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Research Paper

## An undergraduate course on pain: Its impact on students' empathy

Adriana H. van Houwelingen<sup>a,\*</sup>, Ilayda Özyaydin<sup>a</sup>, Theo Wubbels<sup>b</sup>

<sup>a</sup> Department of Pharmaceutical Sciences, Faculty of Science, Utrecht University, Universiteitsweg 99, 3584 GC Utrecht, the Netherlands

<sup>b</sup> Department of Educational Sciences, Utrecht University, Heidelberglaan 1, 3584 CS Utrecht, the Netherlands

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### ABSTRACT

**Introduction:** Empathy towards patients in pain involves an internal process in which both affective and cognitive processes in the observer are responsible for a final behavioral reaction. This study investigated the impact of an undergraduate elective course on pain on students' empathy in a mixed-method design.

**Methods:** Undergraduate students of the elective course on pain (intervention group) as well as undergraduate students of a compulsory course on neuropharmacology (control group) completed the Dutch version of the Interpersonal Reactivity Index (IRI) questionnaire at the beginning and the end of the course. In addition, students' empathy in the intervention group was explored by content analysis of students' reflective writing assignments related to documentary films that were part of the course activities.

**Results:** Twenty students (intervention group) and seven students (control group) completed both IRI questionnaires. IRI scores for subscales perspective taking, fantasy, and personal distress significantly increased over time more in the intervention group than in the control group (intervention x time interaction). Effect sizes (generalized eta squared) for these effects were 0.084, 0.041, and 0.139 for perspective taking, fantasy, and personal distress, respectively. The qualitative data revealed information on cognitive and affective responses, and to some extent behavioral responses.

**Conclusions:** Both IRI outcomes and analysis of the reflective assignments demonstrate that students' empathy increased during the course on pain. Further research should explore in-depth the effects of different documentaries in the course on students' empathy development and the long-term effect of the course on students' empathy.

### Introduction

Pain is a complex multidimensional phenomenon that can be classified as either acute or chronic differing in etiology and treatment. Chronic pain continues for more than three months; in most cases even throughout one's life span. Whilst acute pain often is associated with a relative short pain experience and, in most cases, effectively treated with pharmacologic agents, chronic pain is far more complex and difficult to treat. Until recently, pain is underrepresented in most health care-oriented curricula, and especially in medical and pharmaceutical education.<sup>1–4</sup> Moreover, the 2020 report of the Special Committee on Substance Use and Pharmacy Education pointed out the special need for the psychosocial impact of substance use in pharmacy curricula.<sup>5</sup>

In addition to becoming an expert on pharmacology, drug therapy, and drug compounding and delivery, pharmacy students in the

\* Corresponding author.

E-mail addresses: [A.H.vanHouwelingen@uu.nl](mailto:A.H.vanHouwelingen@uu.nl) (A.H. van Houwelingen), [I.Ozyaydin@students.uu.nl](mailto:I.Ozyaydin@students.uu.nl) (I. Özyaydin), [T.Wubbels@uu.nl](mailto:T.Wubbels@uu.nl) (T. Wubbels).

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Netherlands must develop health care-related competencies as well as a professional identity. For this, the Dutch pharmacy education has embraced and adopted the CanMEDS framework for the development of professional competencies and identity.<sup>6</sup> According to the CanMEDS domains of communication and professionalism, expressing empathy is a necessary skill for Dutch pharmacists in their communication towards patients. Dutch pharmacy students are regularly assessed on their communication skills in compulsory courses during their program. Despite this, patients with chronic pain still experienced a lack of empathy and interest from their health care professionals.<sup>7–9</sup> Only 50% of patients with chronic pain reported positive experiences when asked about their pharmacists' empathy with their condition.<sup>8</sup> Health care professionals suggested themselves that a lack of empathy could be overcome by training to show empathy towards patients in pain.<sup>8</sup>

For patients, pharmacists are the most accessible health care providers, and therefore should be able to demonstrate empathy as one of their core attributes. Although students' empathy needs to grow in health care curricula, literature is pointing to a decline in students' empathy in these curricula.<sup>10,11</sup> Not only was there a decay in students' empathy over time, a tendency for lower empathy in first-year pharmacy students compared to first-year nursing or dental students was shown.<sup>11</sup> Therefore special attention is needed for empathy development and/or sustainability of empathy in health care curricula, and especially in pharmacy curricula.

### *Empathy, perspective taking, and behavioral responses in the context of pain*

Although literature is available on the definition of empathy and its development in social interactive environments, there is far less information regarding the definition of empathy in the field of health care, let alone in the context of pain. Alma and Smaling<sup>12</sup> defined empathy within the field of medicine as “the ability of placing oneself imaginatively in another's experiential world while feeling into her or his experiences (points of view, thoughts, ideas, cognitions, desires, intentions to act, and, especially, motivations, feelings, and emotions)”. Goubert et al.<sup>13</sup> defined empathy towards patients in pain as “a sense of knowing the experience of another person with cognitive, affective, and behavioral components.”

Both definitions point towards empathy as an internal process in the observer where a behavioral reaction towards the observant may occur. This internal process is based upon the observers' affective and cognitive processes while facing others in pain.<sup>12,13</sup> Based on Goubert et al.'s<sup>13</sup> model, cognitive responses involve both meaning and decision making with perspective taking as an outcome. Affective responses involve emotions directed either to the other or to self. Often affective responses directed to others lead to the social interaction between subjects in pain and health care professionals and to behavioral responses such as helping and caring. Social interaction is needed for mutual understanding and forms a foundation for positive effects on patients' clinical outcomes and satisfaction. Affective responses directed to oneself originate from stressful situations in the observer and aim, in most cases, for observers' self-protection. These responses often create social distance and lack of mutual understanding between health care professionals and patients in pain.

Goubert et al.'s<sup>13</sup> model indicated that cognitive and affective processes are influenced by bottom-up and top-down experiences of pain in the observer. Bottom-up experiences are evoked by the person in pain and can provide strong incoming cues in the observer; for example, verbal and/or facial expressions of pain. Weaker cues, such as trying to hide pain, can also be considered a bottom-up experience. Top-down experiences relate to the observers' prior experiences with pain, including the observers' painful experiences in the past but also painful experiences of closely related persons (e.g., family and friends), and the observers' beliefs and ability of controlling pain and/or painful situations.<sup>13</sup>

Observers' cognitive responses mostly remain hidden for people in pain, but affective and behavioral responses can be noticed during verbal and/or non-verbal communication. Whilst helping and care taking are most desirable in health care professionals, the outcome of the cognitive and affective responses could also lead to underestimation of pain and therefore to undesirable reactions like misunderstanding, dismissal of responsibilities, stigmatizing patients in pain, or inappropriate care.<sup>14</sup>

### *Enhancing empathy in health care settings by documentary films and reflective writing*

There is ample information on interventions that stimulate empathy in health care professionals and students in health care or allied programs.<sup>15–19</sup> Interventions that effectively enhanced empathy were small courses (e.g., multiple workshops) and interactive discussions with peers and/or patients. Additionally, watching documentaries and/or small video clips were effective in stimulating students' empathy as measured by valid and reliable inventories.<sup>20,21</sup> Although these studies demonstrated the effectiveness of watching documentaries and/or video clips on empathy, they did not explore students' perspective taking and behavioral responses that happened in the observer while watching these movies. Furthermore, the observers' bottom-up and top-down experiences were not considered. Think-a-loud protocols and/or reflective writing could give in-depth information on observers' internal and perspective taking processes.<sup>17,22</sup>

### *Problem statement and aim of study*

As mentioned above, the effects of facing others in pain on the internal process of perspective taking in health care professionals and (undergraduate) medical and pharmacy students are largely unexplored. Although documentary films can effectively enhance students' empathy as measured with different inventories that investigate empathic tendencies, there are limited reports combining questionnaire data with reflective writing to provide in-depth insight into students' cognitive, affective, and behavioral responses in response to watching documentaries. Therefore, this study will measure students' empathy development by using the Interpersonal Reactivity Index (IRI) inventory and explore students' cognitive and affective responses by content analysis of reflective writing

assignments written after documentary watching in an elective course on pain. Moreover, this study will also give insight in bottom-up and top-down experiences in students related to the documentary films.

## Methods

### Design

To investigate students' empathy development, a mixed-method design was used. The study involved students of an elective course on pain (intervention group, 42 students enrolled) and a compulsory course on neurology (control group, 150 students enrolled) taught in 2020–2021 in the first semester of the second year of the undergraduate pharmacy program. Both courses were eligible for all second- and third-year students at the university.

The neurology course was a 10-week interdisciplinary course on general physiology and pathophysiology of the peripheral and central nervous system. This course included a module on the pathophysiology of acute pain and pain treatment that consisted of a two-hour lecture combined with a case-based learning problem on the biomedical aspects and treatment of pain. The course content was assessed by a test with both multiple-choice questions and open-answer questions (80%) and an essay-like writing assignment (20%). In addition to this, general patient communication was formatively assessed, but not contributing to the course grade.

The elective course on pain was a 10-week multidisciplinary course with autonomy-teaching strategies and four documentary films. The students enrolled in the elective course on pain had to work towards two final assignments; a group assignment that did not contribute to the course grade and an individual assignment. The individual assignment was graded (100% of the course grade) and consisted of two parts; an essay on a topic related to pain and a personal reflection on the course as well as the course setup. Students enrolled in the elective course encountered four different documentaries: the Dutch documentary “Pijn,” the Melody Gilbert documentary “Life Without Pain,” the Amy Stechler documentary “The Life and Times of Frida Kahlo,” and the National Geographic documentary “Sacred Pain.” For detailed information on the course content, autonomy supportive teaching methods, different assessments, and content of the documentaries, see Houwelingen et al.<sup>23</sup> Due to the Dutch lockdown, as a COVID-19, measure all teaching activities in both courses were held online. Therefore students of the elective course had to watch the documentaries from home.<sup>24</sup>

### Participants

A total of 41 students (intervention group = 29, control group = 12) agreed with informed consent to participate voluntarily in this study from which a total of 27 students completed both inventories. Students did not receive compensation for participation in this study. Baseline demographics are presented in Table 1. Students of the intervention group also gave informed consent for analyzing their reflective assignments that were part of the course requirements. To avoid a conflict of interest, data obtained in this study were analyzed after publication of the final course grades. The study was approved by the Science-Geosciences Ethics Review Board Committee (Bèta S-20433).

### Quantitative measures

The Dutch version of IRI was used to measure students' empathy development at the start and end of each course. To prevent students from participating in this study twice, the elective course explicitly requested students to fill out the questionnaire as a participant of the elective course. The IRI is a 28-item five-point Likert scale questionnaire with four seven-item subscales: perspective taking (PT), fantasy (FS), empathic concern (EC), and personal distress (PD) with PT and FS representing the cognitive part of empathy and EC and PD the affective part.<sup>26</sup> The subscale PT relates to the ability of a subject to see another person's perspective (typical item: “I

**Table 1**  
Overview of demographics of intervention and control groups.

Characteristic	Intervention group	Control group
Age (years; average $\pm$ SD)	19.8 $\pm$ 1.11	20.9 $\pm$ 1.2
Study program		
Pharmacy (n)	23	11
Other (n)	6	0
Unknown (n)	0	1
Gender		
Female (n)	23	11
Male (n)	6	1
Year of study		
2nd year (n)	8	11
3rd year (n)	12	1
4th year (n)	5	0
> 4th year (n)	1	0
Unknown (n)	3	0
Total (n)	29	12

sometimes try to understand my friends better by imagining how things look from their perspective.”). The subscale FS relates to the ability to identify with fictitious book or movie characters (typical item: “I really get involved with the feelings of the characters in a novel.”). The subscale EC relates to feelings of care and concern for others (typical item: “I often have tender, concerned feelings for people less fortunate than me.”). The subscale PD relates to a subject's distress and anxiety experiences (typical item: “I sometimes feel helpless when I am in the middle of a very emotional situation.”).

Based on the reliability analysis of pretest data obtained in this study, all reversed-worded items along with IRI01 and IRI25 were removed. Removal of the reversed worded items is in line with a study performed by Ingoglia et al.<sup>27</sup> Moreover, IRI01 was already questioned by de Corte et al.<sup>25</sup> After removing these items, scales had adequate reliability: PT ( $\alpha = 0.78$  pretest;  $\alpha = 0.85$  posttest), FS ( $\alpha = 0.82$  pretest;  $\alpha = 0.7$  posttest), EC ( $\alpha = 0.65$  pretest;  $\alpha = 0.72$  posttest), and PD ( $\alpha = 0.72$  pretest;  $\alpha = 0.79$  posttest). The coefficient alphas in this study were comparable with other studies with the Dutch version of the IRI.<sup>25,28,29</sup>

### Qualitative measures

Directly after watching the documentary films, students of the intervention group were instructed to write a reflective assignment for each that was not graded. The instruction reads (translated from Dutch): “Reflect on a part of the documentary that was important to you, state why it was important, what it had accomplished to you, and how it would affect your future handling.” Students were given 24 hours to hand-in their assignment. In addition to these reflective assignments, students also had to reflect on the overall influence of the documentaries on their perspective on pain and patients with pain in their final course assignment.

A coding scheme was developed for reflective assignments from earlier years that were not used in this study. Therefore, assignments were anonymized by the first author and then coded by the first and last author via content analysis over six rounds until saturation of the coding categories was reached.<sup>30</sup> The initial coding scheme was based on Goubert et al.'s<sup>13</sup> model and IRI subscales and reflected students' cognitive and affective responses, as well as some behavioral responses. Additional codes emerging from the data were added. A detailed overview of the final codes and related (sub)categories can be found in Table 2.

The reliability of the final coding scheme was established using the reflective assignments from the development phase. Due to the format of the reflective writing assignments, fixed units of analyses (i.e. paragraphs) were selected by the first author before coding to ensure that the text units were the same for both coders. These fixed units could receive multiple codes based upon their content. The first and second author independently coded eight assignments in five consecutive rounds. Between every round the second author was trained by the first author in using the scheme. In the last round, this procedure led to a high overall interrater reliability of the coding scheme (Cohen's  $\kappa = 0.89$ ). Interrater reliability of the categories indicated good to excellent agreement: affective responses (Cohen's  $\kappa$

**Table 2**  
Coding scheme for empathy.

Main category	Category	Subcategory
Affective responses	Empathic concern	Feeling admiration
		Feeling amazed
		Feeling impressed
		Feeling inspired
		Feeling moved
		Feeling respect
		Feeling sympathy
		Feeling helpless
		Feeling intense
		Feeling revulsion
Cognitive responses	Personal distress	Feeling incomprehension
		Perspective taking to the other
		Perspective taking to the self
		Detecting differences between cultures
		Detecting differences between religions
		Detecting differences between gender
		Detecting differences between individuals in pain
		NA
		NA
		NA
Behavioral responses	Perspective taking	NA
		NA
		NA
		NA
		NA
		NA
		NA
		NA
		NA
		NA
Bottom-up experiences	Processes contributing to perspective taking	Turned away from screen
		Put hands before eyes
		Turned documentary off
		Call for attention
		Call for respect for different cultures and/or religions
		Specific parts
		Summary
		NA
		NA
		NA
Top-down experiences	Awareness	Own experiences with pain
		Relatives/friends in pain
Top-down experiences	Shared experiences	Own experiences with pain
		Relatives/friends in pain

NA = not applicable.

= 0.91), behavioral responses (Cohen's  $\kappa = 1$ ), cognitive responses (Cohen's  $\kappa = 0.87$ ), bottom-up influences (Cohen's  $\kappa = 0.95$ ), top-down influences (Cohen's  $\kappa = 0.68$ ), and perspective taking processes (Cohen's  $\kappa = 0.95$ ).

### Data analyses

Data on IRI were analyzed using two different statistical software packages; Jamovi, version 2.3.0.0 (Jamovi Project) and SPSS, version 28.0.1.0 (IBM, Corp.). IRI pre- and posttest subscale scores were calculated with listwise deletion for missing data and analyzed by multivariate analysis of covariance (MANCOVA) or repeated measures MANCOVA (RM-MANCOVA) with intervention as an independent variable. Years in study program was entered as a covariate because this variable differed between the intervention and control groups (Table 1). If a significant finding was observed, a repeated measures analysis of variance (RM-ANOVA) was used to detect differences between pre- and posttest data of the IRI different scales. Moreover, generalized eta squared and partial eta squared were calculated to investigate the effect sizes.

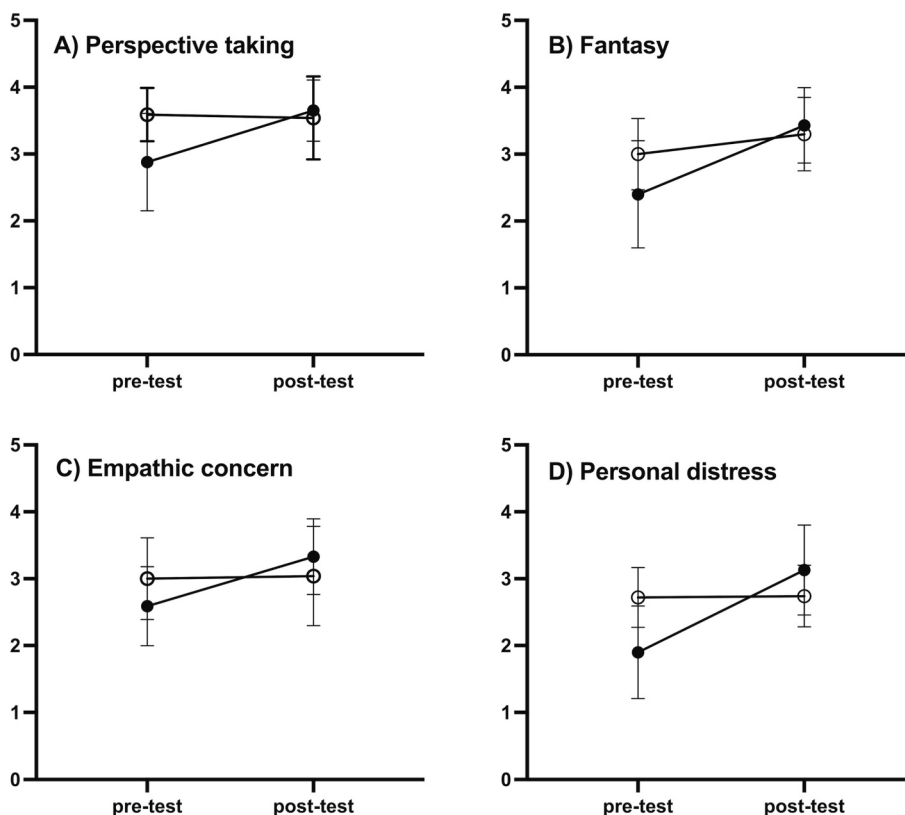
Data of the reflective assignments of course 2020–2021 were first cut into fixed units of analyses by the first author and then coded according to the coding scheme by the second author using a qualitative data analysis software package [Nvivo, release 1.5.1 (QSR International)]. The codes of every tenth assignment were checked by the first author. A single difference between the first and second author was detected and resolved by discussion and consensus.

## Results

### IRI inventory

The largest group in both intervention and control group identified themselves as female (Table 1). Because empathy may decline upon time spent in the study program,<sup>11,20</sup> students' years of study was evaluated. Whilst the control group consisted mainly of second-year pharmacy students, the intervention group consisted of second- to fifth-year students. The difference in group composition was significant ( $\chi^2(3, N = 38) = 12.3, P = .006$ ). Therefore, years in study program was used as a covariate.

Average scores on the four different IRI subscales are depicted in the Fig. 1. There was a tendency in the intervention group for the subscales PT, FS, and PD to be lower at the start of the study compared to the control group (Pillai's Trace = 0.331,  $F(4,36) = 4.45, P =$



**Fig. 1.** IRI measures (average  $\pm$  SD) of the pre- and posttest data of the intervention group (filled circle) and control group (open circle) on subscales PT (A), FS (B), EC (C), and PD (D).

EC = empathic concern; FS = fantasy; IRI = Interpersonal Reactivity Index; PD = personal distress; PT = perspective taking.

.005). To assess intervention related differences on the IRI subscales, RM-MANCOVA was performed with pre- and posttest data on the four IRI scales as dependent variables, intervention as independent variable, and academic year as covariate. The RM-MANCOVA revealed a significant Intervention x Time interaction (Pillai's Trace = 0.604,  $F(1,19) = 28.972$ ,  $P < .001$ ,  $\eta^2_G = 0.085$ ,  $\eta^2_B = 0.535$ ). Further analysis of the different IRI scales via RM-ANOVA yielded a significant effect in the intervention group for PT ( $F(1,23) = 12.59$ ,  $P = .002$ ,  $\eta^2_G = 0.084$ ,  $\eta^2_B = 0.354$ ), FS ( $F(1,25) = 7.13$ ,  $P = .013$ ,  $\eta^2_G = 0.041$ ,  $\eta^2_B = 0.222$ ), and PD ( $F(1,25) = 22.8$ ,  $P < .001$ ,  $\eta^2_G = 0.139$ ,  $\eta^2_B = 0.476$ ), but not for EC ( $F(1,25) = 1.61$ ,  $P = .22$ ).

### Reflective assignments

Analysis of the reflective assignments revealed responses consistent with all subscales of the IRI and were used to illustrate the IRI outcomes in terms of cognitive, affective, and behavioral responses and explored the presence of bottom-up and top-down experiences. Quotes from these reflective assignments in the following sections have been translated from Dutch into English. The documentary and respondent number are provided in parentheses.

### Cognitive responses

The analysis revealed cognitive responses that relate to students' perspective taking and could be roughly divided into three categories: perspective taking to the other, empathic understanding, and taking perspective to self. Perspective taking to the other implies that students are finding themselves standing in patients' shoes and seeing pain from patients' perspectives. An example of perspective taking to the other is as follows: "I can image that the choice to talk about it [pain] with your loved ones, can be difficult. On one hand you would think that talking about it will help, but as Igor explained, someone else never really understands your pain. Talking ensures that someone else knows what you are going through and therefore people can be more understanding, but on the other hand you can also be seen as a somebody who always complains, like Rein." (01 #002).

Perspective taking to the other and empathic understanding are closely related but differ in a way that the latter contained an explanation from the students' perspective. This means that students do not stand in the patients' shoes completely but try to find a rationale from their own perspective; in most cases, an academic perspective. An example of empathic understanding is as follows: "I can image it's very difficult to have a young child who doesn't feel pain at all, because pain provides feedback on what your body can do or can't do. When a child is older, it can learn to deal with this, but for very young children this is, of course, not the case." (02 #008).

Perspective taking to self can often be considered a protective mechanism and, in this study, most often related with a lack of understanding which can be observed in the following statement: "Pain is also for some people an outlet. Look at sports, like boat races or running. It is just hurting yourself just enough that you develop but not break down. For me, this a bit too extreme in this documentary." (04 #001).

The reflective assignments also revealed responses related to the process of perspective taking which normally remain hidden from others. In these cases, students wrote on these processes while writing the reflective assignment as can be observed in the following example: "A question that came to mind was: Does pain disclosure provide relief? Personally, I think that people will get a better understanding of it, so that people can have a mutual understanding." (03 #018).

Besides cognitive responses observed in the reflective assignments based on the different documentaries, students also had to reflect on the influence of the documentaries on their attitudes and beliefs towards pain and patients with pain in general for their final course assignment. In most of these cases, the documentaries raised awareness for patients with pain and therefore changed the way students look at pain and patients with pain. One of the students wrote as follows: "The documentaries broadened my perspective on pain. I know now that there are different ways in how people can deal with pain. These documentaries have taught me the importance of trying to image how others experience pain and see it [the situation] from their point of view." (05 #014).

### Affective responses

Affective responses contained positive as well as negative emotions and reactions towards individuals in pain. Positive reactions to others were reactions that may stimulate behavior like caring and empathic concern. An example of such a reaction is as follows: "The story of Mister Ravestein moved me. Suddenly must stop with something you are passionate about and not be able to do it [boxing] ever again. This was a compelling moment." (01 #007) Negative emotions accompanied their own perspective and self-protection. An example of negative emotions is as follows: "So, I can't quite get my head around how others can become so absorbed in their culture that they can endure so much pain, while I can't even look at the images of it." (04 #025)

### Behavioral responses

Behavioral responses are considered the outcome of the perspective taking process. In ideal situations these responses are accompanied with actions like helping and caring. Although no action was expected from students during and/or after watching the documentaries, it was still possible to observe behavioral-like responses in their assignments. The observed responses could be categorized as responses that relate to social interaction and responses that relate to social disconnection. An example of social interaction is as follows: "The whole documentary made me realize why I study pharmacy. I want to help as many people as possible so that they do not have to go through this." (01 #020).

While socially interactive responses likely induce behaviors that are expected of health care professions, social disconnection also

occurred after watching documentaries. These responses showed a close relation with personal distress as demonstrated by: “It was a very brutal moment. Seeing this for the first time, I kept my eyes shut by putting my hands in front of me because I do think this must hurt so much.” (04 #020).

#### *Bottom-up and top-down experiences*

Bottom-up experiences are responses relating to incoming cues including observing other people's pain behavior and facial expressions. Documentaries can be seen as such a stimulus and therefore it was not surprising that bottom-up experiences were present in the reflective assignments. Students differed, however, in how they handled their responses after watching documentaries. Bottom-up responses in the reflective assignments ranged from in-depth descriptions of parts of the documentaries to a more general summary of the documentaries. An example of a very general statement is as follows: “The story of Gabby was very compelling to me. You noticed the difficulties when Gabby was very young, especially the problems the parents did encounter.” (02 #002).

Top-down experiences are experiences related to the observers' prior experiences of pain. In the reflective assignments there is evidence that students related to parts of the documentaries, especially those that have experienced pain themselves, their relatives, and/or friends. An example of such a prior experience: “I felt mainly recognition while watching this fragment. It made me think back in time when, after a long rehabilitation process, I was disappointed again while facing another injury, as well as how difficult it was for me.” (01 #025).

### **Discussion**

This study examined students' empathy towards individuals and patients in pain in an elective course on pain in a mixed-method design. The quantitative analysis demonstrated that students' empathy score in the intervention group increased significantly on the IRI subscales PT, FS, and PD compared to the control group. In this course, empathy was stimulated predominately by watching documentaries combined with reflective assignments. Analysis of these reflective assignments illustrated how students wrote on their experiences in terms of the concepts of the IRI subscales. The reflective assignments demonstrated students' cognitive and affective responses, as well as behavioral responses. This study also revealed bottom-up and top-down experiences related to the documentaries. As expected, most prominent bottom-up experiences related to parts of documentaries or a summary of the documentary while top-down experiences related to students' own pain perception or pain perception of relatives and/or friends.

Our data on students' empathy development are in line with other studies on empathy development in the health care education domain. First, reviewed studies demonstrated that interventions with longer time frames (like multiple workshops and/or complete courses) and/or multiple methods had significant positive effects on students' empathy development.<sup>15,16,31</sup> Also, this study demonstrated that a 10-week course with multiple documentaries combined with reflective assignments had positive effects on students' empathy development. Second, effect sizes found in this study were comparable to other studies that measured students' empathy scores related to watching documentaries, reflective writing assignments, or simulated consultations in health care settings.<sup>18,20,32</sup> In most studies, students are exposed to single interventions while in this study interventions are combined with a positive effect on students' empathy development as measured by both IRI inventory and content analysis of the reflective assignments. Based on Cohen's conventions, effect sizes in this study on the cognitive part of the IRI (subscales PT and FS) were, medium to large, while effect sizes on the affective part of the IRI vary from very small to large for EC and PD, respectively.<sup>33,34</sup> The effect sizes in this study were larger than in other studies on empathy development and video clips.<sup>20,21,32</sup> Possible reasons for larger effect sizes in this study could be the duration of the intervention, features of the documentaries, study setup, and/or differences in inventories measuring empathy. Third, it has been demonstrated that students' empathy in health care and allied study programs declined with time spent in the study program.<sup>10,11</sup> In this study, there was also a tendency for IRI pretest scores on subscales PT, FS, and PD to be lower in the intervention group than the control group. Since composition of the intervention group differed in current year of study compared to the control group, this tendency may be influenced by students' time spent in the program. Students' academic year in the intervention group was longer than in the control group.

Several other observations on students' empathy development, especially related to empathic concern and personal distress were contrary with observations found in the literature. During childhood development, maturation of the brain takes place with concomitant changes in perspective taking and empathic concern towards others on one hand, and regulation of negative emotions on the other hand.<sup>35</sup> The intervention in this study did not alter students' empathic concern. On contrary, it had a significant effect on students' personal distress level. The effects of the intervention on both EC and PD can be explained by gender differences and to a lesser extent by age. First, it is known that females have higher empathic tendencies at a younger age compared to men.<sup>25,26,29</sup> Moreover, undergraduate female students experienced more empathic distress while watching movies and/or documentaries compared to male undergraduates.<sup>36,37</sup> As the number of female students in this study outweighed that of male students, this could possibly explain the absence of the effect of the intervention on EC as well as the increase in PD induced by the intervention. Second, as the age of the students in this study already reached maturity, it is expected that students in this study could regulate their emotions more so than young adolescents or children. Students in the intervention group, however, are exposed to cues that contain patients and/or individuals in pain. Perhaps the number of documentaries or the content of some of documentaries caused arousal in students and therefore induced personal stress.

Empathy and EC towards patients in pain is essential for health care professions, however, it could also lead to exhaustion of emotions, burn-out, and/or eventually could lead to a reduction in their interest in patients with pain. Empathy and empathy development in health care curricula can therefore be considered a double-edged sword as it is necessary for optimal care, but it also

makes health care professionals vulnerable to stress and burn-out. This means that empathy training in undergraduate courses should be done carefully and aiming at controlling PD in such a way that it will appraise effective emotion and emotion regulation by helping students to cope with stressful situations.

Given the limitations of questionnaires on actual processes of empathy, this study evaluated processes that took place in the observer by analysis of the reflective assignments. Moreover, this study combined outcomes on the cognitive and affective scales of the IRI with illustrations of cognitive and affective responses observed in the reflective assignments. The increase in cognitive IRI scales PT and FS was supported by cognitive responses like perspective taking, meaning making, and empathic understanding. Moreover, increase in the affective IRI scale PD was accompanied with statements that underline stressful scenes present in the documentaries. Although the effect of the intervention on the EC scale was not significant, reflective assignments contained phrases that do show EC. Surprisingly, behavioral responses were limited but still observable in the reflective assignments. These behavioral responses related to measures of emotional protection of the observer, like turning away from the screen, and can therefore be seen as indicators of PD.

### Study limitations and future research

There were several limitations of the present study. First, the qualitative data strongly depend on students' reflective writing skills and engagement in the course. It was noticed that the reflective writing assignments on the first documentaries were longer and therefore contained more units for analysis, compared to later documentaries. Conducting semi-structured interviews probably could have given more equally balanced responses. Also conducting observations, especially during the documentaries, could have provided more insight in affective (e.g., emotional) and behavioral reactions while watching the documentaries. Second, it is known that empathy and empathy development changed with age, gender, and years of study. Due to the small sample size in this study, it was not possible to analyze the effect of gender on empathy. Third, the underlying cause for the increase in PD is unclear. It is known that some documentaries contained content that could have caused arousal in students. However, the comparison of cognitive and affective responses in relation to the different documentaries could not be done because of the sample size.

Finally, there are two interesting questions remaining from this study: (1) to what extent is the observed increase meaningful for both patients and students; and (2) if students in the intervention group gained transferable and/or sustainable empathic skills and attitudes and demonstrate them in future practice. Future research should therefore focus on the long-term effects of the intervention, its meaningfulness for both students and patients, and its effects in other contexts, preferably with a control group of the same population as the intervention group.

### Conclusions

This study showed that multiple documentaries effectivity stimulated students' empathy in an elective course on pain. Moreover, this study showed that documentaries are excellent bottom-up experiences as they provided incoming cues and created moments of friction. Documentaries combined with reflective writing assignments created valuable moments for reflection. Furthermore, documentaries gave rise also to top-down experiences in students. Lastly, this study showed that, besides detecting cognitive and affective responses, it is even possible to detect behavioral responses in reflective writing assignments.

### Disclosure(s)

This study was conducted as part of Utrecht University first edition of the Educational Research Training Program (2019–2021).

### Credit author statement

Adriana H van Houwelingen: Conceptualization, Methodology, Validation, Formal analysis, Writing - original draft, Writing - review & editing. Ilayda Özyaydin: Formal analysis, Validation, Writing - review & editing. Theo Wubbels: Conceptualization, Methodology, Writing - reviewing & editing, Supervision.

### Declaration of Competing Interests

None.

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### References

- 1 Briggs EV, Carr ECJ, Whittaker MS. Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. *Eur J Pain*. 2011;15(8):789–795. <https://doi.org/10.1016/j.ejpain.2011.01.006>.
- 2 Thompson K, Johnson MI, Milligan J, Briggs M. Twenty-five years of pain education research-what have we learned? Findings from a comprehensive scoping review of research into pre-registration pain education for health professionals. *Pain*. 2018;159(11):2146–2158. <https://doi.org/10.1097/j.pain.0000000000001352>.



- 3 Miró J, Castarlenas E, Solé E, Martí L, Salvat I, Reinoso-Barbero F. Pain curricula across healthcare professions undergraduate degrees: a cross-sectional study in Catalonia, Spain. *BMC Med Educ.* 2019;19(1):307. <https://doi.org/10.1186/s12909-019-1741-5>.
- 4 van Lankveld W, Afram B, Staal JB, van der Sande R. The IASP pain curriculum for undergraduate allied health professionals: educators defining competence level using Dublin descriptors. *BMC Med Educ.* 2020;20(1):60. <https://doi.org/10.1186/s12909-020-1978-z>.
- 5 Tran T, Ball J, Bratberg JP, et al. Report of the 2020 special committee on substance use and pharmacy education. *Am J Pharm Educ.* 2020;84(11):8421. <https://doi.org/10.5688/ajpe8421>.
- 6 Koster AS, Mantel-Teeuwse AK, Woerdenbag HJ, et al. Alignment of CanMEDS-based undergraduate and postgraduate pharmacy curricula in the Netherlands. *Pharmacy (Basel).* 2020;8(3):117. <https://doi.org/10.3390/pharmacy8030117>.
- 7 Hadi MA, Alldred DP, Briggs M, Marczewski K, Closs SJ. "Treated as a number, not treated as a person": a qualitative exploration of the perceived barriers to effective pain management of patients with chronic pain. *BMJ Open.* 2017;7(6), e016454. <https://doi.org/10.1136/bmjopen-2017-016454>.
- 8 Eshete MT, Baeumlner PI, Siebeck M, et al. The views of patients, healthcare professionals and hospital officials on barriers to and facilitators of quality pain management in Ethiopian hospitals: a qualitative study. *PLoS One.* 2019;14(3), e0213644. <https://doi.org/10.1371/journal.pone.0213644>.
- 9 Lau ET, Tan SH, Antwertinger YJ, Hall T, Nissen LM. Counseling interactions between patients living with persistent pain and pharmacists in Australia: are we on the same page? *J Pain Res.* 2019;12:2441–2455. <https://doi.org/10.2147/JPR.S199017>.
- 10 Hojat M, Vergare MJ, Maxwell K, et al. The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med.* 2009;84(9):1182–1191. <https://doi.org/10.1097/ACM.0b013e3181b17e55>.
- 11 Nunes P, Williams S, Sa B, Stevenson K. A study of empathy decline in students from five health disciplines during their first year of training. *Int J Med Educ.* 2011;2:12–17. <https://doi.org/10.5116/ijme.4d47.ddb0>.
- 12 Alma HA, Smaling A. The meaning of empathy and imagination in health care and health studies. *Int J Qual Stud Health Well-being.* 2006;1(4):195–211. <https://doi.org/10.1080/17482620600789438>.
- 13 Goubert L, Craig KD, Vervoort T, et al. Facing others in pain: the effects of empathy. *Pain.* 2005;118(3):285–288. <https://doi.org/10.1016/j.pain.2005.10.025>.
- 14 de Rudder L, Kenneth CD. Understanding stigma and chronic pain: a state-of-the-art review. *Pain.* 2016;157(8):1607–1610. <https://doi.org/10.1097/j.pain.0000000000000512>.
- 15 Levett-Jones T, Cant R, Lapkin S. A systematic review of the effectiveness of empathy education for undergraduate nursing students. *Nurse Educ Today.* 2019;75:80–94. <https://doi.org/10.1016/j.nedt.2019.01.006>.
- 16 Everson N, Levett-Jones T, Pitt V. The impact of educational interventions on the empathic concern of health professional students: a literature review. *Nurse Educ Pract.* 2018;31:104–111. <https://doi.org/10.1016/j.nepr.2018.05.015>.
- 17 Silvia RJ. A music assignment to develop pharmacy students' empathy toward people with opioid use disorder. *Am J Pharm Educ.* 2020;84(4):7631. <https://doi.org/10.5688/ajpe7631>.
- 18 Zazulak J, Sanaee M, Frolie A, et al. The art of medicine: arts-based training in observation and mindfulness for fostering the empathic response in medical residents. *Med Humanit.* 2017;43(3):192–198. <https://doi.org/10.1136/medhum-2016-011180>.
- 19 Plake KS. Book club elective to facilitate student learning of the patient experience with chronic disease. *Am J Pharm Educ.* 2010;74(3):37. <https://doi.org/10.5688/aj740337>.
- 20 Hojat M, Axelrod D, Spandorfer J, Mangione S. Enhancing and sustaining empathy in medical students. *Med Teach.* 2013;35(12):996–1001. <https://doi.org/10.3109/0142159X.2013.802300>.
- 21 Ahmadzadeh A, Esfahani MN, Ahmadzad-Asl M, Shalbafan M, Shariat SV. Does watching a movie improve empathy? A cluster randomized controlled trial. *Can Med Educ J.* 2019;10(4):e4–e12. Accessed 14 June 2023 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6892313/pdf/CMEJ-10-e004.pdf>. Accessed 14 June 2023.
- 22 Chen I, Forbes C. Reflective writing and its impact on empathy in medical education: systematic review. *J Educ Eval Health Prof.* 2014;11:20. <https://doi.org/10.3352/jeehp.2014.11.20>.
- 23 van Houwelingen AH, Kusrurkar RA, Engels F. Evaluation of a multidisciplinary bachelor course on pain with autonomy-supportive teaching strategies through the lens of self-determination theory. *Pharmacy (Basel).* 2021;9(1):66. <https://doi.org/10.3390/pharmacy9010066>.
- 24 Hendriksen PA, Garssen J, Bijlsma EY, Engels F, Bruce G, Verster JC. COVID-19 lockdown-related changes in mood, health, and academic functioning. *Eur J Investig Health Psychol Educ.* 2021;11(4):1440–1461. <https://doi.org/10.3390/ejihpe11040103>.
- 25 de Corte K, Buysse A, Verhofstadt LL, Roeyers H, Ponnet K, Davis MH. Measuring empathic tendencies: reliability and validity of the Dutch version of the interpersonal reactivity index. *Psychol Belg.* 2007;47(4):235–260. <https://doi.org/10.5334/pb-47-4-235>.
- 26 Davis MH. Measuring individual differences in empathy: evidence for a multidimensional approach. *J Pers Soc Psychol.* 1983;44(1):113–126. <https://doi.org/10.1037/0022-3514.44.1.113>.
- 27 Ingoglia S, Coco AL, Albiero P. Development of a brief form of the interpersonal reactivity index (B-IRI). *J Pers Assess.* 2016;98(5):461–471. <https://doi.org/10.1080/00223891.2016.1149858>.
- 28 Hawk ST, Keijsers L, Branje SJT, der Graaff Van, de Wied M, Meeus W. Examining the interpersonal reactivity index (IRI) among early and late adolescents and their mothers. *J Pers Assess.* 2013;95(1):96–106. <https://doi.org/10.1080/00223891.2012.696080>.
- 29 Van der Graaff J, Branje S, de Wied M, Hawk S, Van Lier P, Meeus W. Perspective taking and empathic concern in adolescence: gender differences in developmental changes. *Dev Psychol.* 2014;50(3):881–888. <https://doi.org/10.1037/a0034325>.
- 30 Hsieh H, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277–1288. <https://doi.org/10.1177/1049732305276687>.
- 31 Fragkos KC, Crampton PES. The effectiveness of teaching clinical empathy to medical students: a systematic review and meta-analysis of randomized controlled trials. *Acad Med.* 2020;95(6):947–957. <https://doi.org/10.1097/ACM.0000000000003058>.
- 32 Schweller M, Costa FC, Märgm António, Amaral EM, de Carvalho-Filho MA. The impact of simulated medical consultations on the empathy levels of students at one medical school. *Acad Med.* 2014;89(4):632–637. <https://doi.org/10.1097/ACM.0000000000000175>.
- 33 Lakens D. Calculating and reporting effect sizes to facilitate cumulative science: a practical primer for t-tests and ANOVAs. *Front Psychol.* 2013;4:863. <https://doi.org/10.3389/fpsyg.2013.00863>.
- 34 Richardson JTE. Eta squared and partial eta squared as measures of effect size in educational research. *Educ Res Rev.* 2011;6(2):135–147. <https://doi.org/10.3389/fpsyg.2013.00863>.
- 35 Preston SD, de Waal FBM. Empathy: its ultimate and proximate bases. *Behav Brain Sci.* 2002;25(1):1–20. discussion 20–71 <https://doi.org/10.1017/S0140525X02000018>. discussion 20–71.
- 36 de Wied M, van Boxtel A, Matthys W, Meeus W. Verbal, facial and autonomic responses to empathy-eliciting film clips by disruptive male adolescents with high versus low callous-unemotional traits. *J Abnorm Child Psychol.* 2012;40(2):211–223. <https://doi.org/10.1007/s10802-011-9557-8>.
- 37 de Wied M, Zillmann D, Ordman V. The role of empathic distress in the enjoyment of cinematic tragedy. *Poetics (Amst).* 1995;23(1–2):91–106. [https://doi.org/10.1016/0304-422X\(94\)00010-4](https://doi.org/10.1016/0304-422X(94)00010-4).