

ORIGINAL ARTICLE

Open Access



Is there a relationship between student attitudes and behavior regarding integrity issues?

Hanneke Mol and Mariëtte van den Hoven*

* Correspondence: m.a.vandenhoven@uu.nl
Ethics Institute, Utrecht University,
Janskerkhof 13A, 3512, BL, Utrecht,
the Netherlands

Abstract

Stimulating responsible conduct of research is considered important within universities and research organizations. In this contribution, we investigated if there are gender differences regarding three aspects: students' attitudes towards integrity related issues, self-reported misconduct, and suspicions of misconduct and willingness to report fellow students. A questionnaire was sent to 1266 first year starting master students in the life sciences. Male students were significantly more likely to report not doing their fair share in group work and putting their name on work without checking it. No significant differences were found regarding attitude and suspecting and reporting other students.

Background and introduction

Stimulating responsible conduct of research is considered important within universities and research organizations (Steneck & Bulger, 2007; Kalichman, 2013). An important means to stimulate responsible behavior is to offer trainings for researchers on how to act in a responsible manner and stimulate a positive research culture (Steneck, 2007). The Office of Research Integrity (ORI) in the US gives guidance on how to teach integrity courses by indicating which topics should be more openly discussed. These include issues related to conflicts of interest, authorship, replication, and research with human subjects. The ORI also emphasizes the relevance of preventing questionable research practices and indicates how to become more transparent, honest, and accountable for decisions and actions in research practices (Steneck & Bulger, 2007). More and more, such integrity courses are also being taught to students in undergraduate and graduate phases of their studies, next to (early career) researchers. These courses often focus on topics that are related to the research process, and are often referred to as research integrity, as the ORI topics focus primarily on issues that are relevant to people who are involved in research practices. Yet, for many students, their educational journey on integrity issues starts with experiences that are said to belong to the domain of *academic integrity*, focusing on attitudes of students towards their studies. Macfarlane et al.



© The Author(s). 2022 **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

(2014) state that academic integrity should be defined as “about the values, behavior and conduct of academics in all aspects of their practice” (p. 340) while they also point out that the notion academic integrity is actually commonly interpreted to refer to student behavior only. Indeed, multiple studies on academic conduct focus on various forms of dishonest or non-integer behavior of students, including cheating, not doing one’s fair share of work in a group project, and arbitrarily choosing resources for one’s paper (e.g., Olafson et al., 2014; Simon et al., 2004). In this study, we interpret academic integrity as referring to student behavior, while we also acknowledge that academic integrity is ultimately about values and behavior in academic contexts that should be underlying to this student behavior. Interpreted like this, there is a clear continuum between academic and research integrity, as both take the behavior and values of performance within academia as reference point. It makes sense in the educational journey of students to see how study behavior and behavior in research contexts succeed and overlap each other. We see this clearly when students enter a master program: their experiences with integrity will most likely be in both fields; they already got acquainted with typical topics in the field of research integrity (e.g., how to collect, handle and present data), will also have experiences with academic integrity (the need to be honest and transparent for example) and will have witnessed or experienced breaches of academic integrity (like cheating, cutting corners in the analysis of data etc.). Thus, when studying integrity among students, it is more interesting to combine examples from the fields of academic integrity and research integrity. In the current study we therefore used examples from both fields.

With regards to the literature on *academic integrity* of students, we find multiple examples of breaches of academic integrity as mentioned above. In the field of *research integrity*, we also find a wide area of so-called questionable research practices (QRPs) that are much more in the grey area (Steneck, 2007) and which are extensively discussed in the literature (e.g., Vries et al., 2006). In the field of research integrity it is widely acknowledged that many dilemmas are much more in the grey zone, i.e., concern situations that are not clear cases of misconduct, and in which it is sometimes unclear what would be the best thing to do (Vries et al. 2006). We think that it is more likely that students, like researchers, will have encountered grey area issues more frequently than cases of misconduct (Gopalakrishna et al., 2021), despite the fact that high cheating rates are reported in the literature at times (Iqbal et al. 2021).

A focus on grey areas will increase the chances that integrity education relates more closely to experiences of students and also emphasizes that integrity issues are not only about avoiding misconduct, and that there are not always straightforward solutions. Focusing on grey zone cases also stimulates students to see that choices can be made, that it is not always a matter of clear right and wrong when confronted with dilemmas, and that one can learn what it takes to behave responsible. This clearly differs from focusing on what penalties await when one enters the field of misconduct (van den Hoven & Krom, 2020). Therefore, we decided to include grey area issues in a study among students who took a course on integrity as part of the introduction to their master’s degree.

Critical factors with regards to academic integrity and research integrity

When one wants to stimulate upright behavior among students, it is relevant to know which critical factors for academic and research integrity are known. Kisamore et al.

(2007) make a distinction between *individual factors for academic integrity*, “such as gender, age, grade point average, education, and several personality variables”, and *situational factors*, “such as honor codes, surveillance, rewards/sanctions, peer context, fraternity, or sorority membership and campus housing” (p. 381). Olafson et al. (2014) state that there are multiple, overlapping reasons for cheating behavior, including

“lack of time, procrastination, the decline of morals in society, peer acceptance that cheating is necessary to get good grades, the belief that cheating is too prevalent to stop, and the use of new technology such as finding or buying information on the Internet” (p. 660-1).

With regards to research integrity, similar individual and organizational predictors are found (Langlais, & Bent, 2014).

Gender and integrity

One factor that is frequently mentioned is gender (e.g., Miller et al. 2007). Yet, if gender is a critical factor, how should this be interpreted: are male students more vulnerable to misbehaving, do female and male students have different views or attitudes towards integrity issues, and/or do they behave differently when confronted with an integrity issue? Several studies can be found in the literature focusing on either the attitude of students, suspecting and reporting others, or student behavior towards academic and research integrity, yet many studies still seem inconclusive. We will discuss these below.

Attitude

First, previous research suggests that female researchers have a less favorable attitude towards academic and research misconduct than male. For example, in a meta-analysis on cheating behavior, Whitley Jr et al. (1999) found that female researchers on average had a less positive attitude towards cheating than male researchers and that these “gender differences increased over time” (p. 662). Talib et al. (2013) investigated attitudes towards research misconduct by comparing the mean attitude of male to that of female researchers in a questionnaire covering five types of misconduct: fabrication, falsification, plagiarism, publication-related misconduct, and financial misconduct. They found that female respondents on average were less tolerant to research misconduct than male respondents. To our knowledge, attitudes towards grey area issues in research integrity have so far not been studied from a gender perspective.

Suspecting and reporting others

Simon et al. (2004) found that “women are significantly more likely to report academic dishonesty than are men” (p. 81). Yet, in a study by Kisamore et al. (2007) no convincing support was found for the hypothesis that “males are likely to estimate cheating as occurring more frequently, to suspect and consider misconduct more, and to report cheating less than females” (p. 387). Instead “males actually reported significantly *lower* perceptions regarding the frequency of cheating than did females” (Kisamore et al., 2007: p. 387 italics added). Horbach et al. (2020) investigated the influence of three

power relations in research practices, namely academic seniority, work contracts (permanent vs temporary positions) and gender. To their surprise, they found little difference between male and female respondents regarding the reporting of alleged research misconduct (p. 1609). They also found no substantial differences between male and female respondents in the likeliness of perceiving reporting as having constructive consequences (ibid). Thus, studies have so far been inconclusive, and more research is needed to determine whether female students are more likely to report than male students. We therefore want to address this issue in our study.

Behavior

Previous studies provide some evidence that suggests that female researchers and students are less likely to commit academic misconduct than male. For example, in their meta-analysis, Whitley Jr et al. (1999) found that male students were somewhat more likely to cheat than female students. Yet, they also note that this difference was small and not significant. A possible explanation offered by Whitley derives from a study of McCabe and Trevino (1996), suggesting that more women are working in previously male-dominated academic majors (in Whitley Jr et al., 1999: p. 667). In a study on disciplinary action for academic dishonesty, it was clear that numbers of female students that have to attend disciplinary matters are less prevalent (Witmer & Johansson, 2015). Similarly, in an investigation of misconduct reports between 1994 and 2012, most of which involved fraud, Fang et al. (2013) found an overrepresentation of men: 65% of the cases of misconduct were male, which they note is higher than could be expected based on the male-female distribution in science and engineering. One explanation is that social norms could explain the higher prevalence of misconduct amongst male researchers: risk taking is “more strongly associated with the male gender, while being timid is more strongly associated with the female gender” (Kaatz et al. 2013: p.1). The suggestion that social norms can influence behavior is also found in a study by Huang and Hung (2013), namely that males show higher behavioral integrity under conformity pressure in public, but less integrity in private under pressure to protect themselves. Yet, we also need to be careful with the conclusion that social norms explain gender differences, as it might also be true that females are less likely to be detected, while possibly committing misconduct in similar proportions to male researchers (Kaatz et al., 2013). Thus, also with regards to gender differences behavior, findings are mixed. We therefore decided to include behavioral differences in our study.

The current study

Although previous research provides some evidence that gender is a relevant factor in differences regarding attitudes and behavior on integrity issues and in suspecting and reporting of misconduct, still these findings are inconclusive, often not significant and limited. Many studies tend to focus on only one aspect of integrity (i.e., attitude, behavior, or suspecting and reporting others), and on only one specific topic (e.g., cheating) or on integrity as a general construct rather than distinguishing between the different subjects that integrity can involve. Furthermore, previous research focuses mainly on misconduct, and not much is known yet about the ‘grey areas’ that students and researchers are more likely to be confronted with. The aim of the current study is to

generate more encompassing and detailed insight into the role of gender in research integrity by incorporating attitude, suspecting and reporting others, and behavior in one study, and by comparing female and male students on a range of academic and research integrity topics including grey areas.

Our research question is: can we observe differences between male and female students with regards to attitude, suspicion and reporting of misconduct, and (self-reported) behavior? We formulated the following hypotheses, inspired by hypothesis 1 of Kisamore et al. (2007), which were tested.

Hypotheses

H1) Females have a less favorable attitude towards misconduct and grey area issues than males.

H2) Females are more likely to suspect and report fellow students' misconduct.

H3) Females are less prone to self-report academic misconduct than males.

Method

Participants

The questionnaire was sent to research master students in the life sciences at one Dutch university upon entering their studies in the Introductory week, where integrity lectures and workshops were offered as part of the program. Participants were 1266 first year master's students who were enrolled in one of the life sciences programs of the university between September 2015 and September 2018. Four students were excluded from analysis as they did not fill in their gender or did not identify as male or female, thus in total 1262 students were included in the analyses. Of these participants, 36.8% ($n = 465$) was male and 63.2% ($n = 797$) was female. The weighted average percentage of women enrolled in a program in the life sciences in the period of the study was 60.3%, suggesting that female students were slightly more likely to participate in the study than male students.

Data collection and procedure

For four consecutive years (i.e., in the academic years 2015–2016 till 2018–2019) life science master's students at one Dutch university received, a week before the introduction started, an email invitation to fill in an online questionnaire. No ethics committee for this type of research existed at the time of the questionnaire; hence no ethics assessment was done at the time and GDPR regulations only came into existence in May 2018, leaving a transition period to adjust to these new regulations in most universities. However, ethical considerations were taken into account by informing students about the purpose of the study and about the way their data would be used if they chose to participate in the study, and by emphasizing that participation was voluntary and anonymous. Furthermore, the data were stored on a secure server. In total, 2020 students received an invitation, of whom 1266 filled in the questionnaire. Thus, the response rate was quite high (62%).

Instrument

A questionnaire was used which was composed by three researchers, working in social sciences and philosophy, using examples of topics derived from both the academic

integrity literature and research integrity literature. The questionnaire was tested among a number of students to see if the items were clearly stated, and adjusted where necessary, before presenting the questionnaire to student groups for four consecutive years. The questionnaire was structured according to three categories which appeared in the following order: (1) attitude towards integrity-related conduct, (2) suspecting and reporting fellow students' academic misconduct, and (3) self-reported behavior regarding academic (mis)conduct (see Additional file 1: 'questionnaire'). The results of the questionnaire were presented in an introductory lecture on research integrity to students each year and showed stable results across the years.

Attitude towards integrity-related conduct

The first part of the questionnaire focused on students' attitude, in particular on their tendency to find questionable research practices acceptable. This part consisted of 12 items that described behaviors belonging to the so-called grey zone areas of research integrity (e.g., item 5: "if source A quotes source B, you do not mention source A, but only the original source (B)") and control questions that do not present questionable situations (e.g., item 3: "you choose an easy subject for your research"). The attitude of students was tested by asking them how acceptable they deemed the suggested actions on a 5-point Likert scale from completely unacceptable to completely acceptable. The items consisted of aspects of research that the students, starting with their master's program, could have encountered during their bachelor studies. Hence the examples were chosen to closely relate to students' experiences (e.g., item 12: "you try to do the least amount of work during a group assignment").

Suspecting and reporting fellow students

The second part of the questionnaire focused on personal experiences of students with misconduct of fellow students. Four types of misconduct were presented: cheating, plagiarizing, falsifying data, and not doing their fair share in group work. For each of these types of misconduct, we asked participants if they a) ever suspected and b) ever reported fellow students regarding these items. Thus, in total this part had 8 items. Participants could answer yes or no to each of the items.

Self-reported behavior

In the third part, participants were asked if they had ever engaged in specific forms of academic misconduct. This part consisted of 7 items that described a range of misconduct and questionable behaviors (e.g., "have you ever neglected to name a source you used?", "have you ever modified results to improve the outcome?", and "have you ever put your name on a work without checking it?"). Again, we chose the items that most closely related to the student's experience. For each of these behaviors we asked students if they never, rarely, sometimes, or often had done this.

Analysis

The data for attitude and behavior were analyzed with a Mann-Whitney U test. For the data regarding suspecting and reporting other students, a Chi-Square test was conducted. Assumptions were checked before doing the tests. The Holm-Bonferroni

correction was applied to account for multiple testing. This correction method adjusts the *p*-value significance threshold for individual tests to keep the family-wise error rate below .05. The statistical analysis was checked pre and post data analysis with a statistics expert.

Results

Attitude

The answer distributions of male and female students, and results of the Mann-Whitney U test, for attitude are displayed in Table 1. No significant differences were found between male and female students in attitude towards research integrity. Both male and female students were most likely to find referring to sources they did not read (completely) acceptable, i.e., referring to a book of which they have read only the abstract (seen as acceptable or completely acceptable by 35.1% of male students and 33.2% of female students) and directly referring to sources that they have read about in another source (seen as acceptable or completely acceptable by 58.5% of male students and 62.2% of female students). On the other hand, both male and female students were least likely to find it acceptable to try to do the least amount of work during a group assignment (acceptable or completely acceptable according to 1.6% of male students and 0.9% of female students) and to not mention evidence they found against their

Table 1 Attitude towards research integrity

	Mann-Whitney		Male					Female				
	U	<i>p</i>	% CU	% U	% N	% A	% CA	% CU	% U	% N	% A	% CA
Your paper would be stronger if you showed that your research has not been done before, so you don't mention a similar study to yours.	165,601.0	.419	31.7	50.9	12.6	3.9	0.9	28.9	56.1	11.3	3.0	0.7
While searching for and reading literature for your paper you find evidence against your hypothesis. You don't mention this evidence in your paper.	159,335.5	.081	40.3	50.3	8.2	0.7	0.5	37.0	51.5	8.8	2.5	0.1
If source A quotes source B, you do not mention source A but only the original source (B).	160,656.0	.203	2.3	15.6	23.3	38.7	20.1	2.8	11.9	23.1	42.9	19.3
You find information in an online abstract of a book that you don't have access to. You use the information and add the book to your reference list.	163,334.0	.409	5.3	30.3	29.4	31.0	4.1	6.2	28.1	32.5	29.3	4.0
You add literature that you have read but not used to your bibliography to expand it.	162,657.5	.207	30.3	48.3	16.4	3.6	1.4	28.8	47.6	18.5	4.6	0.5
You change your hypothesis after seeing the results of your research.	160,184.0	.185	31.1	31.5	18.7	12.1	6.6	30.1	36.2	18.3	12.3	3.1
Your friend copies lab work/notes before class starts.	161,230.0	.209	15.4	29.8	33.3	17.4	4.1	15.4	29.1	38.8	15.7	1.1
You try to do the least amount of work during a group assignment.	164,678.0	.313	49.5	41.6	7.3	1.1	0.5	50.3	42.5	6.3	0.7	0.3

Note. CU completely unacceptable, U unacceptable, N neutral, A acceptable, CA completely acceptable

hypothesis in their paper (acceptable or completely acceptable according to 1.1% of male students and 2.6% of female students).

Suspecting and reporting others

Results of the Chi-square test for suspecting and reporting others, and the percentages of men and women who have suspected others of, and reported others for, cheating, plagiarism, falsifying, and neglecting to do their share of the work in a group project are displayed in Table 2. After applying the Holm-Bonferroni correction, no significant differences were found between male and female students for suspecting and reporting others. The majority of both male (87.1%) and female students (89.0%) said they had suspected other students of not doing their part of the work in a group project. About half of male (48.4%) and female (50.3%) students reported others for this. On the other hand, both male and female students were very unlikely to report other students for cheating, plagiarism, and falsifying, even though a substantial proportion did suspect other students of these behaviors.

Behavior

Self-reported behavior frequencies of male and female students, and results of the Mann-Whitney U test for behavior, are displayed in Table 3. After applying the Holm-Bonferroni correction, significant differences were found between male and female students for neglecting to do one’s part of the work in a group project and for putting one’s name on work without checking it. More specifically, male students (mean rank = 645.14) were significantly more likely to report having neglected doing their part of group work than female students (mean rank 575.48), $U = 147,999.0$, $z = -4.26$, $p < .001$, $r = -0.12$. Male students (mean rank = 631.55) were also significantly more likely than female students (mean rank = 585.77) to report putting their name on work without checking it, $U = 155,299.5$, $z = -3.41$, $p < .001$, $r = -0.10$. Both male and female students were most likely to report having at least once neglected to name a source they used (53.1% of males, 47.1% of females) and put sources in their bibliography without reading them (50.2% of males, 53.7% of females), and least likely to report having changed research data (10.2% of males, 7.6% of females) and having put their name on work without checking it (21.4% of males, 13.7% of females).

Table 2 Suspecting and reporting others

	Chi-square				Male		Female	
	Suspected		Reported		%	%	%	%
	χ^2	p^a	χ^2	p^a	Suspected	Reported	Suspected	Reported
Cheating	<.01	.477	.13	.358	47.3	2.0	47.1	2.4
Plagiarism	7.38	.003	.62	.215	38.2	4.3	30.6	3.4
Falsifying	4.92	.013	.20	.329	28.1	2.5	22.4	2.1
Neglecting to do one’s share in group work	1.00	.160	.41	.261	87.1	48.4	89.0	50.3

Note. a: After applying the Holm-Bonferroni correction, no significant differences were found

Table 3 Reported behavior frequencies

	Mann-Whitney		Male				Female			
	U	p	% Never	% Rarely	% Some- times	% Often	% Never	% Rarely	% Some- times	% Often
Have you ever neglected to name a source you used?	156,417.5	.016	46.9	45.8	7.1	0.2	52.9	41.7	5.2	0.1
Have you ever cheated on a test?	167,289.5	.429	75.2	20.5	3.6	0.7	74.7	20.8	4.5	0.0
Have you ever put sources in your bibliography without reading them?	157,505.0	.055	49.8	39.3	9.8	1.1	46.3	38.9	13.7	1.2
Have you ever modified results to improve the outcome?	158,874.0	.007	78.3	18.6	2.7	0.5	84.0	13.4	2.6	0.0
Have you ever put your name on a work without checking it?	155,299.5	<.001*	78.6	17.5	3.4	0.5	86.3	11.1	2.6	0.0
Have you ever changed research data?	164,214.5	.059	89.8	9.0	0.7	0.5	92.4	7.1	0.5	0.0
Have you ever neglected to do your part of the work while working on a group project?	147,999.0	<.001*	64.1	31.6	4.1	0.2	75.4	22.3	2.2	0.0

*= significant at the .05 level after Holm-Bonferroni correction

Discussion

The aim of the present study was to investigate whether female and male students differ in their attitudes, suspecting and reporting of other students, and in their behavior, with regards to academic and research integrity. We expected female students to have a less favorable attitude towards misconduct, to be more likely to suspect and report fellow students than male students, and to be less prone to self-report academic misconduct. Although no significant differences were found for attitude and suspecting and reporting other students, male and female students did differ significantly in their likeliness to report “neglecting to do their part of the work in a group work” and “putting their name on work without checking it”. Below, these findings are discussed more in depth and related to the hypotheses we had formulated.

H1) females have a less favorable attitude towards misconduct than males

With regards to attitude towards the 8 items in the grey zone that we presented to students, we found no significant differences between male and female students. This is interesting, as this contrasts with Talib et al. (2013) who found that female researchers have a less tolerant attitude towards misconduct, hence will probably have a different attitude towards integrity issues than male researchers. Thus, differences between male and female students may only apply to cases of clear misconduct and not to the more prevalent grey area issues. Another explanation is provided by recent studies which show that differences are small when male and female students within the same area of study are compared (Fang et al., 2013). Whitley Jr et al. (1999) suggest that the small differences between male and female researchers who are in the same discipline may be

due to either socializing in a field where certain norms are dominant or already possessing characteristics that align with the norms in that disciplinary field (Whitley Jr et al., 1999). However, it is inconclusive whether this applies to the current study as it was conducted among research master students (i.e., one could question to what extent they are already socialized in a certain discipline) and we did not investigate characteristics or norms in the life sciences, thus more research is needed to clarify this.

H2) females are more likely to suspect and report fellow students' misconduct

In opposition to our expectations and the earlier findings of Simon et al. (2004), in the current study no significant differences were found between male and female students for suspecting and reporting fellow students. A possible explanation for this is that both male and female students were very unlikely to report other students for cheating, plagiarism, and falsifying. One reason for this could be that reporting academic dishonesty can be very stressful and costly to a student, thus both male and female students may be unwilling to get involved in this (Simon et al., 2004). In group work, on the other hand, there is also a direct interest for the students themselves, as they will be part of the group that will be graded. Indeed, in the current study both male and female students were most likely to have suspected and reported other students for lacking to do their fair share in group work.

Another explanation could be that gender differences in academia need to be understood in connection with institutional characteristics. For example, Horbach et al. (2020) note that power imbalances should be taken into account and suggest that more research is needed to see if reporting by female researchers is less likely to have constructive consequences than reporting by male researchers. Simon et al. (2004) suggest that the perception that students have of their academic institution plays a role. They found that female students were more likely to perceive their institution as not dealing with academic dishonesty adequately than male students. On the other hand, male students were more likely than female students to feel that their institution was trying to decrease academic dishonesty and to have a low willingness to contribute to limiting academic dishonesty. Thus, to what extent gender differences can be found regarding integrity may also be related to characteristics of the institution and how these are perceived by male and female students.

H3) females are less prone to self-report academic misconduct than males

Although for five out of seven items, female students indicated more often than male students that they were never or rarely involved in these types of academic misbehavior, a significant difference was found for two items. Male students were more likely to report having neglected doing their fair share in a group assignment and having put their names on work without checking it. These two findings can be related: if students do not do their fair share in group work, they are more likely also to put their name on work without checking it.

A possible explanation for these findings is that females tend to be more disciplined (Duckworth & Seligman, 2006), show higher self-control (Carvalho, 2016), and be less prone to avoid work (Steinmayr & Spinath, 2008) than males. Hall and Buzwell (2013) suggest that a difference in work styles can also play a role in free-riding, i.e., if some

students in the group like to start early whereas others prefer to do their work last-minute, those who prefer starting early may end up doing most of the work. Indeed, research suggests that males are more prone to procrastinating work than females (Balkis & Duru, 2017). Lastly, group dynamics can also partially explain free-riding, i.e., students may encourage a group member to contribute less if they feel like the work of that group member will not be up to their standards (Hall & Buzwell, 2013). Female students on average show higher academic performance and have higher grades than male students (Fortin et al., 2015), thus the described group dynamic may result in encouragement of free-riding by male students.

That significant differences were found for some, yet not for other items, suggests that gender differences may vary depending on the type of misconduct focused on, rather than females showing higher integrity in general. For example, not doing one's share of the work in a group assignment may have different underlying reasons than cheating on a test, which would explain why we did find a significant gender difference for the former but did not for the latter. Thus, while previous studies comparing males and females mostly did not distinguish between different types of integrity, we suggest that it would be fruitful to do so in future research, to gain a more detailed understanding of the connection between gender and integrity.

Conclusion

Students beginning their research master studies enter the field of research and research integrity and have experiences with issues of academic integrity. In this study we compared male and female students' attitude towards integrity topics, suspecting and reporting misconduct, and self-reported misconduct. Males were found significantly more likely to report not doing their fair share in group work and putting their name on work without checking it. The present study contributes three main insights and future directions to the literature: (1) that it is important to incorporate grey areas in research on integrity rather than only focus on misconduct, (2) that academic and research integrity overlap and can be integrated, and (3) that differences between male and female students may not apply to, and be the same for, integrity as a whole but rather depend on which specific topic of integrity is focused on, thus indicating the importance of more detailed research on gender differences that clarifies what topics male and female students are more and less likely to differ on and what the underlying reasons for this could be.

Limitations of the study

The current study has several limitations. First, research integrity is a broad subject encompassing many different grey areas, and we investigated only a subset of attitudes and behaviors. No conclusions can be drawn about differences between female and male students regarding research integrity in general, only regarding the specific aspects of research integrity included in this study. For example, while we did not find significant differences between the attitudes of male and female students on the 12 items that we presented (Table 1), more research is needed to see if their attitudes do differ regarding other topics that we did not test, like on data management or conflicts of interest. Second, all our data were collected from students in the Netherlands in one

university, within the life sciences. Previous research has shown that it is likely that attitudes and behaviors regarding research integrity differ depending on culture (Godecharle et al., 2014). Thus, more research is needed to investigate whether and how differences, or absence thereof, between female and male researchers and students differ between disciplines, universities, and countries. Third, even though self-reports are quite common in educational research (Fulmer & Frijters, 2009), there is a risk that the results are prone to social desirability, i.e. that students will not answer their true personal views and attitudes, as the survey was conducted in the context of a course on research integrity. Thus, in a follow up study, it would be good to compare findings of actual misconduct with the self-reported results or to test social desirability next to the items on integrity (Nederhof, 1985).

Abbreviations

RCR: Responsible conduct of research; ORI: Office of Research Integrity; H1-H3: Hypothesis 1, 2 or 3

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1007/s40979-022-00100-5>.

Additional file 1. Questionnaire.

Acknowledgements

We want to thank the H2020Integrity colleagues for discussing drafts of the paper with us: Carline Klijnman and André Krom. We thank Hugo Quene for his advice on the statistical analysis.

Authors' contributions

Hanneke Mol: data analysis, method & design of the study, writing of results and discussion section (partly) and reviewing the entire text. Approving final manuscript. Mariëtte vd Hoven: data collection, method & design of the study, writing introduction and discussion section (partly) and reviewing the entire text. Approving final manuscript. All authors read and approved the final manuscript.

Funding

This project has been funded by the European Union, Swafs-02-2018, H2020INTEGRITY, Grant Agreement No. 824586.

Availability of data and materials

The Data accompanying this manuscript are submitted to Yoda, the repository of UU, with the request to publish it ODC-BY. <https://doi.org/10.24416/UU01-MW5SOQ> (<https://doi.org/10.24416/UU01-MW5SOQ>).

Declarations

Ethics approval and consent to participate

No, an ethics committee did not exist at the time of data collection at UU for this type of research. Since 2020, a faculty ethics committee exists in the humanities (www.fetc.hum.uu.nl). The data was collected before that time.

Consent for publication

The data are collected via an online survey, students participated anonymously. The personal data collected involved: gender (with option not to answer) and study program. No identifying data were collected. The raw data are destroyed; only pseudonymized data are kept in the repository.

Competing interests

The authors declare they have no relevant financial or non-financial interests to declare.

Received: 28 April 2021 Accepted: 12 January 2022

Published online: 15 March 2022

References

- Balkis M, Duru E (2017) Gender differences in the relationship between academic procrastination, satisfaction with academic life and academic performance. *Electron J Res Educ Psychol* 15(41):105–125. <https://doi.org/10.14204/ejrep.41.16042>
- Carvalho RGG (2016) Gender differences in academic achievement: the mediating role of personality. *Personal Individ Differ* 94:54–58. <https://doi.org/10.1016/j.paid.2016.01.011>
- Duckworth AL, Seligman MEP (2006) Self-discipline gives girls the edge: gender in self-discipline, grades, and achievement test scores. *J Educ Psychol* 98(1):198–208. <https://doi.org/10.1037/0022-0663.98.1.198>
- Fang FC, Bennett JW, Casadevall A (2013) Males are overrepresented among life-science researchers committing scientific misconduct. *mBio* 4(1):e00640-12. <https://doi.org/10.1128/mBio.00640-12>

- Fortin NM, Oreopoulos P, Phipps S (2015) Leaving boys behind: gender disparities in high academic achievement. *J Hum Resour* 50(3):549–579. <https://doi.org/10.3368/jhr.50.3.549>
- Fulmer SM, Frijters JC (2009) A review of self-report and alternative approaches in the measurement of student motivation. *Educ Psychol Rev* 21(3):219–246. <https://doi.org/10.1007/s10648-009-9107-x>
- Godecharle S, Nemery B, Dierickx K (2014) Heterogeneity in European research integrity guidance: relying on values or norms? *J Empir Res Hum Res Ethics* 9(3):79–90. <https://doi.org/10.1177/1556264614540594>
- Gopalakrishna G, ter Riet G, Vink G, Stoop I, Wicherts JM, Bouter LM (2021) Prevalence of questionable research practices, research misconduct and their potential explanatory factors: a survey among academic researchers in The Netherlands. *MetaArXiv Preprints*. <https://doi.org/10.31222/osf.io/vk9yt>
- Hall D, Buzwell S (2013) The problem of free-riding in group projects: Looking beyond social loafing as reason for non-contribution. *Act Learn High Educ* 14:37–49. <https://doi.org/10.1177/1469787412467123>
- Horbach SPJM, Breit E, Halffman W, Mamelund SE (2020) On the willingness to report and the consequences of reporting research misconduct: the role of power relations. *Sci Eng Ethics* 26(3):1595–1623. <https://doi.org/10.1007/s11948-020-00202-8>
- Huang HJ, Hung Y (2013) Gender differences and behavioral integrity: from a social contract perspective. *J Manag Organ* 19(1):86–100. <https://doi.org/10.1017/jmo.2013.6>
- Iqbal Z, Anees M, Khan R, Hussain IA, Begum S, Rashid A, Abdulwadood H, F. (2021) Cheating during examinations: prevalence, consequences, contributing factors and prevention. *Int J Innov Creat Chang* 15:601–609 https://www.ijicc.net/images/Vol_15/Iss_6/15641_Iqbal_2021_E1_R.pdf
- Kaatz A, Vogelmann PN, Carnes M (2013) Are men more likely than women to commit scientific misconduct? Maybe, maybe not. *mBio* 4(2):e00156-13. <https://doi.org/10.1128/mBio.00156-13>
- Kalichman MK (2013) A brief history of RCR education. *Accountability Res* 20(5-6):380–394. <https://doi.org/10.1080/08989621.2013.822260>
- Kisamore JL, Stone TH, Jawahar IM (2007) Academic integrity: the relationship between individual and situational factors on misconduct contemplations. *J Bus Ethics* 75(4):381–394. <https://doi.org/10.1007/s10551-006-9260-9>
- Langlais P, Bent BJ (2014) Individual and organizational predictors of the ethicality of graduate students' responses to research integrity issues. *Sci Eng Ethics* 20(4):897–921. <https://doi.org/10.1007/s11948-013-9471-2>
- Macfarlane B, Zhan J, Pun A (2014) Academic integrity: A review of the literature. *Stud High Educ* 39(2):339–358. <https://doi.org/10.1080/03075079.2012.709495>
- McCabe DL, Trevino LK (1996) What we know about cheating in college. *Change* 28(1):28–33. <https://doi.org/10.1080/00091383.1996.10544253>
- Miller A, Murdock T, Anderman E, Poindexter A (2007) Who are all these cheaters? Characteristics of academically dishonest students. In: Anderman E, Murdock T (eds) *Psychology of academic cheating*. Elsevier, Amsterdam, pp 9–32. <https://doi.org/10.1016/B978-012372541-7/50003-6>
- Nederhof AJ (1985) Methods of coping with social desirability bias: A review. *Eur J Soc Psychol* 15(3):163–280. <https://doi.org/10.1002/ejsp.2420150303>
- Olafson L, Schraw G, Kerhwald N (2014) Academic dishonesty: behaviors, sanctions, and retention of adjudicated college students. *J Coll Stud Dev* 55(7):661–674. <https://doi.org/10.1353/csd.2014.0066>
- Simon CA, Carr JR, McCullough SM, Morgan SJ, Oleson T, Ressel M (2004) Gender, student perceptions, institutional commitments and academic dishonesty: who reports in academic dishonesty cases? *Assess Eval High Educ* 29(1):75–90. <https://doi.org/10.1080/0260293032000158171>
- Steinmayr R, Spinath B (2008) Sex differences in school achievement: what are the roles of personality and achievement motivation? *Eur J Personal* 22(3):185–209. <https://doi.org/10.1002/per.676>
- Steneck, N. H. 2007. Introduction to the responsible conduct of research. ORI. <https://ori.hhs.gov/ori-introduction-responsible-conduct-research>.
- Steneck NH, Bulger RE (2007) The history, purpose and future of instruction in the responsible conduct of research. *Acad Med* 82(9):829–834. <https://doi.org/10.1097/ACM.0b013e31812f7d4d>
- Talib NA, Othman S, Hamid KCA, Zainuddin A, Nen ZM (2013) An alternative dimension towards integrity: A perception of university researchers. *Procedia Soc Behav Sci* 90:940–948. <https://doi.org/10.1016/j.sbspro.2013.07.171>
- van den Hoven M, Krom A (2020) Empowerment and conceptual clarity in research integrity. *Sci Eng Ethics* 26(3):1883–1884. <https://doi.org/10.1007/s11948-020-00179-4>
- Vries R, Anderson MS, Martinson BC (2006) Normal misbehavior: scientists talk about the ethics of research. *J Empir Res Hum Res Ethics* 1(1):43–50. <https://doi.org/10.1525/jer.2006.1.1.43>
- Whitley BE Jr, Nelson AB, Jones CJ (1999) Gender differences in cheating attitudes and classroom cheating behavior: A meta-analysis. *Sex Roles* 41(9/10):657–680. <https://doi.org/10.1023/A:1018863909149>
- Witmer H, Johansson J (2015) Disciplinary action for academic dishonesty: does the student's gender matter? *Int J Educ Integr* 11(6):1–10. <https://doi.org/10.1007/s40979-015-0006-2>

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.