

Online Learning Can Be Beneficial for Self-esteem by Hindering Social Comparison in First-year University Students.

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Abstract.

The present study investigated the relationship between online-only learning compared to online learning combined with in-person learning; and self-esteem via social comparison processes in first-year university students. We hypothesised that online-only learning would be negatively associated with self-esteem due to fewer opportunities for social comparisons including positive comparisons. We collected data from first-year university students (N = 128), some studying exclusively online, while others engaged in online learning supplemented with in-person classes during the COVID-19 pandemic in 2021. This was a unique opportunity as students could not choose between online and in-person learning and thus avoided the influence of respective learning preferences between the student groups. Results did not show a bivariate association between the learning environment (online-only versus online with in-person learning) and self-esteem. However, students with online-only classes had fewer opportunities for social comparison and made fewer positive comparisons than those also experiencing in-person learning. Moreover, more positive social comparison was associated with higher self-esteem. Importantly, and contrary to our hypothesis, online-only learning appeared to protect self-esteem in first-year students when positive comparison was controlled for. Limitations of the study and study implications are discussed.

Keywords: First-year university students; Online learning; Self-esteem; Social comparison; Transitioning to university.



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1. Introduction.

Online teaching and learning (the delivery of education in an online environment using the internet; Sing & Thurman, 2019) has become increasingly popular over the last decade. For example, in the United States 15% of all undergraduate students were exclusively studying online in 2019 (National Center for Education Statistics, 2023). In Ireland, online teaching and learning had slowly but steadily increased prior to March 2020 with a substantial increase thereafter (Statista Research Department, 2023). Previous research has discussed the advantages and disadvantages of online learning among Irish University students who suddenly moved from in-person to online learning in 2020 due to restrictions related to the COVID-19 pandemic (Yang, 2021). This research highlighted that those students missed the social aspect of face-to-face interactions with instructors and peers.

From a social-psychological perspective, a crucial distinction between an online-only learning environment and one with in-person classes is that online learning lacks many of the social aspects of in-person learning (Akpen et al., 2024). For example, students who prefer in-person learning do so because it allows them to meaningfully interact with other people (Bright & Vogler, 2024). In-person classes also offer opportunities for social comparison which helps students to find their place in a social setting and to learn about themselves (Dijkstra et al., 2008; Festinger, 1954). In fact, implementing social comparison feedback into online environments can increase engagement (Guerra et al., 2016) and completion rates (Davis et al., 2017).

These social aspects of the learning environment are particularly relevant for students in the transition phase from secondary education to university (e.g., Meehan & Howells, 2017; Wilcox et al., 2005). During this phase, students find out about their own standing through social comparison (von Keyserlingk et al., 2019) which can affect how they feel and think about themselves (Collins, 1996). However, the literature on the specific effects of online learning on self-esteem remains limited.

Most studies investigating online versus in-person learning are limited by self-selection of participants or the lack of an in-person learning control group (e.g., Xu & Jaggars, 2013). The shift to mostly online-only learning due to restrictions during the COVID-19 pandemic imposed a challenge for students and their learning behaviour (Germani et al., 2020; Morales-Rodríguez, 2021). This sudden transition also provided a unique opportunity to investigate how online-only learning environments affect self-esteem separate from students' motivations for choosing online learning. The present study took advantage of this opportunity, investigating the effect of online-only versus online complemented with in-person learning on first-year students' self-esteem through social comparison processes.

In March 2020 most teaching and learning in higher education in Ireland moved online due to COVID-19 lockdowns. Hodges et al. (2020) termed this “*Emergency Remote Teaching*” a short-term solution to an immediate problem. As such, emergency remote teaching was less planned and developed than other types of online education. Data for the present study were collected one year after this shift. Although still governed by the crisis, online teaching had evolved by then. This study capitalised on the fact that first-year students did not choose between online-only or online learning with in-person classes. We investigated the effects of online-only versus online with in-person learning on self-esteem through opportunities for social comparison and positive social comparison. In this context, we refer to online-only learning as a fully online environment without any in-person classes, practical sessions, or tutorials. We refer to online learning with in-person classes as the group of students who, in addition to online learning, had any face-to-face on-campus activities. The latter terminology differs from what is commonly described as blended or hybrid learning, reflecting the less mature state of online with in-person educational modalities during the study period.

2. Literature review.

Literature on online learning has uncovered benefits but also drawbacks in comparison to inperson teaching and learning. Results regarding student performance are mixed. Some studies indicate increased performance among online students, while others show the opposite (for a review, see Akpen et al., 2024). This suggests a complex relationship dependent on additional factors. While online learning offers accessibility and flexibility it may fall short of replicating the social aspects of in-person learning environments (Akpen et al., 2024). These social aspects are relevant for student satisfaction (e.g., Alenezi, 2022) and engagement (Croxtton, 2014; Davis et al., 2017). In-person learning environments provide many opportunities for social comparisons, which, besides engagement, can also affect self-esteem (Dijkstra et al., 2008). While many studies have investigated the effects of online versus in-person learning on engagement, performance, and other relevant variables, little is known about the effects on self-esteem.

2.1 Self-esteem in first-year students.

General self-esteem, the overall subjective evaluation of oneself (Rosenberg, 1965) is important for academic success and well-being (Körük, 2017; Sowislo & Orth, 2013). Social comparison plays a crucial role in the development of identity and self-esteem in first-year students (Noon et. al., 2022). The transition to university from secondary education involves considerable stress and can negatively affect self-esteem (Besser & Zeigler-Hill, 2014). This is relevant as higher levels of self-esteem are associated with better adaptability and mental

well-being (Besser et al., 2020). Importantly, self-esteem is positively linked to academic success (Körük, 2017), while low self-esteem is associated with heightened risk of depression and anxiety, and reduced overall well-being in students (Sowislo & Orth, 2013). Thus, self-esteem is central to general well-being and academic success.

The link between general self-esteem and performance is especially relevant for first-year students (Wintre et al., 2011). During the transition to university, students need to re-evaluate their standing compared to others (Wolff et al., 2020). At university they are surrounded by new peers often selected on the basis of high performance. This new setting may negatively influence first-year students' academic self-concept (von Keyserlingk et al., 2019). The change in comparison group (from secondary education to university) on academic self-concept is termed the big-fish-little-pond or frog-pond effect (Davis, 1966; Marsh & Parker, 1984, von Keyserlingk et al., 2019). This effect describes the phenomenon in which students can display higher academic self-concept when they are in a lower achieving class (Marsh et al., 2000).

The frog-pond effect highlights the role of social comparison during transitions. People compare themselves with others to understand and evaluate themselves (Festinger, 1954). This process can affect self-esteem (Sheffler & Cheung, 2023; Wang et al., 2017). Although students may compare themselves on various dimensions (e.g., gender, economic status), academic performance is particularly salient in an academic context (Deutsch & Roth, 2021). Comparing academic performance specifically affects the academic aspect of self-concept which is a part of general self-esteem (Collins, 1996; Marsh & Martin, 2011; Reynolds, 1988). There are potentially different mechanisms by which social comparison affects the self-esteem of first-year students.

2.2 Opportunity for social comparison.

We considered that the opportunity for social comparison itself is relevant and may affect people's general self-esteem during transitions. During the COVID-19 pandemic, in-person first-year students had more chances to compare themselves with peers than those studying exclusively online (Davis et al., 2017). Social comparisons provide beneficial feedback on academic performance (Davis et al., 2017) and help determine one's standing, thus preventing uncertainty (Festinger, 1954; Hogg, 2000). Uncertainty can create stress (Moawad, 2020) that can hamper self-esteem (Hermann et al., 2002) by increasing doubt and concern (Hogg, 2000). We argue that social comparison can reduce this uncertainty by providing self-relevant information about academic standing. However, online-only learning offers fewer

opportunities for social comparison than in-person learning, potentially hampering students' general self-esteem.

2.3 Positive social comparison.

Research on social comparison distinguishes between positive and negative social comparison. Positive social comparison occurs when a student's performance is superior to the performance of relevant peers (usually happening when people compare downwards with those worse than themselves). Negative social comparison occurs when a student's performance is inferior to their peers (when people compare upward with those that are better than themselves; Festinger, 1954; Gibbons & Buunk, 1999). Research has demonstrated that positive social comparison protects self-esteem compared to negative social comparison (Buunk & Gibbons, 2007; Wang et al., 2017). Furthermore, people may strategically use positive social comparison to bolster their self-esteem (Brown, 2012).

Generally, people strive for positive social comparisons (Brown, 2012). However, a recent meta-analysis (Gerber et al., 2018) shows that people usually compare themselves to those with superior performance resulting in negative social comparison and thus negative effects on self-esteem (Trautwein et al., 2009). Gerber et al. (2018) suggest that when self-esteem is threatened, such as during a transition phase, people tend to strategically engage in more positive social comparison to protect and enhance their self-esteem. Thus, if in-person learning provides students with more opportunities for strategic positive social comparison than online-only learning, it may protect students' self-esteem.

Given that in-person learning provides the opportunity for social comparison as well as the opportunity for strategic positive social comparison, we hypothesised that first-year students with in-person classes would overall show higher general self-esteem than those who had online classes only and thus, no chance to meet their new peers face-to-face. Therefore, we stated the following hypotheses:

H1. First-year students engaging in online learning with in-person classes will show higher self-esteem than students engaged in online learning solely.

H2. The impact of online-only versus online with in-person learning on self-esteem is mediated by both the opportunity for social comparison and the positivity of the comparison.

These hypotheses were preregistered at the Open Science Framework before data collection (<https://doi.org/10.17605/OSF.IO/S8AG3>). We received ethical approval from the first author's university Research Ethics Committee (ref: 2020_12_37_EHS). All materials, data, and analyses are publicly available (osf.io/qn84c).

3. Methodology.

The present study used a quantitative approach to test our preregistered hypotheses. Our goal was to quantify first-year students' perceived opportunities for social comparison, how positive they felt after comparing with their fellow students, and their general self-esteem. We compared whether those self-reported variables differed between students who studied exclusively online and those who had additional in-person activities.

3.1 Participants and design.

We gathered data from first-year undergraduate students in Ireland via online surveys using Qualtrics from the 1st of March to the 1st of April 2021. During this time, restrictions allowed in-person teaching and learning only when deemed essential. Essential meant that in-person instruction was required to achieve specific learning goals. From the outset of students' first semester, most teaching and learning occurred online. However, a subset of students participated in in-person classes where online learning alone was insufficient to achieve their learning goals. Study participants were recruited via posts on social media platforms, word of mouth, and an email to first-year students in the University of Limerick – a large university in the West of Ireland.

We assessed whether first-year students participated in in-person classes and online learning or engaged exclusively in online learning. This quasi-experimental factor served as a predictor variable. Additionally, we assessed general self-esteem as the criterion variable. Furthermore, we examined the opportunity for social comparison and the extent of positive social comparison as mediators in the hypothesised relationship between the learning environment and self-esteem.

We included participants aged 18 or older who were first-year university students and successfully passed an attention check. Out of 155 participants, 27 did not meet the inclusion criteria. The analysed sample consisted of $N = 128$ students (58.6% women, 41.4% men; $M_{age} = 19.6$, $SD = 3.0$). On average, students had 17 hours of classes per week ($SD = 5.9$). Among those included $n = 87$ (63.2% women, 36.8% men; $M_{age} = 19.3$, $SD = 3.2$) studied online-only, and $n = 41$ (48.8% women, 51.2% men; $M_{age} = 20.2$, $SD = 2.4$) spent on average 3 to 5 hours per week on campus in addition to online classes. The gender distribution did not differ significantly in the online-only and online with in-person groups, $\chi^2(1, N = 128) = 2.39$, $p = .122$. There was no significant difference in age between both learning groups, $t(125) = 1.50$, $p = .137$. For students in Psychology, participation in this study contributed to their required study participation credits. There was no other remuneration. For data anonymisation purposes, students' study subject was not assessed in this study. Sensitivity analysis (Faul et

al., 2007) estimated that the present sample size allowed us to detect medium sized effects ($d = 0.5$) for group comparisons with α of 5% and 80% Power.

3.2 Measures.

3.2.1 Online-only learning versus online with in-person learning.

Online-only learning was assessed with the question “*Do you have any face-to-face on campus activities in college?*”. The two response options were coded yes (online with inperson) = 1 and no (online-only) = 2.

3.2.2 Self-esteem.

Self-Esteem was assessed with the Rosenberg Global Self-Esteem Scale (Rosenberg, 1965) which consists of 10 items (e.g., “*I am able to do things as well as most other people*”, 1 = strongly disagree to 4 = strongly agree; $\alpha = .90$). We reverse scored negative items and averaged all items with higher scores indicating higher self-esteem.

3.2.3 Social comparison.

We used two scales of Social Comparison (SC) that we adapted from the Iowa-Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999). The first scale assessed the opportunity for SC and included seven items (e.g., “*I had a chance to find out how well I have done in my assignments by comparing my grades with the grades of my classmates*”; 1 = strongly disagree to 5 = strongly agree; $\alpha = .87$). We reverse-scored negative items and averaged all items to form the opportunity for SC scale with higher values indicating more opportunity for SC.

The second scale assessed positive SC with four items indicating how positive people felt after comparing themselves with others (e.g., “*Compared to my classmates, I feel I am struggling with school*”; reverse; 1 = strongly disagree to 4 = strongly agree; $\alpha = .75$). We again reverse-scored negative items and averaged all items to form the positive SC score with higher values indicating more positive comparison, i.e., considering themselves better than their fellow students.

3.3 Procedure.

After providing informed consent by ticking the box labelled “*I agree with all statements and I want to continue with the study,*” participants indicated whether they studied online-only or online with in-person classes. If they had in-person classes, they were also asked to report the number of hours spent on campus. Then, participants completed the self-esteem and SC scales. The items within one scale were presented in randomised order. The SC scale

included an attention check: "It is important to pay attention in this questionnaire, please select strongly agree". Lastly, participants reported their age and gender before being debriefed and thanked.

4. Findings.

Data were analysed with data analysis software IBM SPSS Statistics 28.0.0.0. All statistical tests were carried out two-tailed with a significance level of $\alpha = .05$. As expected, students in the online-only learning group reported fewer opportunities for SC, and less positive SC, compared to students who also received in-person instruction (Table 1). However, students who studied on an online-only basis showed similar levels of self-esteem as those who studied online with in-person classes, which does not support H1.

Table 1: Means and Standard Deviations for Online-only (n = 87) vs In-person (n = 41) Learning, and Zero-order Correlations between Variables.

	Online-only <i>M (SD)</i>	Online with In-person <i>M (SD)</i>	Learning	Self- Esteem	Opportunity for SC
Self-Esteem	2.67 (.51)	2.70 (.55)	-.02		
Opportunity for SC	2.61 (.67)	3.86 (.75)	-.64**	.26**	
Positive SC	2.34 (.57)	2.68 (.55)	-.27**	.53**	.49**

Note. Learning: 1 = Online with In-person, 2 = Online-only; SC = Social Comparison;

***p*value < .01.

To test H2, whether any variance between online-only (vs. online with in-person) learning and self-esteem is explained by the opportunity for SC or positive SC, we included them as mediators and performed a parallel mediation analysis with the PROCESS macro (Hayes et al., 2017). A parallel mediation means that both mediators are tested individually while controlling for the respective other mediator (Figure 1). For mediation analysis, several regressions are computed (for more detail see Hayes, 2009).

First, we estimated the impact of online-only learning (= 2 vs online with in-person = 1) on the first mediator (M1), opportunity for SC (a1-path): $ba_1 = -1.25$, $SEa_1 = .14$, $t(126) = -8.97$, $p < .001$. Second, we estimated the link between opportunity for SC and self-esteem while controlling for online-only (vs online with in-person) learning and positive SC (b1-path): $bb_1 = 0.08$, $SEb_1 = .07$, $t(124) = 1.28$, $p = .204$. To test whether the indirect effect (i.e., the product of

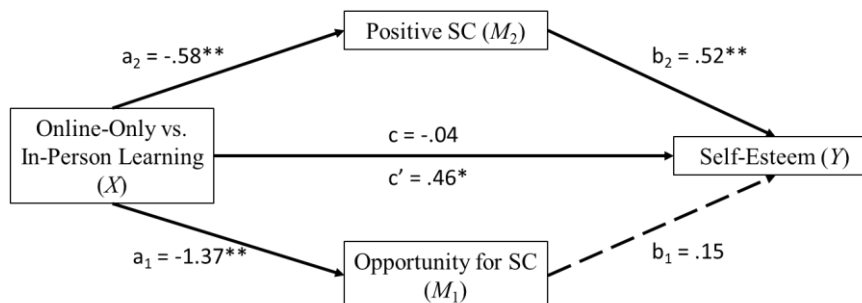
the a-path and b-path) significantly differs from zero, confidence intervals (CI) were computed using bootstrapping with 5,000 samples and heteroscedasticity consistent standard errors (HC3; Davidson & MacKinnon, 2004). Zero was included into the CI indicating no statistically significant indirect effect: $bab_1 = -0.11$, $SE_{ab_1} = .08$, 95% CI [-.28, .05], $\beta_{ab_1} = -.20$, $SE_{ab_1} = .16$, 95% CI [-.53, .11]. Thus, opportunity for SC did not mediate any relationship between online-only versus online with in-person learning and self-esteem.

We applied the same procedure for testing the second mediator (M2), positive SC. Results show that online-only (vs online with in-person) learning went along with less positive SC (a2path): $ba_2 = -0.34$, $SE_{a_2} = .11$, $t(126) = -3.16$, $p = .002$. While controlling for online-only (vs online with in-person) learning and opportunity for SC, the association between positive SC

and self-esteem was positive (b2-path): $bb_2 = 0.46$, $SEb_2 = .08$, $t(124) = 5.79$, $p < .001$. Furthermore, results show a statistically significant indirect effect: $bab_2 = -0.16$, $SEab_2 = .06$, 95% CI $[-.27, -.06]$, $\beta ab_2 = -.30$, $SEab_2 = .11$, 95% CI $[-.52, -.11]$. In partial support of H2, online-only (vs online with in-person) learning had a negative impact on self-esteem, as students engaged less in positive SC which was linked to increased self-esteem.

While there was no relationship between online-only (vs. online with in-person) learning and self-esteem (total effect, c-path: $bc = -0.02$, $SEc = .10$, $t(126) = -0.22$, $p = .825$), a relationship became evident when controlling for opportunity for SC and positive SC (direct effect, c'-path: $bc' = 0.24$, $SEc' = .11$, $t(124) = 2.23$, $p = .028$). Notably, when controlling for both opportunity for SC and positive SC, online-only learning was related to higher self-esteem compared to online with in-person learning. This indicates that even though students' overall self-esteem did not differ between our two learning groups, in the online with in-person learning group students made more positive social comparisons with their peers, which was positively related to their self-esteem. As positive social comparison was lacking in the online-only group, those online students' self-esteem was protected by the learning environment.

Figure 1: Parallel mediation.



Note. Online-only learning = 2, Online with In-person learning = 1; SC: Social Comparison; standardised coefficients; *p-value < .05; **p-value < .01.

- Alt Text: A path diagram illustrating the relationships between "Online-Only learning coded as 2 vs. In-Person Learning coded as 1 (X)", two mediators—"Opportunity for Social Comparison (M₁)" and "Positive Social Comparison (M₂)"—and the outcome variable "Self-Esteem (Y)". The diagram shows: X negatively predicts M₁ with a path coefficient of $a_1 = -1.37$ (significant with p smaller than .01, denoted by **).
- X negatively predicts M₂ with a path coefficient of $a_2 = -0.58$ (significant with p smaller than .01, denoted by **).
- M₁ predicts Y with a path coefficient of $b_1 = 0.15$ (not significant).
- M₂ positively predicts Y with a path coefficient of $b_2 = 0.52$ (significant, with p smaller than .01, denoted by **).
- X predicts Y with a path coefficient of $c = -0.04$ (not significant).
- X predicts Y controlling for the mediators with a path coefficient of $c' = 0.46$ (significant, with p smaller than .05, denoted by *).

Solid arrows indicate significant paths, while the dashed arrow indicates a non-significant path.

5. Discussion.

5.1 Summary of results.

The present study aimed to test a link between online-only (vs online with in-person) learning and self-esteem in first-year students who were transitioning to university. We focused on processes of social comparison (SC) influencing this relationship. Results show that online only learning was associated with less engagement in positive SC compared to online learning with in-person classes, which in turn was linked to higher self-esteem. While online only learning was also linked to reduced opportunity for SC compared to online with in-person learning, opportunity for SC did not affect the relationship between learning and self-esteem. Interestingly, results did not show a positive relationship between online with in-person learning and self-esteem. Instead, online-only learning was associated with higher self-esteem compared to in-person learning when the opportunity for SC and positive SC were controlled for.

For our first hypothesis that students with in-person classes will show higher self-esteem than students who study online-only, we argued that in-person classes allow students to compare themselves with other students, which a) reduces uncertainty and b) allows for positive SC, which both in turn protect and improve self-esteem. Our results did not support this hypothesis. In fact, we found no link between online-only versus online with in-person learning and self-esteem. On the contrary, when the opportunity for SC and positive SC were controlled, students who studied online-only reported higher self-esteem than students with in person classes. Thus, the data indicate that online-only learning can protect self-esteem when SC is controlled for. Specifically, positive SC showed a suppression effect (e.g., MacKinnon et al., 2000) on the relationship between online-only learning and self-esteem compared to in person learning.

It could be that first-year students who had not met their new classmates after transitioning to university compared themselves predominantly with their family members, former classmates from secondary school, or friends, which protected their self-esteem from negative SC (Davis, 1966; Huguet et al., 2009; Marsh & Parker, 1984). Instead, those first-year students with in person classes could have compared themselves with their new, highly capable classmates

(upward comparison), negatively affecting their self-esteem (see frog-pond effect; Marsh et al., 2000). Another possible explanation could be that online-only learning was particularly protective for those who had poor performance and thus the lack of SC for them may have protected their self-esteem, as low-performing students are more susceptible to the negative effects of SC (Trautwein et al., 2009). These findings are in line with and extend previous research demonstrating that online learning can be particularly beneficial for low-performing students (Clark et al., 2021).

Our second hypothesis stated that the relationship between online-only versus online with inperson learning and self-esteem is mediated by both the opportunity for SC and positive SC. While both the opportunity for SC and positive SC were fewer in students who studied onlineonly compared to those with in-person learning, only positive SC was associated with higher self-esteem. In line with our hypothesis, fewer positive SC when studying online-only mediated the relationship between the learning environment and self-esteem. However, the opportunity for SC did not affect any relationship between online-only (vs. online with in-person) learning and self-esteem.

These findings are in line with previous studies that have demonstrated the impact of the direction of SC on self-esteem (e.g., Gremmen et al., 2018; Jackson, 2013; Trautwein et al., 2009). For example, Sheffler and Cheung (2023) have demonstrated that students who participated in negative SC felt discouraged by being outperformed, which negatively affected their self-image as learners. The present lack of evidence of a relationship between the opportunity for SC and self-esteem could be due to interindividual differences. Studies have demonstrated that SC can impact self-esteem in varying ways depending on a) students' response to the SC experience and b) how much they identify with the target of comparison (Dijkstra et al., 2008). Moreover, as Brown (2012) and Gerber et al. (2018) discuss, individuals can actively influence the SC process rather than being passive recipients of social influences. Future research could further investigate how a lack of opportunity for SC when studying online-only may affect relevant outcomes in students.

We argued that our online-only students' group would have fewer opportunities for social comparison as well as for positive social comparison. The present results provide evidence for this claim even though our online-only students may still have had opportunities to interact online during class, for example in small groups/breakout rooms, or outside of class. Still, the

present results indicate that those opportunities do not outweigh the lack of social comparison and positive social comparison in a learning setting with in-person contact. Future research could investigate how more versus less opportunities for social comparison and positive social comparison in online and in-person teaching and learning environments may affect self-esteem and other outcomes.

5.2 Strengths and limitations.

A strength of the present study is that we investigated first-year university students after their transition from secondary school and assessed correlates of online-only learning compared with online with in-person learning when those students did not voluntarily enroll in online classes. Previous research that compared the effects of online learning on outcomes in students usually suffers from the confound that students with certain characteristics have picked their respective learning environment. Thus, third variables such as self-efficacy perceptions, internal motivation to learn, learning preferences, and others could potentially account for any relationship between online learning and correlates in previous research. Furthermore, it could be that students with higher self-esteem usually pick an online course or vice versa, reversing the potential causal relationship between the variables. In the present study, this drawback is circumvented due to the governmental restrictions that forced some students into an online-only learning environment.

Given the correlational nature of the study, there can still be other factors apart from the learning environment driving the observed effects on SC and self-esteem, which is in fact indicated by the present suppression effect. Of course, there are a multitude of individual, social, and cultural variables that affect students' experiences in university, including their self-esteem (Collier & Blanchard, 2023; Dighero et al., 2023). Factors such as social class background or being a first-generation student may particularly affect first-year students' experiences when transitioning to university (e.g., de Vreeze et al., 2018). These are just a few examples of variables that may affect how different students deal with an online or an in person learning environment and that may relate to self-esteem (also see Seabi, 2011).

Notably, the present study took a quantitative reductionist approach focusing on a specific set of variables pertaining to social comparison and analysing the relationship between these variables in a sample of first-year college students. As the present study was designed to test specific hypotheses that we had preregistered following open science principles, we only

collected data focusing on these hypotheses. Therefore, the present data are limited and cannot explore the influence of the multitude of additional factors influencing self-esteem in online-only compared to online with in-person classes in an extended situation of crisis, as the study has not been designed to explore those additional factors. We also acknowledge that there are institutional, disciplinary, and programme factors (Dighero et al., 2023) that could affect both subsets of students differently and interact with self-esteem (Terblanche et al., 2020). For example, it could be that lecturers in the online-only courses made extra efforts to encourage and engage students, anticipating that the COVID-19 crisis and online learning were challenging for first-year students. These and other variables could have affected why in the present study, online-only students did not have lower self-esteem than those students with in-person classes as hypothesised. Those variables could have also influenced the relationship between learning group and self-esteem via SC. Therefore, we urge caution in suggesting causation as that would go beyond the present data. Instead, the present results provide an initial indication that online-only learning is positively related to self-esteem and that some variance in this relationship overlaps with positive social comparison. Future research could explore this relationship in more detail, controlling for some relevant individual, social, cultural, and institutional variables. Researchers could also conduct a true experiment in which students are randomly assigned to either online-only classes or a combination of online and in-person classes for part of their studies.

Another limitation is that our sample was relatively small and homogenous. We collected data from first-year university students in Ireland. Therefore, we cannot claim generalisability. Future research could aim to replicate the present findings in other contexts. In the present study, we assessed general self-esteem (Rosenberg, 1965), which is important for academic success and well-being (Körük, 2017; Sowislo & Orth, 2013). Future research could additionally also assess different components of self-esteem such as students' academic self-concept (Marsh & Craven, 2006), which has been shown to be most relevant in studying contexts (Trautwein et al., 2006). Different components of self-esteem may be relevant for its relationship with SC. Whereas SC of academic performance may most strongly affect students' academic self-esteem, interpersonal connections outside of the studying context could bolster general self-esteem by increasing social aspects of self-esteem. Furthermore, apart from self-esteem, future research could investigate whether fewer (positive) SC in

online-only learning settings have downstream consequences on performance and achievement.

6. Conclusion.

This study used a quantitative approach to assess students' opportunities to compare themselves with their peers, whether those comparisons were positive, and how these factors related to their overall self-esteem. The study capitalised on the unique circumstances created by government restrictions during the COVID-19 pandemic, which resulted in some students receiving instruction exclusively online, while others experienced a combination of online and in-person classes. The results indicate that online-only learning hindered social comparison processes that are particularly relevant in first-year students who have transitioned from secondary school to university. Importantly, results did not show that online-only learning had a negative relationship with students' self-esteem compared to when online learning was complemented with in-person classes. In contrast, results indicate that studying on an online only basis may even protect self-esteem when in-person learning does not allow for positive social comparison. This study provides a first indication of the potential positive effect of online-only learning on students' general self-esteem via a lack of positive social comparison. Thus, when students do not have a chance to compare positively with other students, the online environment protects their self-esteem. However, there are a multitude of individual, social, disciplinary and institutional factors that may affect this relationship, and future research is needed to replicate the present findings and extend it by exploring factors that can protect first-year students' self-esteem in different learning environments.

We need to be cautious when drawing conclusions to suggest what institutions and teachers could do to support students' self-esteem from a single quasi-experimental study with a limited sample size. Based on the present findings, we cautiously argue that online-only learning presents fewer opportunities for (positive) social comparison than in-person learning. Institutions and academics can foster a supportive environment by encouraging students to recognise their own strengths and learn from the strengths of others, thereby promoting positive social comparison and enhancing self-esteem. Furthermore, data indicate that onlineonly learning can have a self-esteem protective function. Therefore, institutions may want to offer different teaching and learning modes to support different students and their varying needs.

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