Simulation training and professional self-confidence: a large-scale study of 3rd year nursing students

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CRediT AUTHORSHIP CONTRIBUTION STATEMENT

Fuglsang, Bloch and Selberg constructed the study framework and study design. Selberg implemented the intervention and collected data. Fuglsang and Bloch analyzed and interpreted data. Fuglsang wrote the original draft manuscript. Bloch and Selberg revised the manuscript and provided writing suggestions. All authors read and approved the final manuscript.

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SUPPLEMENTARY MATERIALS

Additional analyses are provided in the attached document titled “Supplementary materials”. These analyses will be hosted online by Aarhus university after submission.

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ABSTRACT

Background: While hands-on training is a prerequisite for successful education of nursing students, constraints on clinical training availability and quality have increased focus on effects of in-school simulation training. However, existing research has produced inconsistent conclusions and the literature lacks high-powered evidence from controlled trials.

Objectives: To test effects of a simulation scheme on student professional self-confidence in technical and non-technical skills, as well as to investigate effects on knowledge acquisition and interaction with clinical training.

Design: Field experiment, treatment is a 3+2 day simulation training scheme while control is a standard 3 hour simulation session. Self-confidence in a list of technical and non-technical skills are measured in three survey-rounds. Enriched with data on type of clinical training site and grade attainment.

Setting: University College Copenhagen Department of Nursing, all 3rd year students in 2019.

Participants: 352 in cohort, out of which 316 participated and 311 answered first survey round (163 in treatment, 148 in control).

Methods: Field experiment analyzed utilizing multivariate OLS regression analysis.

Results: Students who receive increased simulation training report markedly higher levels of professional self-confidence immediately after training. This effect is double the size for confidence in technical skills, compared to non-technical skills. The effects on self-confidence in technical skills persist at the end of the following semester for those that receive low intensity clinical training. Students who receive the treatment see a small (and statistically uncertain) relative increase in grade attainment in the semester of treatment, but this difference dissipates over time.

Conclusions: Simulation training has substantial positive short-term effects for the professional self-confidence of nursing students and appears to have small positive effects on knowledge acquisition. Most of these effects are crowded out by other factors (notably intensive clinical training) over time but might have long-term positive effects for those that do not receive other intensive hands-on experiences. This is interpreted as an indication that simulation training can be used to compensate for uncertainties in providing sufficient training experiences outside of academic training.

Keywords: Nursing education, simulation, self-confidence, knowledge acquisition, clinical training, grade attainment.

INTRODUCTION

It is widely accepted that "graduating competent [nurses] is predicated on the assumption that ample opportunities are made available for student learners to intentionally experience meaningful encounters that include the opportunity to apply and expand their knowledge and skills in hands-on clinical settings." (Mancini, LeFlore & Cipher, 2019: 561). However, constraints on clinical training capacity and efficacy as well as concerns of patient safety (Ziv & Wolpe, 2000; Ironside & McNelis, 2010; Lewis & Smith, 2012; Hayden et al., 2014) have called into question the adequacy and availability of clinical training as the stand-alone provider of nursing student practical training. In addition, discussions amongst practitioners, experts and students point towards problems of anxiety induced by clinical training (Chernomas & Shapiro, 2013; Turner & McCarthy, 2017), potentially decreasing efficacy of clinical training (e.g. Cheung & Fong Au, 2011), and discussions within nursing education point towards problems implementing academic education into practice (the "theory-practice gap"; see Landers, 2000; Scully, 2011). A potential solution to these challenges is in-school simulation training, which might bridge the gap between theory and practice (Weeks et al., 2019), heightening confidence and abilities of nursing students.

This has fostered interest among practitioners, decision makers, and researchers in the merits of simulation training, spawning a large body of literature on the effects of implementing simulation programs in nursing schools. However, studies conducted in the last 15 years report mixed results. The literature suggests positive effects of simulation training on multiple relevant outcomes (e.g. knowledge acquisition, critical thinking, student satisfaction, self-confidence/efficacy, technical skills, non-technical skills, and patient safety), though conclusions are inconsistent across studies. In addition, reviews note that methodologically robust evidence remains scarce (Lewis & Smith, 2012; Hayden et al., 2014; Laschinger et al., 2007; Lapkin et al., 2010; Husebø et al., 2018; Mariani & Doolen, 2016; Yuan, Williams & Fang, 2012).

Outcome measures can be loosely divided into three groups: student satisfaction, self-confidence and knowledge acquisition (including the related "clinical competency" and "critical thinking", which is operationalized as test performance). Students generally report high satisfaction with simulation training (as noted in e.g. Laschinger et al., 2007; Lapkin et al., 2010), however reported effects on self-confidence/efficacy are mixed (Lapkin et al., 2010), and although simulations training appears to increase knowledge acquisition (or clinical competence, critical thinking), it is unclear whether these effects persist over time (Laschinger et al., 2007).

Most randomized controlled trials find little or no relation between simulation training and self-confidence among nursing students (Alinier, Hunt & Forden, 2004, Alinier et al., 2006; Blum, Borglund & Parcells, 2010; Brennan, White & Bezanson, 2008; Brown & Chronister, 2009), with one even identifying higher levels of self-confidence among those not participating in simulation (Brown & Chronister, 2009). Some report positive effects on self-confidence, though predominantly employing designs that lack a comparison group (e.g. Mould, White & Gallagher, 2011; Burns, O'Donnell & Artman, 2010). One randomized controlled trial stands out among papers with positive findings, fielding a large (n = 403) multisite experimental US study (Jeffries & Rizzolo, 2006), reporting significant positive effects of high-fidelity simulation on self-confidence (as well as learning outcomes). A point of interest in this body of research is that the object in which the students are confident varies considerably between studies, for example "confidence in working in a technological environment" (Alinier et al., 2006: 366) and "the skills they practiced and their knowledge about caring for the type of patient presented in the simulation" (Jeffries & Rizzolo, 2006: 7).

Most studies of the effects of simulation training on aspects of knowledge acquisition investigate effects of simulation training on test scores. Among these, two studies (Alinier, Hunt & Forden, 2004; Alinier et al., 2006) employ the OSCE (Objective Structured Clinical Examination) as a measure of student nursing ability, finding positive effects of simulation training in controlled experimental designs. Similarly, Brannan, White & Bezanson (2008) employ an Acute Myocardial Infarction Questionnaire (AMIQ), and Sullivan-Mann, Perron & Fellner (2009) use the Health Sciences Reasoning Test (HSRT), both finding higher performance among those participating in simulation training as compared to classroom nursing training. Another potential avenue for measuring student knowledge acquisition is through instructor evaluations of nursing students. This method is employed by Blum, Borglund & Parcells (2010), finding that clinical competency is increased further in simulation training compared to standard curriculum. A group of studies examines effects substituting clinical time for simulation. These find comparable levels of knowledge acquisition between groups receiving standard clinical training and groups substituting up to 50 % of clinical with simulation training (Schlairet & Fenster, 2012; Hayden et al., 2014; Mancini, LeFlore & Cipher, 2019). These studies point towards the interplay between simulation and clinical training, which is further investigated in this study.

This study aims to contribute to this literature by investigating *effects on student professional self-confidence* in technical as well as non-technical skills, as well as *knowledge acquisition* measured though grade attainment. Additionally, we aim to evaluate the *sustained effects of simulation training* after subsequent clinical training with *differing levels of clinical training intensity*. We do this by performing a controlled field experiment (n = 311, treatment: 148, control: 163), fully integrated into the nursing training program at University College Copenhagen during the fall semester of 2019, for all 3rd year nursing students.

METHODS

All spring 2019 5th semester bachelors nursing students at University College Copenhagen were included in the field experiment. Students were divided into treatment and control through cluster randomization at the classroom level. A total of 10 classes (ranging from 29 to 40 students) were enrolled, 5 classes each assigned to control and treatment groups. 352 students were enrolled in the cohort, out of which 316 participated and 311 answered the first survey round (163 in treatment, 148 in control). Randomization checks indicate that groups are approximately equal though the intervention group shows slightly higher prior simulation exposure (see supplementary materials-S.1; difference is controlled out in regression analysis). Participation in the experiment was mandatory as it was fully integrated into the education plan, though students were free to opt out of data collection.

The treatment group received a comprehensive three plus two day full-scale simulation program (the latter two days during the 6th semester) utilizing up-to-date equipment and teaching techniques, whereas the control group received the standard course at the institution, which consisted of a short three-hour simulation training program. The full-scale simulation training was a human patient simulation scheme, carefully designed to have high physical, conceptual as well as emotional fidelity (Choi et al., 2017). The initial simulation training targeted both technical and non-technical skills, employing teacher instructed exercises, peer-to-peer training, simulation scenarios as well as follow-up debriefing. Groups of four participated in each of the scenarios, while the rest of the class observed and participated in the debriefing. The two-day follow up session during the following semester (coming back to school from clinical stays) included one day of peer-to-peer training and one day with simulation. Not all students acted as the active nurse in the scenarios; this was registered and controlled for in regression analyses.

Descriptive statistics for all variables included in the regression analysis can be seen in table 1. This displays the scales and ranges for all variables, as well as the levels in the treatment and control groups. This also displays the number of observations, which shows some attrition over the course of the three survey rounds. Additional analysis (supplementary materials-S.2) indicates that attrition is non-systematic.

[Table 1, descriptive statistics]

To measure student self-confidence, two batteries were deployed. These measured confidence in technical skills (11 questions) and confidence in non-technical skills (7 questions). These batteries asked the student to "indicate how confident you are in your ability to perform the following skills", such as "blood transfusion" and "communicating the patient" (see wordings, translated and in Danish, in supplementary materials S.3). All questions were 5-point Likert questions ranging from "I have little or no knowledge of this" to "I am completely confident in performing this independently". These two batteries have been recoded into two additive measures ranging from 0 to 10, 0 indicating very low confidence, 10 indicating very high confidence. Students were surveyed prior to simulation training (T1), immediately after 5th semester training was completed (T2), and finally at the end of the 6th semester after participants had attended clinical training (T3).

Exam grades[1] were merged with an anonymized version of the dataset. This includes a pre-study GPA for the first four semesters, and (post treatment) GPAs for the 5th and 6th semesters. Additionally, information on clinical training sites for each student was manually coded to indicate whether training was done in a hospital setting, in a municipal setting, or in psychiatric practices. Hospital settings are assumed high intensity settings, whereas municipal sites are assumed to be lower intensity. Only a small group were in psychiatric settings, and therefore this group is excluded in analyses including clinical site. The assumptions regarding intensity of clinical settings correspond to student perceptions (see supplementary materials S.3).

Finally, 5th semester coursework includes both a theoretical teaching module and a clinical teaching module, where half of the classes (5) started with theory (/clinical) and then switched mid-semester, and where these modules took place before and after treatment. Three treatment classes and two control classes started with clinical training. This is registered as "pre-training", and this asymmetry is controlled for in the regressions below.

All statistical analyses are performed using OLS in R Studio, graphical representation done in ggplot 2.

SELF-CONFIDENCE

Analysis of the effects of the treatment on participants' self-confidence can be seen in table 2. These regression analyses examine the effect of the treatment on technical and non-technical self-confidence at T1, T2, and T3, controlling for relevant confounders: participation in the clinical teaching module prior to treatment, prior experience, grade point averages prior to the

[1] Awardable grades in the Danish grading system are; -3, 00, 02. 4, 7, 10, 12.

5th semester. Additionally, the analyses for T2 and T3 control for T1 self-confidence levels, as well as whether the individual was an active performer in the simulation scenarios.

[Table 2, technical and non-technical self-confidence]

Regressions including confounders one by one (which reach identical conclusions) can be seen in supplementary materials S.4.

The pre-test results, T1, show that differences between the treatment and control groups are small and not statistically significant ($p = 0.22$ & 0.75). However, we still choose to control for pre-test levels in the analyses (see further discussion in supplementary materials S.4).

Turning to T2-tests, results recorded just after treatment/regular training, the effects are substantial. The treatment group is significantly more confident in their nursing skills, both technical and non-technical. Effects are larger (more than double) for self-confidence in technical skills, which is of some interest as training focuses as much on teamwork and communication as it does on development of technical skills. This difference could potentially reflect that technical skills are perceived as more tangible metrics than non-technical skills. This is further elaborated upon in the discussion section. In terms of size, the effects are increases of about 11 and 5 percentage points on the confidence scales respectively. Though this is hard to translate into substantial changes in confidence, these results are interpreted as quite significant difference.

Professional self-confidence was measured again in the subsequent semester while students were involved in clinical training. The two first T3 models display effects without considering type of clinical training site. These two models show how effects on self-confidence in technical abilities persist at this point, indicating a quite resilient effect of the full-scale simulation training. However, prior research as well as discussions on differences in clinical training quality motivate the investigation of how the intensity of clinical training moderates the longevity of the effects of full-scale simulation training. This is investigated in the two final models of table 2. Here we introduce an interaction term between treatment and a dichotomous variable indicating whether the student was in a high intensity (hospital) or low intensity (municipal) clinical training. These models still only show effects of the treatment on self-confidence in technical skills. The effects are large for those who received low intensity clinical training, whereas the effects are substantially reduced for those who received high intensity training (interaction term narrowly outside of conventional statistical significance, $p = 0.10$). This indicates that effects are crowded out by powerful hands-on experiences such as high intensity clinical training, but effects of the simulations scheme persists if hands-on experience is of a lower intensity, suggesting that simulation training might help reduce consequences of inconsistencies in clinical stay experiences.

Additionally, though the controls in table 2 are not randomly attributed, three additional points merit some attention: First, self-confidence is not predicted by prior grade point levels, indicating that self-confidence is not merely a reflection of prior accomplishments; this opens a discussion on the connection between skills and self-assessment of these, which is elaborated upon below. Second, the results show little difference between active participants and observers during the simulations, also discussed below. Finally, participation in the clinical teaching module prior to treatment and prior experience are positively associated with pre-simulation self-confidence. These effects might lead to expectation that experience or training also moderates effects of the treatment. However, testing for such interactions finds no evidence that treatment is more/less effective among those who started with practical training, or those that indicate prior experience (see supplementary materials S.5).

[Figure 1, see title and notes in “figure titles and notes”]

Figure 1 illustrates changes in self-confidence over time. Presented estimates are raw means, as confounders change across survey rounds. Self-confidence in technical skills rises drastically for the treatment group after the treatment, whereas this is not the case for the control group. This difference disappears for those that received high intensity clinical training (T3H), indicating that high intensity clinical training levels out the (longer term) differences in confidence. However, the differences persist among those who received low intensity clinical training (T3L), an indication that full-scale simulation training might remedy problems relating to clinical training site availability. Turning to non-technical skills, differences are generally lower, and the intensity of clinical training site seems to matter less. Here, all T3 estimates are very close, indicating that effects of simulation training do not persist regarding self-confidence in non-technical skills.

KNOWLEDGE AQUISITION

As a measure of knowledge acquisition, this study employs grade point averages of the participating students. Grade point averages were calculated for the first four semesters, the fifth, and the sixth semester. To investigate the influence of treatment upon subsequent test performance, a series of OLS regressions were performed, see table 3. These show positive but narrowly statistically insignificant relations ($p = 0.12$, $p = 0.10$) between the treatment and 5th semester grade point average, and show no relation to 6^{th} semester grades. However, the pattern of these results, as seen in figure 2, merit some attention.

[Table 3, grade attainment]

The top graph in figure 2, showing the raw grades of the two groups, mainly shows that the treatment group obtains higher grades than the control group, but that this difference is already present prior to treatment. When the prior grades are subtracted (lower graph), we see that grades are still higher for the treatment group, though the difference at the 5th semester is too small to reach conventional statistical significance ($p = 0.12$). This result is subject to considerable uncertainty, but this is a soft indication of a small temporary boost in knowledge acquisition connected to simulation training of nursing students, which dissipates over time as other experiences crowd out the effects.

[Figure 2, see title and notes in “figure titles and notes”]

A final point of interest is the correlation between levels of self-confidence and GPAs, seen in table 4. The first two models show 5th-semester grades predicted by the self-confidence levels just after the treatment / regular training (T2), controlling for prior grades. This shows how these self-confidence levels are clearly related to the grades at the end of this semester, indicating that self-confidence seems to be connected to (academic) performance, at least during the treatment semester. The subsequent tests of self-confidence in T2 and T3 on 6th-semester grades show no connections. What causes this correlation to be present only in the treatment semester is uncertain, though grades for the 6th semester are based on a project report, which arguably may be less aligned with simulation training than coursework during the first five semesters. The results for grades thus support the narrative that emerges above, that simulation training is especially efficient in raising student confidence, and through this, performance in the short term, whereas effects are crowded out by stronger influences, i.e. clinical training, in the long run.

[Table 4, relations between professional self-confidence and grades]

DISCUSSION AND CONCLUSION

This study demonstrates increases in professional self-confidence of nursing students as a product of simulation training. This increase is especially striking for self-confidence in technical skills, which displays a significant increase that persist a semester later for individuals who receive low intensity clinical training. Additionally, the results indicate small (less clear) short-term increases in knowledge acquisition. In line with comments from reviews of the literature, our results indicate that effects of simulation training diminish over time as other factors crowd out the increases in confidence or knowledge, but additionally these results indicate that simulation training might correct for inequalities in other influencing factors in nursing education, in this study specifically clinical training intensity. The results of our analyses regarding self-confidence stand in contrast with earlier studies which tend to indicate only small or no effects on self-confidence (Alinier, Hunt & Forden, 2004, Alinier et al., 2006; Blum, Borglund & Parcells, 2010; Brennan, White & Bezanson, 2008; Brown & Chronister, 2009). This could be the result of differences in design, setting or sample size, but two specific takes on this difference are highlighted here.

As touched on above, a potential driver of this difference should be the skills in which student self-confidence is measured. One thing that varies across studies is the alignment of specific aspects of confidence with the actions which were trained during the simulation. Confidence in skills that are clearly connected to what is simulated should be affected whereas more distant aspects, i.e. working in technological environments, should be less affected.

A related but separate explanation for the differences in findings could be ease of evaluation in relation to a specific skill or survey wording. It seems possible that students register larger increases in more tangible aspects of confidence, as self-evaluation is more easily performed when measuring “hard skills”, whereas skills such as communication are more difficult to self-evaluate. This corresponds well with differences found among studies, where harder to evaluate skills show little to no changes in self-confidence. This also offers a potential explanation for the differences in confidence changes for technical and non-technical skills found in this study, where technical skills can be seen as more tangible and therefore easier to assess for participants.

Neither the “training-skill alignment” or “tangibility of evaluation” explanations for what types or measures of self-confidence are affected by simulations training can be clearly evaluated on the basis of the data of this study, but they could be further examined in future studies. Both points relate to a need for a clearer focus on which forms of confidence (and towards which skills) a given study investigates, and how the concept of self-confidence is measured. This study demonstrates that what we term "professional self-confidence", i.e. confidence in the ability to perform nursing skills, is affected by simulation training and that this confidence subsequently affects grades in the short term.

Another point of interest is the lack of difference between active participants and observers. Though the similar effects between individuals regardless of activity in the simulation training is intuitively puzzling, this is in line with experiences of the practitioners performing the full-scale simulation training, and mirrors other studies (e.g. Jeffries & Rizzolo 2006), additionally it might be explained by effects of teaching activities around the simulation (better preparation, debriefing, etc.). Related to this, it is puzzling that prior grades do not affect self-confidence levels, especially that this is the case for pre-study grades and pre-test confidence (this lack of correlation persists in all models even if removing all other controls). It would seem reasonable to assume that prior performances affect self-confidence. As such, prior grades would be central in the "calculation" of confidence in one's skills. However, this seems to not be the case in this data, which could either mean that self-confidence as a concept is not reliant on this specific sort of professional self-evaluation or that the prior grades are simply too distant (in time or perceived relevance) to be relevant or be used heuristically by the participants.

Finally, the treatment employed in this study contains multiple components, and the independent influence of each of these cannot be isolated in this design. In this study the data does not enable us to separate the influence of the different elements of the simulation training (briefing, simulation, debriefing, peer to peer training), and as such, we cannot say what exactly it is that works. Future studies could further investigate this, however some earlier studies indicate that the success of the treatment is not merely controlled by the level of fidelity (Kim et al., 2016, Smith & Roehrs, 2009), but might also be affected by the surrounding setup outside of the simulation lab which intuitively resonates with the results of, and logic behind, this study.

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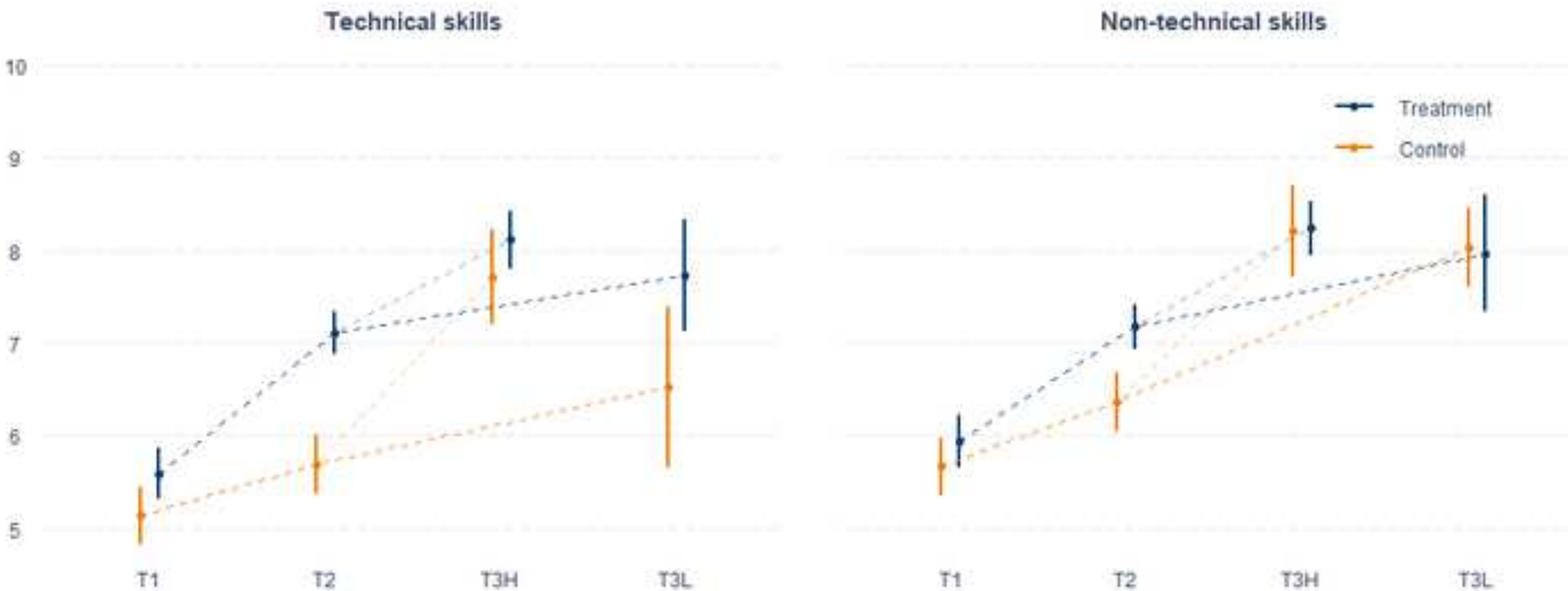
Figure 1



Technical skills
Non-technical skills
10
9
8
7
6
5
Treatment
Control
T1
T2
T3H
T3L
T1
T2
T3H
T3L

Figure 2

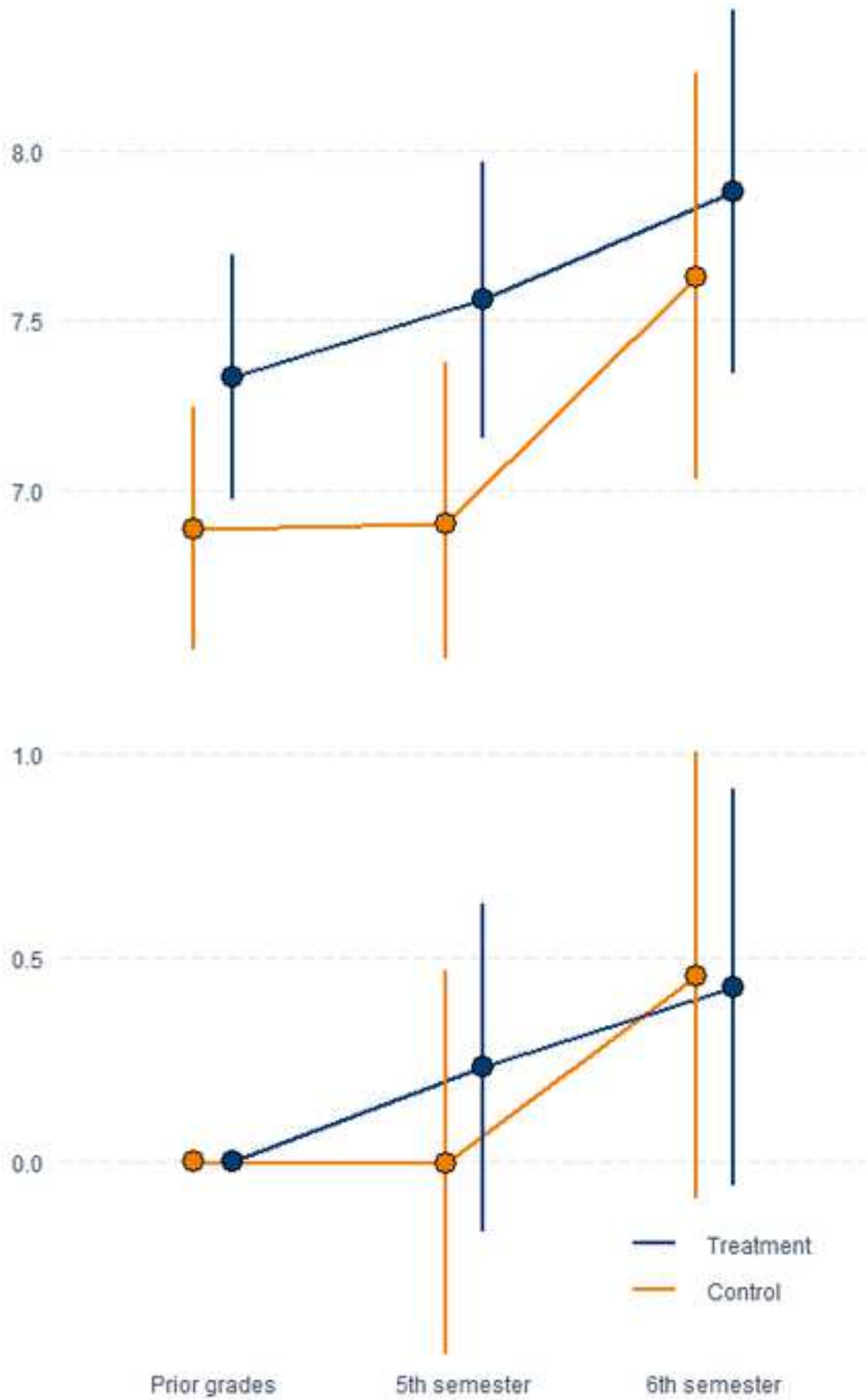

8.0
7.5
7.0
1.0
0.5
0.0
Treatment
Control
Prior grades
5th semester
6th semester

Table 1: Descriptive statistics

			Treatment		Control	
	Scale	Range [observed]	n	Mean (SD)	n	Mean (SD)
Self-confidence in technical skills						
Pre-test	Continuous	0-10	163	5.6 (1.8)	148	5.1 (1.9)
Post-treatment	Continuous	0-10 [1.4-10]	151	7.1 (1.4)	133	5.7 (1.8)
End of 6th semester	Continuous	0-10 [0.2-10]	91	8.0 (1.3)	52	7.2 (1.8)
Self-confidence in non-tech skills						
Pre-test	Continuous	0-10 [1.1-10]	163	5.9 (1.9)	148	5.6 (1.9)
Post-treatment	Continuous	0-10 [0.7-10]	151	7.2 (1.5)	133	6.4 (1.9)
End of 6th semester	Continuous	0-10 [1.8-10]	91	8.2 (1.2)	52	7.8 (1.8)
Grades						
Prior to 5th semester	Ordinal[a]	-3-12 [1.2-12]	171	7.3 (2.4)	173	6.9 (2.4)
5th semester	Ordinal[a]	-3-12 [-1.5-12]	168	7.6 (2.7)	166	6.9 (3.1)
6th semester	Ordinal[a]	-3-12 [0-12]	148	7.9 (3.3)	129	7.6 (3.4)
Pre-training (1 = training prior)	Dichotomous	n/a	174	.55	176	.32
Active (1 = active)	Dichotomous	n/a	174	.68	176	.50
Clinical intensity (1 = high)	Dichotomous	n/a	147	.69	117	.74

Notes: [a]: treated as continuous GPAs in analyses.

Table 2: Technical and non-technical self-confidence

	T1, Tech	T1, Non-tech	T2, Tech	T2, Non-tech	T3, Tech	T3, Non-tech	T3, Tech	T3, Non-tech
Intercept	4.33 *** (0.48)	4.92 *** (0.49)	2.44 *** (0.38)	2.46 *** (0.44)	4.36 *** (0.74)	4.45 *** (0.74)	5.28 *** (0.83)	6.23 *** (0.71)
Treatment	0.26 (0.21)	0.07 (0.22)	1.13 *** (0.15)	0.53 ** (0.17)	0.59 * (0.28)	0.24 (0.26)	1.33 ** (0.48)	-0.16 (0.41)
Prior grades	-0.06 (0.04)	-0.09 (0.04)	-0.02 (0.03)	0.04 (0.03)	0.10 (0.06)	0.08 (0.05)	0.05 (0.06)	0.04 (0.05)
Prior simulation experience	1.10 ** (0.41)	1.24 ** (0.42)	0.35 (0.29)	0.53 (0.33)	0.52 (0.67)	0.85 (0.62)	-0.80 (0.68)	-0.09 (0.57)
Pre-training	0.77 *** (0.21)	0.71 ** (0.22)	0.19 (0.15)	0.37 * (0.17)	-0.40 (0.26)	-0.15 (0.25)	-0.52 * (0.26)	-0.26 (0.22)
Pretest (specific)			0.60 *** (0.04)	0.56 *** (0.04)	0.34 *** (0.07)	0.32 *** (0.06)	0.32 *** (0.07)	0.30 *** (0.06)
Active			-0.17 (0.16)	-0.24 (0.17)	0.03 (0.27)	0.15 (0.26)	-0.06 (0.26)	-0.04 (0.22)
High clinical intensity							1.30 ** (0.45)	-0.03 (0.38)
Treatment*intensity							-0.93 (0.55)	0.33 (0.47)
N	306	306	278	278	127	127	110	110
R2	0.08	0.07	0.57	0.45	0.26	0.23	0.27	0.23

*Notes: OLS regressions *** p < 0.001; ** p < 0.01; * p < 0.05. Standard error in parentheses. Pretest is the pretest score for the specific skill-battery.*

Table 3 Click here to access/download;Table;Table 3, grade attainment.docx

Table 3: Grade attainment

	5th semester	5th, recoded	6th semester	6th, recoded
Intercept	3.32 ***	2.31 ***	2.71 ***	1.80 ***
	(0.47)	(0.32)	(0.62)	(0.41)
Treatment	0.46	0.19	0.08	0.02
	(0.29)	(0.11)	(0.36)	(0.14)
Prior grades	0.52 ***		0.68 ***	
	(0.06)		(0.08)	
Prior grades, recoded		0.53 ***		0.68 ***
		(0.06)		(0.08)
N	331	331	274	274
R2	0.19	0.19	0.22	0.22

*Notes: OLS regressions *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Standard error in parentheses. Regressions use both raw grades (-3, 00, 02, 4, 7, 10, 12), and recoded grades running from 1 to 7 (marked as recoded).*