modified the impact of the course on their behavioral intention. The before-after intention difference was the same regardless of age, gender and domain of practice (laboratory, surgical and medical domains). Thus, the course successfully reached physicians regardless of their sociodemographic characteristics and does not need to be adapted for a specific population. For example, a previous study found that surgeons were the least likely physicians to use peer support [24], hence the importance of our finding that surgeons as well responded favorably to the online CPD course.

Comparison of Determinants of Intention Pre- and Post-Course With Prior Work

Third, we found that determinants of intention to approach a colleague in difficulty after the CPD course included social influences, beliefs about capabilities, and moral norm. Beliefs about capabilities was the strongest predictive variable of the intention to approach a colleague in

difficulty. This means improving physicians' perception of their self-efficacy in adopting a behavior, as well as their perceived control over performing that behavior, is important to motivate them to approach a colleague in difficulty. Thus, CPD course developers should target beliefs about capabilities through BCT for peer support training. Beliefs about capabilities was also the most significant determinant of intention in Godin's systematic review on healthcare workers' behaviors [30]. BCTs that are known to be effective for this include: 1) increasing skills, 2) coping strategies, 3) repetition or practice of the behavior, 4) feedback, 5) planned self-affirmations, 6) motivational interviewing and 7) graded tasks (starting with tasks that are easy to accomplish and gradually making them more difficult). In previous studies, beliefs about capabilities, moral norm, and beliefs about consequences were all predictive of intention to adopt behaviors related to patient care (e.g. "Prescribe opioids in a safe manner when managing perioperative pain in my patients") post-course [49, 60]. Our results differ slightly from these, with social influence also being predictive of this intention. Approaching a colleague in difficulty is a social behavior that can be adopted by a whole departmental team [19]. Our results suggest that the social context may be a more important influence on team-based behaviors than on clinical behaviors, which are associated more with individual clinicians.

Comparing Predictive Capacity Post-Course With Prior Work

Our model had a low predictive capacity ($R^2=0.22$), explaining only 22% of the variance in intention. In comparison, previous literature showed that the predictive capacity of models analyzing one single behavior varied between 19% and 62%, depending on the type of behavior [30]. Bakwa & al.'s study of multiple behaviors related to patient care among Quebec physicians explained 82% of the variance in physicians' intention to adopt the clinical behavior [49]. However, Bakwa & al. included multiple behaviors in the same model [49], while we studied only one behavior, and moreover one that is specific to the wellbeing of physicians rather than geared to a clinical task. Indeed, existing studies mainly predict behaviors related to patient care [30, 49]. While variables of Godin's integrated model for predicting health professionals' behavior are sufficient to predict such behaviors [28], approaching a colleague is not a clinical behavior and may be influenced by factors not measured by Godin's model such as lack of time, lack of privacy and organizational culture [73, 74]. This is significant because the Quintuple Aim—adopted by many healthcare systems—now emphasizes five key outcomes, and not all of them clinical: patient outcomes, patient experience, efficiency, clinician wellbeing, and equity. Therefore, further development is needed regarding fostering behaviors related to clinician wellbeing.

Triangulated Quantitative and Qualitative Data

Fourth, triangulating quantitative with qualitative results confirmed that beliefs about capabilities was a key determinant of intention to approach a colleague in difficulty. Interestingly, results regarding beliefs about consequences diverged slightly: while it was the second most frequent reason for intention to change of behavior stated in physicians' open-ended responses, it was not a statistically significant determinant of intention in our quantitative results. One explanation is that statistical significance varied according to the other variables included in the model, perhaps because the *P value* for beliefs about consequences was so close to the critical alpha value of .05. Another possible explanation is that beliefs about consequences, as described by Godin, seems to refer to the consequences for oneself [28]. Items for measuring beliefs about consequences quantitatively were worded as follows "Overall, I think that *for me* approaching a colleague in difficulty would be...." [51]. In contrast, in our qualitative analysis, beliefs about the consequences of adopting the behavior could also refer to its consequences for the colleague being approached, the team, the department, or for society (Table 4). Indeed, many physicians taking part in our study perceived that the consequences of approaching a colleague in difficulty would be beneficial for the team and the department, a theme often mentioned in the open-ended responses. Also, approaching a colleague in difficulty is a team-focused behavior that takes place between two healthcare workers, while behaviors related to patient care occur between a clinician and a patient (e.g., prescribing medication). We hypothesize that such team-focused behaviors may depend on a wider variety of determinants, such as organizational culture, than do individual behaviors related to patient care [73, 75, 76]. Whether peer support strategies can be applied without fear of judgment or retaliation within the organization may depend on its climate of psychosocial safety, or the perception among employees that their psychological health is a priority for the management [77, 78]. A study by Tolin & al. reported that physicians' perception of institutional support had a positive impact on implementation of a physician-focused peer support program [19]. Thus the perception of the consequences of team-focused care may include organizational benefits, team benefits, patient benefits, and benefits to individual team members [75]. Broadening the item statements on beliefs about consequences to include effects on others and adding questions with regards to role and identity may be a good starting point for improving measuring tools regarding team-based behaviors. Other determinants to measure in future studies should include social and professional role or identity and past behavior or habits related to the behavior, both mentioned by participants as determinants of intention and present in Godin's integrated model for predicting health professionals' behavior (Table 4) [28]. Our qualitative analysis identified the following further potential

determinants: 1) knowledge, 2) action planning, 3) memory, attention and decision processes, 4) environmental context and resources and 5) emotion related to behavior. The first three of these determinants are also behavioral domains targeted by BCTs identified in the CPD course.

Self-reported Behavior Adoption Four Months After CPD Course

Fifth, 4 out of 10 physicians reported having approached a colleague in difficulty in the four months following the CPD course and those who did so had a higher intention to adopt the behavior after the CPD course. No statistically significant difference in intention to approach a colleague in difficulty was found between those who did and those who did not adopt the behavior (5.4 vs 5.0, $p = .24$). This unexpected finding is possibly due to the limited statistical power of the analysis, estimated at 23%. Also, environmental factors, such as practicing solo, were the barriers most mentioned by physicians. Some of these physicians who might have been willing to approach a colleague in difficulty were simply not in the right environment to be able to do so. Other studies report on peer support courses that are part of comprehensive peer support programs that include an organization-wide referral system [12, 18-26]. Thus, a physician could be the only physician in a department and still participate in a peer support program thanks to the referral system. It would be valuable to further evaluate whether formalizing peer support through these programs helps overcome certain environmental barriers or, conversely, introduces new barriers, compared to informal peer support outside of a program, as occurred in our study.

Behavioral Change Techniques Present in the Course

Lastly, we identified seven BCTs in the online CPD course. This is the first time that BCTs have been identified in an FMSQ course and triangulated with before-and-after measures of CPD-REACTION. The results suggest that the BCTs effectively targeted determinants of intention, such as beliefs about capabilities and social influence, which had changed after the course. However, our study, which analyzed only one course, cannot make recommendations on which BCTs to use for which behaviors. Nevertheless, our results offer significant methodological progress in evaluating CPD course content, which could lead to innovations in CPD course development. Further studies on the use of theory-informed BCTs in CPD course design to enhance clinician adoption of targeted behaviors could further our understanding of effective course development strategies.

Limitations

First, the quasi-experimental before-and-after study design is vulnerable to confounding concomitant events that could influence study outcomes because the design comprises only a single group [27].

However, the short duration of the online CPD course (one hour) made it less likely for other events to introduce bias. We chose this before-and-after study design as it is better suited to the constraints of practice settings than randomized control trials and better reflects the real-world CPD context [27]. Triangulation of quantitative with qualitative methods improved the internal validity of the study [27, 79].

Second, our results mainly apply to specialist physicians who chose to follow a non-mandatory CPD course and thus had some interest in the subject. The effect of the CPD course could have differed if it were mandatory for all physicians, as seen in other education programs [80]. Furthermore, general practitioners were underrepresented in this study (n=9). Thus, we don't know how general practitioners responded to the CPD course but have no reason to think that they would behave differently than specialists. In addition, the well-being of all health professionals is paramount, and it is not clear if the CPD online course would have any impact on other types of health professionals.

Third, only a small proportion of participants responded to the self-reported behavior questionnaire four months after the course. This may indicate a selection bias for the most motivated physicians, potentially overestimating the proportion adopting the behavior.

Fourthly, we lacked statistical power to measure the difference in intention to approach a colleague in difficulty between those who did and those who did not adopt the behavior.

Lastly, there was a possible social desirability bias whereby physicians overrated their intention to approach a colleague in difficulty [27]. Confidentiality and anonymity were ensured to limit this bias. Of note, we measured intention using the same instrument used by Bakwa et al. and Ayivi-Vinzie et al. in their studies, so the desirability bias would have applied to their results as well and does not explain the higher before and after intention difference we observed in our study [49, 60].

Conclusion

To the best of our knowledge, this is the first study that uses validated before and after intervention measures to examine the effect of a CPD course on physicians' intention to approach a colleague in difficulty (experiencing distress, burnout or second victim symptoms after a patient adverse event, etc.). The CPD course produced an increase in physicians' intention regardless of age, gender or domain of practice (laboratory, surgical and medical domains). Beliefs about capabilities was an important determinant of intention to approach a colleague in difficulty. Although the CPD course increased physicians' intention to approach a colleague in difficulty, there is still a gap in

understanding what other factors predict this intention. Within four months of the CPD course, 41% of the physicians reported approaching a colleague in difficulty using strategies taught in the online CPD course. Identifying BCTs in the CPD course design was a methodological innovation for FMSQ course evaluation.

Although the CPD course demonstrated a positive effect on physicians' intention to approach a colleague in difficulty, more research is needed to better understand the mechanisms through which the intervention works. This could be done by translating the course into English, making it available to physicians in other Canadian provinces or internationally, and measuring the effect of the CPD course on approaching a colleague in difficulty in other contexts. Furthermore, instructional designers should focus on enhancing physicians' beliefs about their capabilities to facilitate their adoption of this peer support behavior. Instructional designers could consider using BCTs, especially when targeted behaviors are less widely accepted by clinicians or perceived as more difficult to adopt. Evaluating the effect of BCTs on behavioral intention could deepen our understanding of interventions aimed at changing clinicians' behaviors.

Our results suggest that peer support courses help build a culture of care among physicians. By enhancing our knowledge of interventions aimed at improving the peer support capabilities of physicians, this project indirectly aimed to improve the well-being of healthcare professionals. Peer-supported professionals could then be better able to contribute to resilient healthcare systems and to providing quality care to patients.

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Data Availability

The datasets generated or analyzed during this study are available from the corresponding author on reasonable request.

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Conflicts of Interest

None declared.

Abbreviations

BCT	Behavioral change technique
CPD	Continuing professional development
CSD	Combined standard deviation
EL	Éloi Lachance
FL	France Légaré
FLIZ	Florence Lizotte
FMSQ	Fédération des médecins spécialistes du Québec
MÉDUSE	Online learning platform of the Fédération des médecins spécialistes du Québec
MT	Martin Tremblay
QPHP	Québec Physicians' Health Program

R ²	Predictive capacity of model
RDC	Roberta de Carvalho Corôa
SD	Standard deviation
SJD	Sam Jr. Daniel
SRQR	Standards for Reporting Qualitative Research
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology

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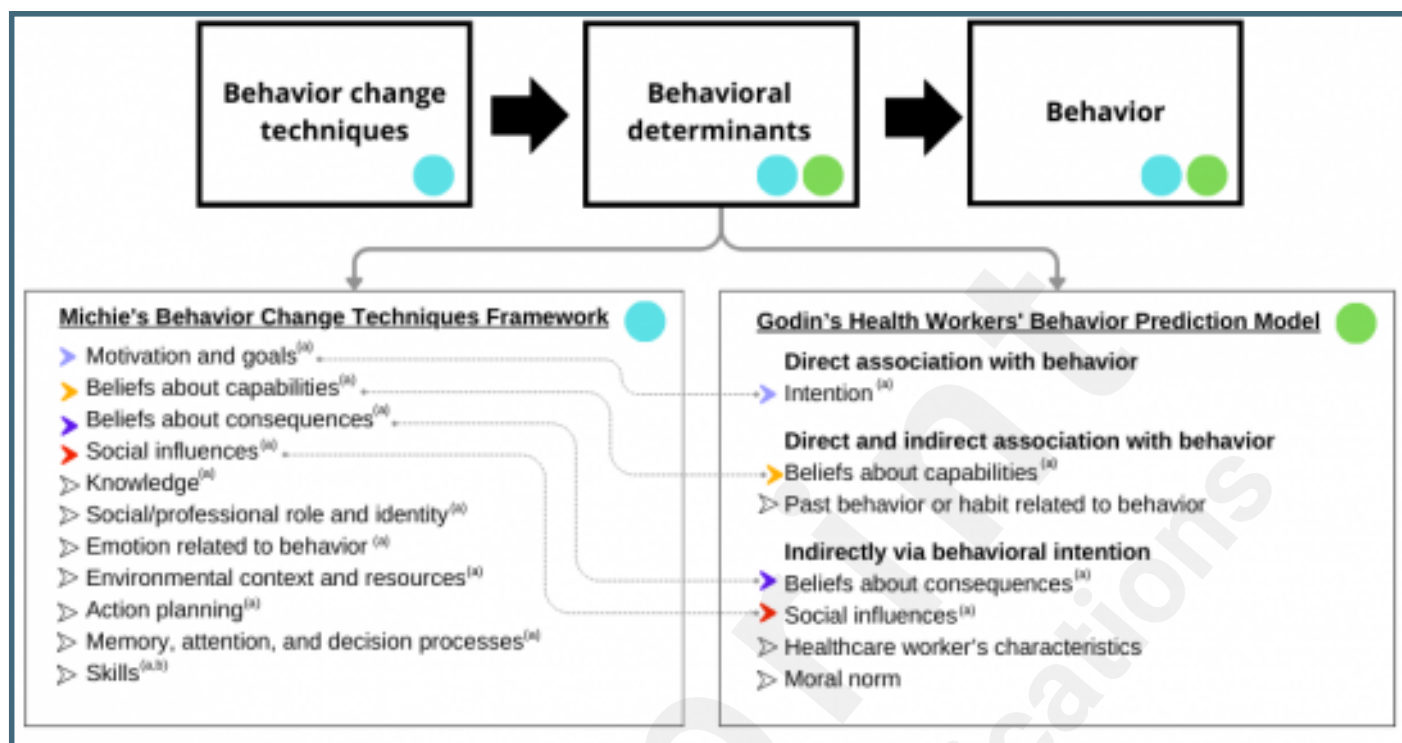
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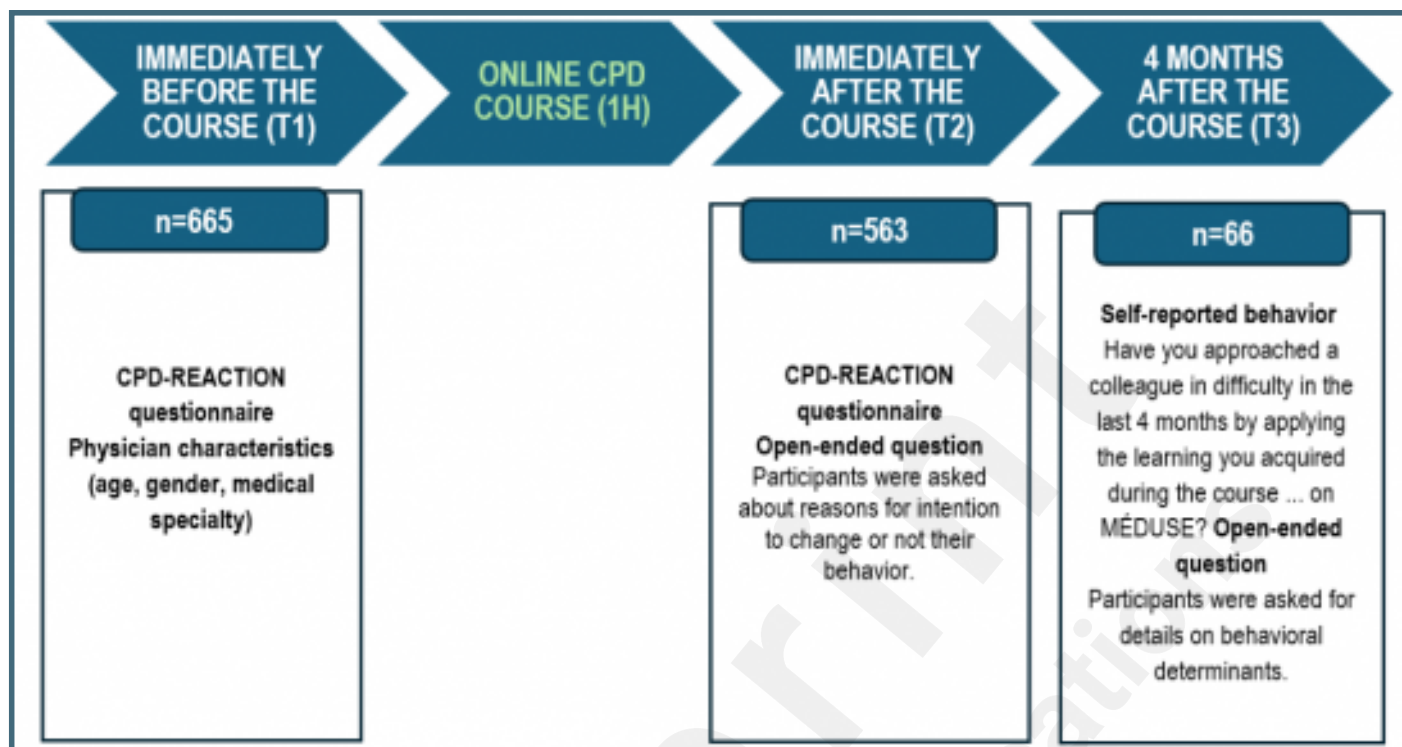
Supplementary Files

Figures

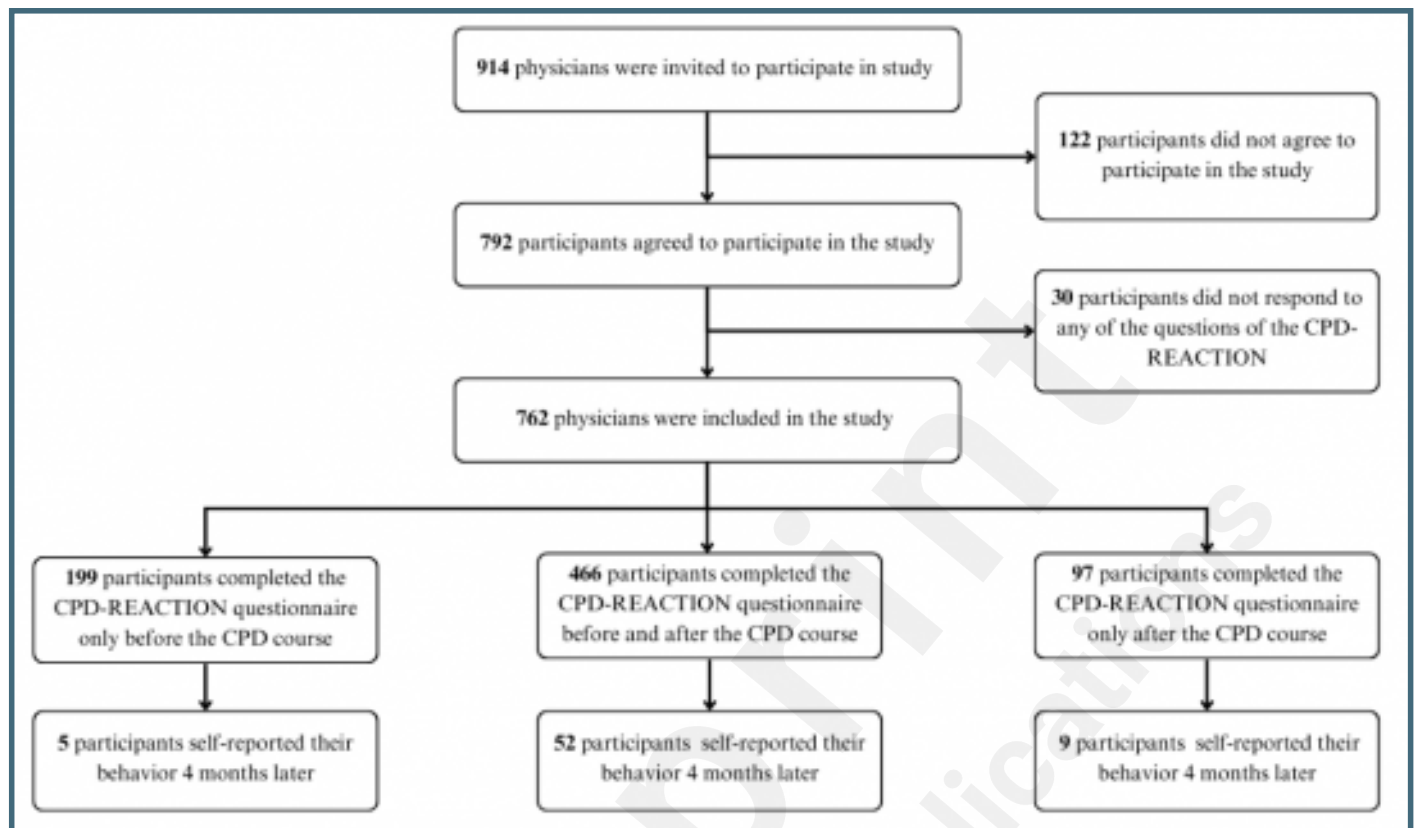
Framework combining Godin's integrated model for predicting health professionals' behavior and Michie's Behavior Change Techniques Framework.



Data sources and collection.



Study flow chart.



Multimedia Appendixes

Conceptual framework.

URL: <http://asset.jmir.pub/assets/db3dc0d0c404bbe774c047f98cb3d365.docx>

Questionnaires.

URL: <http://asset.jmir.pub/assets/6551c2d4385210c4e16ad28ed36b3154.docx>

Grid for evaluating the CPD course according to Michie's Behavior Change Techniques.

URL: <http://asset.jmir.pub/assets/a9b0b7746f8244c6c24ee28a3db42caf.docx>

Supplementary data analysis.

URL: <http://asset.jmir.pub/assets/11b185e160a6e767823c16b85e701884.docx>

