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## Peer influence in clinical workplace learning

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## Chapter 3

# **Peer influence on students' estimates of performance: social comparison in clinical rotations**

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## ABSTRACT

**Context** During clinical rotations, students move from one clinical situation to another. Questions exist about students' strategies for coping with these transitions. These strategies may include a process of social comparison because in this context it offers the student an opportunity to estimate his or her abilities to master a novel rotation. These estimates are relevant for learning and performance because they are related to self-efficacy. We investigated whether student estimates of their own future performance are influenced by the performance level and gender of the peer with whom the student compares him- or herself.

**Methods** We designed an experimental study in which participating students ( $n = 321$ ) were divided into groups assigned to 12 different conditions. Each condition entailed a written comparison situation in which a peer student had completed the rotation the participant was required to undertake next. Differences between conditions were determined by the performance level (worse, similar or better) and gender of the comparison peer. The overall grade achieved by the comparison peer remained the same in all conditions. We asked participants to estimate their own future performance in that novel rotation. Differences between their estimates were analysed using analysis of variance (ANOVA).

**Results** Students' estimates of their future performance were highest when the comparison peer was presented as performing less well and lowest when the comparison peer was presented as performing better ( $p < 0.001$ ). Estimates of male and female students in same-gender comparison conditions did not differ. In two of three opposite-gender conditions, male students' estimates were higher than those of females ( $p < 0.001$  and  $p < 0.05$ , respectively).

**Conclusions** Social comparison influences students' estimates of their future performance in a novel rotation. The effect depends on the performance level and gender of the comparison peer. This indicates that comparisons against particular peers may strengthen or diminish a student's self-efficacy, which, in turn, may ease or hamper the students learning during clinical rotations. The study is limited by its experimental design. Future research should focus on students' comparison behaviour in real transitions.

## INTRODUCTION

There is a strong interest in how students learn and perform during clinical rotations, within a context of real-life patients, surrounding staff and institutional rules.<sup>1-3</sup> As a result, clinical workplace learning is explained by a diversity of learning theories, such as those of situated learning,<sup>4</sup> communities of practice,<sup>5</sup> and cognitive apprenticeship.<sup>6</sup> Recently, several authors have indicated that transitions, in which students move from one clinical rotation to another, represent a rather unexplained part of clinical workplace learning.<sup>7,8</sup> During transitions, students experience difficulties in adapting to new roles, responsibilities and supervisor relationships.<sup>9-11</sup> Questions exist about the strategies students may use to cope with these transitions and their consequences for learning. A study among residents coping with frequent transitions revealed that they primarily relied on one another by talking and exchanging experiences, as well as self-study and the developing of relationships with helpful others.<sup>7</sup> In this context, social comparison may also be used to cope with transitions, because people who enter a novel situation often use this strategy to estimate their abilities to master that particular situation.<sup>12</sup>

As they enter a novel clinical rotation, students may wonder whether they fit into the new team and meet the expected level of performance.<sup>9</sup> In general, people tend to estimate their abilities to master a situation before they enter the situation itself.<sup>12</sup> Such estimates or ideas of one's own abilities to master a specific task or situation are defined as self-efficacy.<sup>13</sup> Self-efficacy affects people's aspirations, goal setting, selection of activities and perseverance during difficulties.<sup>14</sup> In learning situations, self-efficacy is positively related to learning and performance.<sup>15</sup> Self-efficacy is mainly based on one's own former experiences.<sup>16</sup> However, when the situation is novel or unfamiliar, people are inclined to rely on the experiences of others and to do this by making social comparisons.<sup>17</sup> Therefore, social comparison is acknowledged by Bandura as a main source of self-efficacy.<sup>16</sup> We wondered whether social comparison influences student estimates of their own performance in a novel rotation and whether the process of social comparison, in turn, might strengthen or diminish students' self-efficacy during that rotation.

Social comparison is defined as the process of thinking about one or more others in relation to the self.<sup>18</sup> Social comparison can be seen as a strategy for coping with all kinds of social situations and is used by almost all people to make sense of themselves in an actual or future position.<sup>19</sup> Previous research among medical students in clinical workplace learning revealed that students also frequently compared themselves.<sup>20</sup> Students were found to prefer to compare themselves with peer students who were similarly situated in a clinical hierarchy and equally experienced in clinical practice. In a transition to a novel rotation, peer students who have already completed that rotation are of special interest as comparators. The process of thinking about a peer's performance, in terms of his or her efforts, successes and failures during that rotation, in relation to a student's own abilities, offers that student the opportunity to estimate his or her own future performance during that rotation. If social comparison has an effect on students' estimates of performance, the perceived performance level of the comparison peer might be of influence. Therefore, we included the comparison peer's performance level in our experimental study and asked:

What is the influence of social comparison on a student's estimate of his or her performance in a novel rotation after comparison with a peer student – known to be better, similar or worse – who has completed that particular rotation?

In social comparison theory, similar others are considered the most informative comparators because they most reliably reflect one's own position and opportunities.<sup>12</sup> Similarity is described in terms of factors such as experience, intelligence, age and gender, which may influence an individual's position and opportunities.<sup>21</sup> In clinical rotations, most undergraduate medical students share the same history of education, are similarly equipped for clinical practice and are about the same age. Therefore, they are quite homogeneous on most of these aspects. However, in a learning environment that includes both male and female students, comparisons in opposite-gender situations may occur. We wondered whether students' estimates of their future performance are influenced differently by comparisons with peer students of the same or the opposite sex. To investigate this influence of gender, we formulated the following research question:

Are there differences between: (i) estimates of female and male students; (ii) estimates in female–female and male–male comparisons, and (iii) estimates in female–male and male–female comparisons?

## **METHODS**

According to social comparison theory, the preferred comparison other depends on situational circumstances and personal preferences.<sup>19</sup> In clinical rotations, there are many situations in which students can compare themselves with all kinds of peers. The perceived performance level of these peer(s) may vary on different aspects of performance. The great variety of possible comparison situations may obscure effects measured in an authentic setting. To control for this variety, we designed an experimental study in which we used a written comparison situation and controlled for the performance level and gender of the comparison peer.

### **Context and participants**

Participants were a cohort of students ( $n=321$ , 67% female) in the first year of the Master's programme of the University Medical Center Groningen, Groningen, the Netherlands. This study year includes four clinical rotations. At the time of the study, all participants had completed two rotations and were required to start their next rotation within 2 weeks. The study was introduced by a teacher of the pre-clinical Bachelor's programme and all students were given a written explanation. Participation was voluntary and anonymous and was expected to take approximately 10 minutes. All students decided to participate and gave their consent. The study was approved by the Ethical Review Board of the Netherlands Association of Medical Education, (Nederlandse Vereniging voor Medisch Onderwijs [NVMO]).

### **Procedure**

We presented the participants a written comparison situation (Fig. 1). In this situation, each participant was asked to imagine that he or she met a comparison peer known from a skills training course they had both completed. During that course, the participant had become familiar with the performance level of the comparison peer (variable: 'peer's performance'; values: 'better', 'similar' or 'worse') and the comparison peer's gender (variable: 'peer's gender';

values: 'male' or 'female'). At the time of their meeting, the comparison peer had already completed the rotation the participant was scheduled to undertake next. The comparison peer told the participant about his or her experiences and mentioned the overall grade (7.5 on a 10-point scale) he or she obtained in that particular rotation. This grade was the same in all conditions and is representative of the average performance grade in first-year rotations. The participant was asked to estimate his or her own performance in the forthcoming rotation using a 5-point scale (variable: 'student's estimate'; values: 1=much worse to 5=much better).

**Box 1** Instruction to participants

Imagine: Prior to your next clinical rotation you meet one of your fellow students. You know him\* from the skills training center, where you both attended a skills training course. During that course you noticed that his\* performances were better\*\* than yours. You also know that he\* performed better\*\* than you did on the final assessment of that training period.

He\* tells you about his most recent clinical rotation, the one you are going to do next: 'They have an attractive program and provide good supervision. If they know your capabilities, you are allowed to do a lot. When discussing a patient you have seen, they are generous with their compliments when satisfied, but also very critical about things you did not do or ask. They always want to know why you do or ask something. Assessment is taken very seriously as well and, as a consequence, your overall grade really corresponds to your capabilities.'

He\* had received a 7.5

Estimate your own performance	<b>much worse</b>				<b>much better</b>
My overall grade in this rotation will be	1	2	3	4	5

\* These words were expressed in male or female forms (he/she, him/her, his/her) according to the comparison condition;  
 \*\* These words were expressed as better, similar or worse according to the comparison condition.

In a pilot study (n=8), we tested the instruction for participants in several conditions and adjusted the situation in accordance with their constructive comments.



## Design

The combination of participant gender with all values of the variables 'peer's performance' and 'peer's gender' resulted in 12 conditions, which are presented in Figure 2. Each condition represents the participant's gender (female [ $F_{part.}$ ] or male [ $M_{part.}$ ]), the comparison peer's gender (female [F] or male [M]), and the comparison peer's performance level (worse [W], similar [S] or better [B]). For example, the condition  $F_{part.}$ -FW means that the participant is a female student who compared herself with a female peer introduced as performing worse. To guarantee enough statistical power in each condition, male ( $n=107$ ) and female ( $n=214$ ) participants were evenly distributed across the variables 'peer's gender' and 'peer's performance'. This resulted in at least 35 female and 17 male students per condition.

Participant's gender	Peer's gender	Peer's performance	Conditions	n
Female	Female	Worse	$F_{part.}$ -FW	36
		Similar	$F_{part.}$ -FS	36
		Better	$F_{part.}$ -FB	36
	Male	Worse	$F_{part.}$ -MW	35
		Similar	$F_{part.}$ -MS	35
		Better	$F_{part.}$ -MB	36
Male	Female	Worse	$M_{part.}$ -MW	18
		Similar	$M_{part.}$ -MS	18
		Better	$M_{part.}$ -MB	18
	Male	Worse	$M_{part.}$ -FW	17
		Similar	$M_{part.}$ -FS	18
		Better	$M_{part.}$ -FB	18

**Figure 2** Study design, schematic illustration about the distribution of female and male participants across the variables 'peer's gender' and 'peer's performance'.  $F_{part.}$ =female participant;  $M_{part.}$ =male participant; FW=female, worse; MW=male, worse; FS=female, similar; MS=male, similar; FB=female, better; MB=male, better

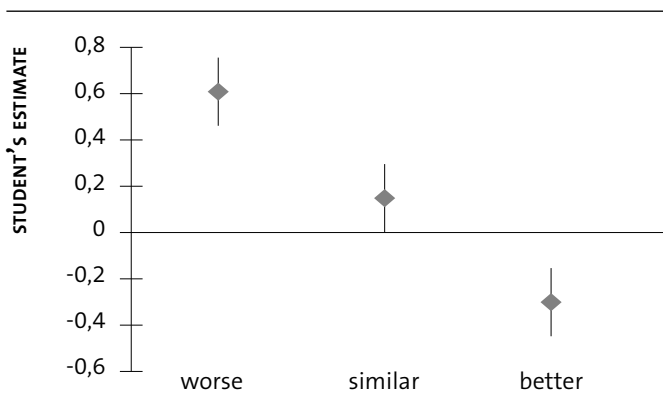
## Analysis

To distinguish between estimates that were worse or better than the comparison peer's performance level, participants' estimates of their own performance were recoded from the scale of 1–5 to a scale of –2 to 2, on which –2 = much worse, –1 = worse, 0 = similar, 1 = better and 2 = much better.

Differences between participants' average estimates based on the comparison peer's performance level (worse, similar or better) were assessed by means of analysis of variance (ANOVA) with post hoc Bonferroni tests. Gender differences were analyzed using unpaired *t*-tests.

## RESULTS

The highest estimates of performance in a novel rotation were made by participants who compared themselves with a peer student introduced as performing worse (mean = 0.60, standard deviation [SD] = 0.58), followed by estimates made by participants who compared themselves with a peer introduced as performing similarly (mean = 0.13, SD = 0.69). The lowest estimates were made by participants who compared themselves with a peer introduced as performing better (mean = -0.30, SD = 0.81). Differences between these average estimates assigned to the comparison peers' performance level were all significant ( $F_{(2,318)} = 44.184, p < 0.001$ ) (Fig. 3).



**Figure 3** Students' estimates of their own future performance according to the comparison peer's performance level (worse, similar or better), shown as means with 95% confidence intervals

The average estimate of performance of all female students (mean = 0.04, SD = 0.77) was significantly lower than the average estimate of all male students (mean = 0.35, SD = 0.79) ( $t_{(207)} = 3.35, p < 0.001$ ).

In all same-gender conditions – in which female students compared themselves with female peers and male students with male peers – female students' average estimates of performance did not differ significantly from those of male students (Table 1).

**Table 1** Same-gender comparisons showing differences between students' estimates of their own performance according to the comparison peer's performance level (worse, similar or better) in female-female and male-male comparisons.

Condition	n	Mean	SD	t	df	p
F <sub>part.</sub> -FW	36	0.51	0.55	1.922	52	0.060
M <sub>part.</sub> -MW	18	0.83	0.62			
F <sub>part.</sub> -FS	36	0.14	0.64	0.741	52	0.462
M <sub>part.</sub> -MS	18	0.28	0.67			
F <sub>part.</sub> -FB	36	-0.44	0.88	0.878	52	0.384
M <sub>part.</sub> -MB	18	-0.22	0.88			

SD = standard deviation; Fpart. = female participant; Mpart. = male participant; FW = female, worse; MW = male, worse; FS = female, similar; MS = male, similar; FB = female, better; MB = male, better

In opposite-gender conditions – in which female students compared themselves with male peers and male students compared themselves with female peers – female and male students' average estimates of performance were equally high when the comparison peer's performance level was known to be worse. The average performance estimates of female students were significantly lower than those of male students when the comparison peer's performance level was known to be similar or better (Table 2).

**Table 2** Opposite-gender comparisons showing differences between students' estimates of their own performance according to the comparison peer's performance level (worse, similar or better) in female-male and male-female comparisons.

Condition	n	Mean	SD	t	df	p
F <sub>part.</sub> -MW	35	0.60	0.55	- 0.244	50	0.809
M <sub>part.</sub> -FW	17	0.56	0.61			
F <sub>part.</sub> -MS	35	- 0.17	0.62	3.868	51	0.000
M <sub>part.</sub> -FS	18	0.56	0.70			
F <sub>part.</sub> -MB	36	- 0.39	0.66	2.411	52	0.019
M <sub>part.</sub> -FB	18	0.11	0.83			

SD = standard deviation; F<sub>part.</sub> = female participant; M<sub>part.</sub> = male participant; FW = female, worse; MW = male, worse; FS = female, similar; MS = male, similar; FB = female, better; MB = male, better

## DISCUSSION

In this experimental study, we analysed the influence of social comparison on students' estimates of their performance in a novel rotation. These estimates were highest in conditions in which students compared themselves with a peer student known to be performing less well. Male students' estimates of their own performance were higher than those of female students in opposite-gender conditions. These findings imply that student estimates of their own performance in a novel rotation are influenced by the performance level and gender of the comparison peer.

Estimates of future performance are strongly related to self-efficacy.<sup>16</sup> The findings of our experimental study indicate that students' self-efficacy is strengthened by comparisons with peers who are known to be performing less well and diminished by comparisons with peers known to be performing better. This peer influence in the process of social comparison is of potential educational relevance as self-efficacy affects students' learning and is positively related to performance.<sup>15</sup> Given our results, the benefit to be derived

by students of their use of social comparison depends on the performance level of the peer student against whom they compare themselves. This raises questions about which performance level is preferable in actual transitions, when students are free to choose their own comparison peers.

According to social comparison theory, the preferred direction of comparison – with others doing better or with others doing worse – depends on the underlying motive for making the comparison.<sup>22</sup> People motivated by the desire to enhance their self-confidence are known to prefer downward comparisons in which they compare themselves with others who are known to be doing less well. Therefore, students who are uncertain about their abilities to master a novel rotation may prefer to compare themselves with a peer student perceived to be doing less well. Such a downward comparison may be beneficial to these students' learning as it may strengthen their self-efficacy. A study among high school students showed improved performance after downward comparison across a range of educational courses.<sup>23</sup> By contrast, people motivated by self-improvement mainly prefer to make upward comparisons in which they compare themselves with others known to be doing better.<sup>22</sup> For that reason, students motivated by self-improvement may prefer to compare themselves with a peer student perceived as doing better. Several studies outwith the field of medical education have shown that upward comparisons are also related to performance improvement, particularly when student is able to identify him- or herself with the better- performing peer.<sup>23-25</sup> These comparisons are considered to endow a sense of one's own potential.<sup>23</sup> However, upward comparison may also emphasize someone's inferior position, especially when the performance of the comparison other is considered to be out of reach.<sup>26</sup> In learning situations, such an upward comparison may lead to the lowering of personal standards.<sup>25</sup> This may have happened to our participants in the conditions that included a better-performing peer and may explain their lowest estimates of performance in a novel rotation. Further research should include the great variety of comparison situations possible in an authentic setting and investigate the motives that encourage students to compare themselves, the factors that determine which peers they choose to compare themselves against and which contexts of comparison contribute to students' learning and performance.

In an authentic setting, students in transition to a novel rotation may compare themselves with peers of the same and of the opposite sex. Overall, our study revealed that male students' average estimate of their future performance was above that of females. However, when we analysed the outcomes per condition, we found no significant differences between male and female students' estimates in same-gender conditions. In other words, male students were as influenced by the performance level of a male comparison peer as female students were by the performance level of a female peer. This equal influence can be explained by social comparison theory, in which comparators with the most similarity are considered to reflect one's own (future) position most reliably.<sup>21</sup>

In opposite-gender conditions, male and female students' average estimates of their future performance did not differ when the comparison peer was presented as performing less well. However, in opposite-gender conditions, in which the comparison peer was introduced as performing better or similarly, the average estimate of male students of their own performance was significantly higher than that of females. A possible explanation is offered in studies on gender and self-efficacy, in which gender differences in estimates of performance were related to domains stereotyped as male or female.<sup>15</sup> Estimates of males were highest in male-specific domains, like mathematics and information and communication technology (ICT). Medicine was traditionally labelled as a male-specific domain and it may still be so because women are still underrepresented at higher levels of the profession.<sup>27,28</sup> Furthermore, female students in clinical practice still report gender-associated barriers to their progression, such as those imposed by male supervisors' lower expectations of female students' performance and possibilities for specialization.<sup>29,30</sup> Students who compare themselves with a peer student of the opposite sex may be more influenced by stereotyped differences than students who compare themselves with a peer of the same sex.

In recent years, the number of female students has increased significantly.<sup>29</sup> In the context of social comparison, we might reason that female students' learning in clinical rotations will benefit from this 'feminisation' in medicine. Given females students' higher estimates of their performance in same-gender comparisons, their average self-efficacy in a novel rotation may increase. Male students may also benefit from this because their estimates of their own

performance were highest after comparison with a female peer. However, in social comparison theory the most similar other is the preferred comparator.<sup>12</sup> Therefore, male students may require to compare themselves with male peers because only male peers can provide information about their future *male* position in a novel rotation. Further research in actual practice is needed to fully elucidate the impact of gender on students' use of the comparison strategy. Similar research is required for factors that may cause a comparison to involve dissimilar comparators, such as ethnicity and socio economic background. Like gender, the impact of these factors may also influence the comparison process.

In this experimental study, we used 12 different comparison situations in which we controlled for the comparison peer's performance level and gender. We included a large enough number of students, especially male students, to ensure sufficient statistical power in every condition. However, the experimental nature of the study is a limitation that restricts the generalizability of our findings. In actual clinical practice, students are free to choose the performance level and gender of their own comparison peer or peers, in a great variety of circumstances. Therefore, further research in an authentic setting is required. Another limitation of our study might be that the outcome measure – the estimate of future performance – is based on self-reported data. The use of self-perceptions is inevitable because social comparison is an internal process that takes place in people's minds and cannot be measured otherwise. Because of the experimental nature of our study, we were unable to relate estimates of future performance to actual performance. However, the relevance of those estimates to actual performance can be derived from the literature, which shows that estimates of future performance are related to self-efficacy, which, in turn, is positively related to performance.<sup>16</sup>

## CONCLUSIONS

The outcomes of this experimental study showed that the use of social comparison influences students' estimates of their future performance. The effect depends on the comparison peer's performance level and is affected by gender. This may be of educational relevance because it indicates that the characteristics of the peer student chosen for comparison will strengthen or diminish a students' self-efficacy in a novel rotation. A deeper understanding

of students' comparison behaviour during transitions might contribute to understandings of this part of clinical workplace learning. Therefore, future research in an authentic setting should focus on how students actually use social comparison to cope with transitions.



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