



Managing students' illusion of control in higher education: effect on unrealistic optimism and expectancy disconfirmation

Gonzalo Luna-Cortes¹

Accepted: 7 March 2024
© The Author(s) 2024

Abstract

Prior studies showed that optimism has positive benefits for students in higher education. However, research indicates different types of optimism, including the unrealistic optimism associated with the illusion of control. The literature review showed a lack of research on the effect of the illusion of control among students in higher education. Two studies were conducted to fill this gap. In Study 1 ($N=210$), university students responded to two surveys: one before oral presentations in class (measuring illusion of control and unrealistic optimism) and another after they received their grades for the presentations (measuring disconfirmation and satisfaction). The results show that the illusion of control is positively associated with unrealistic optimism, which leads to disconfirmation and dissatisfaction. Study 2 was a between-subjects design experiment (condition ($N=102$) vs. control ($N=102$)) that tested a stimulus to mitigate the illusion of control in this context. The results of Study 2 show that explaining to students their inability to control some variables during the presentation helps to reduce the illusion of control. This influences lower unrealistic optimism and disconfirmation, leading to higher satisfaction after the presentations. When testing moderating effects of demographics among these relationships, we found that gender moderates the effect of the stimulus used to reduce the illusion of control, with females showing a significantly higher decrease in this bias in comparison with male students. Based on these findings, we provide recommendations that can help to decrease the illusion of control in the context of higher education, with benefits for students and educators.

Keywords Illusion of control · Unrealistic optimism · Expectancy disconfirmation · Satisfaction

✉ Gonzalo Luna-Cortes
gonzalo.lunacortes@ju.se

¹ Jönköping International Business School, Jönköping University, Gjuterigatan 5, Box 1026, 551 11 Jönköping, Sweden

Introduction

The literature shows a wide variety of biases in higher education, including students' perception of classmates and instructors based on stereotypes, such as race (e.g., Heffernan, 2022) and gender (e.g., Hand et al., 2017). Other authors have examined the effects of self-enhancement bias (i.e., students' tendency to attribute mostly positive qualities to oneself) (Schlee et al., 2007), bias of self-efficacy (i.e., students overestimating their capabilities) (Aesaert et al., 2017), and optimistic bias (i.e., students overestimating their likelihood of experiencing certain positive outcomes) (Rentner & Alsulaiman, 2023; Ruthig et al., 2007).

Research on optimistic bias (a.k.a., unrealistic optimism) in higher education has examined different consequences, including perceived performance, motivation, and well-being (Richman, 2010; Robins & Beer, 2001; Ruthig et al., 2007), risk of sexual victimization, illegitimate behavior (e.g., plagiarism, copying...), and influence on healthy behaviors (see the review by Rentner & Alsulaiman, 2023). Some of these prior studies show conflicting findings, with results varying in different contexts. For instance, while in computer sciences studies found positive outcomes of this bias among students (Aesaert et al., 2017), in health education, some authors found that optimistic bias limits students' learning, which can lead to negative outcomes (e.g., behaving in an unhealthy manner) (Rentner & Alsulaiman, 2023).

Regarding students' expectations and performance in the classroom, while some authors indicated that optimism bias usually give students a false sense of hope that leaves them unprepared for scholastic challenges (e.g., disregard important course materials or not preparing well for tests) (Robins & Beer, 2001), other authors found that students that rated high in optimistic bias perceived higher control over academic outcomes, which was associated with better year-end performance and well-being (Ruthig et al., 2007). In the present research, we argue that such perceived control might be based on some proof, such as shown skills and prior results, or it can be an illusion, in which some students simply overestimate their control over future outcomes without any solid proof. The latter case can be associated with the illusion of control bias (Langer, 1975). To the best of our knowledge, no prior research has examined the effects of the illusion of control (hereafter IOC) on students' optimism, expectations, and associated outcomes.

The IOC is the individuals' erroneous belief that they can regulate variables out of their control (Langer, 1975). As a result, they tend to be more optimistic when approaching tasks and challenges (Sloof & von Siemens, 2017). Illusions and unrealistic optimism can lead to negative psychological outcomes once individuals face reality (Jefferson et al., 2017). It has also been established that, when people have a high IOC, and the outcome they expect occurs, they overestimate the degree to which they were instrumental in making it happen. When the outcome they expected does not occur, they might suffer negative psychological consequences (Armor & Taylor, 2002; Kaufmann et al., 2019). Building on these prior findings, the goal of the present research is to examine if students who rate higher in the IOC tend to hold higher unrealistic optimism about their performance. Furthermore, the study aims to test the relationship of unrealistic optimism with disconfirmation, once students see their grades and, finally, with their satisfaction. Finally, this research strives to find a stimulus to reduce this bias, which can benefit students and educators in higher education.

To achieve these research goals, this paper presents two studies, which test the relationships between the mentioned constructs (Study 1), and a stimulus that can reduce the IOC in this context of research, to observe the subsequent effect on students' unrealistic

optimism, disconfirmation, and satisfaction (Study 2). Findings in Study 1 provide the basis of a theoretical model on the effect of the IOC on students in higher education. Building on it, Study 2 presents a novel approach to reduce this bias, with benefits for students when presenting assignments in this context. Thus, findings in Study 2 provide key theoretical and practical implications of interest for educators, which are presented as part of the conclusions.

Theoretical framework

Research on the IOC

The first studies on the IOC provided evidence that many people act as if they have control over situations that are determined by chance (Langer, 1975). Hence, some individuals attribute random outcomes just to their abilities, without considering other external factors. Building on the study by Langer (1975), research in the 80s showed a connection between the IOC and individuals' involvement in gambling. More recent studies have examined how individuals who rate high in the IOC tend to assume risks, find patterns in random events, and convince themselves of their ability to control a desired outcome in different situations (Yon et al., 2020).

Building on prior research in psychology, some authors have examined the effect of the IOC in the field of transportation, testing the effect of this variable on driving behaviour and accidents on the road (Nees et al., 2021). Other research has been conducted in the fields of business and management (e.g., Sloof & von Siemens, 2017). These studies showed how individuals who rate high in the IOC tend to pursue authority. It can also affect some decisions in the business world, due to an association with risk perception and ambiguity tolerance. Few studies have applied this theory to learning and education management, as it is described in the next section.

The IOC in learning and higher education

A profound review of the literature in widely used datasets (i.e., ScienceDirect, Emerald, SAGE, Google Scholar, and EBSCO Business Source) showed a lack of studies on the effect of the IOC in learning and education. To confirm this fact, a more systematic search of the literature was performed, using the *Web of Science Core Collection* tool. The search aimed to identify any study that includes the IOC as part of their research in these fields and that might have been missed in the previous search (i.e., *keywords*: “illusion of control” (in any part of the text); *fields*: learning, education). This combined search provided only one study (Wouters et al., 2010).

The study by Wouters et al. (2010) used an experiment in which they tested the effect of the IOC, together with three different instructor's methods (i.e., study–practice vs. practice–study vs. study–study), on learners' ability to solve a problem. The IOC was not measured as an individual difference, but it was manipulated using a computerized experiment (i.e., “participants... were free to select the order of the buttons...to generate expectations about the control they could exert...” p. 95). Only one hypothesis was confirmed, namely, that the IOC impedes the transfer of learning (i.e., applying the skills learned to other situations). Therefore, the results showed a negative effect of the IOC on students' learning.

The IOC and unrealistic optimism

Optimism is the individuals' tendency to believe that they will experience good outcomes in life, therefore expecting that more desirable than undesirable things will occur in the future (Davidson & Prkachin, 1997). This type of optimism is also known as dispositional optimism. Research in psychology showed that dispositional optimism is connected with important benefits for individuals, such as increased problem-focused and decreased avoidant strategies. The latter can be associated with perseverance and progress (Davidson & Prkachin, 1997). A similar term is situational optimism, namely, general expectations of good outcomes but in a specific context, such as students' optimism during college (Nonis & Wright, 2003).

The study by Nonis and Wright (2003) showed that situational optimism positively influences some outcomes among college students, such as grade point average, credit hours earned to credit hours attempted ratio, and subjective performance perception. Hence, situational optimism influences the confident thinking that leads to positive outcomes (Kaufmann et al., 2019). This type of optimism does not contain predictions of specific life events, and it does not need to be unrealistic or associated with illusions (Jefferson et al., 2017).

However, other types of optimism might not lead to such positive outcomes. Weinstein (1980) first introduced the term unrealistic optimism, as the individuals' belief that, relative to their peers, they are unlikely to suffer future adverse events. Examples examined in the literature include control over unwanted pregnancy, the likelihood to suffer natural disasters, the end of a romantic relationship, or control over diseases (Waters et al., 2011). Building on this prior research, the review by Shepperd et al. (2013) described the differences between unrealistic comparative optimism (i.e., people believing that positive outcomes are more likely to occur for oneself than for others) and unrealistic absolute optimism (i.e., unrealistic assessment compared to actual outcomes). As an example, Jefferson et al. (2017) proposed that expecting an unrealistically good outcome during a college course, which does not match the actual performance (e.g., final exam grade), would be unrealistic absolute optimism. Unrealistic comparative optimism in this context would be the expectation of a grade that is too high in comparison with the average grade in the course, without a clear cause to support the assumption.

An important factor that can influence optimism is perceived controllability. Controllability refers to being capable of producing desired events, or preventing undesired ones (Ruthig et al., 2007). When individuals rate high in the IOC, they tend to exaggerate these control capabilities and, as a result, they feel more optimistic about the outcome. However, this type of optimism is based on illusions, not real facts (Robins & Beer, 2001) (e.g., "if I pick the lottery ticket myself, I am more likely to win"), which connects the IOC with unrealistic optimism (Shepperd et al., 2013). This can happen to students as well, as some might believe they can control outcomes that, in reality, are out of their control (e.g., the teachers' grading), and this can make them optimistic and overconfident, for example, when preparing for tests or before taking an exam (Robins & Beer, 2001). Thus, the relationship between the IOC and unreal optimism occurs because students who rate high in the former bias are unrealistically optimistic about desired outcomes, due to their belief that they have full control over them (Jefferson et al., 2017). Based on this prior research, we theorize a direct relationship between the IOC and unrealistic optimism:

H1: The IOC is directly and positively associated with students' unrealistic optimism about their performance.

The IOC, unrealistic optimism, and disconfirmation

The appraisal theory suggests that emotions change due to revisions in the appraisals (Kaufmann et al., 2019). Kaufmann et al. (2019) posit that the IOC can lead to overoptimistic perceptions that might not result in positive emotions, especially when the person faces a loss of control or observes different outcomes. Hence, the authors suggest that stimulating the IOC is not a recommendable vain to induce positive emotions and well-being. Similarly, other studies show that believing something that conflicts with evidence can lead to a distorted picture of reality and, as a result, have negative emotional consequences for a person (Langens, 2007).

In connection with the above, the study by Langens (2007) indicated that, when an outcome does not match the individuals' expectations and prior optimism, their reaction might depend on how the feedback is provided to them. Precisely, the IOC can lead to positive emotions if individuals do not receive feedback, or if the feedback is ambiguous. This is not the case when clear feedback is provided. In the context of education, students normally receive an objective assessment, which can be viewed as concise feedback. This can lead to a gap between expected and actual results.

When individuals perceive a gap between what they expect and the final (objective) results, they can perceive expectancy disconfirmation (Oliver, 1997; Van Ryzin, 2005). Expectancy disconfirmation theory was first examined in marketing (Oliver, 1997). The theory holds that consumers form judgments about products/services using their prior expectations about their characteristics or benefits. This theory has been applied to other contexts, proving that when individuals observe objective outcomes that differ from what they expected, they perceive disconfirmation (e.g., Armor & Taylor, 2002; Van Ryzin, 2005). The review by Armor and Taylor (2002) titled "when predictions fall" indicated that, if individuals hold unrealistic optimism, they are prompt to perceive disconfirmation. Building on the relationship previously hypothesized, and the mentioned prior findings in the literature, it is proposed that students' IOC is positively associated with unrealistic optimism, which in turn, will lead to students' disconfirmation once they received their grades.

H2: Unrealistic optimism mediates the relationship between the IOC and students' disconfirmation with the grade received.

The IOC, performance, and satisfaction

In the field of education, satisfaction can be defined as the student's joy of fulfilment regarding the experiential outcomes of the learning activities (Kangas et al., 2017). Student satisfaction appears as a variable of interest among scholars in more current studies as well (Alcalde & Nagel, 2019; Kangas et al., 2017; Littman-Ovadia & Freidlin, 2022; Rakhshandehroo & Ivanova, 2020; Wong & Chapman, 2023). Prior research has examined some antecedents of students' satisfaction, highlighting the content provided in class, location and facilities, the quality of services offered by the university, organizational resources, and the teachers' engagement and capabilities (Kangas et al., 2017).

A prerequisite to assessing satisfaction is considering students' expectations. Prior studies suggest that students' satisfaction is associated with their expectations and subsequent outcome (Alcalde & Nagel, 2019). When the feelings and experiences during the time at university, or a specific program, do not match the student's expectations, they usually feel dissatisfied. In addition, if the individual's perception of their own performance is worse

than expected, this can lead to disconfirmation and dissatisfaction (Kangas et al., 2017). Based on this prior research, the following hypothesis is proposed:

H3: Students' disconfirmation with the grade received is negatively associated with satisfaction.

The role of gender on students' IOC in higher education

Prior findings on the relationship of gender with the IOC show some conflicting results. Some research indicated that men usually rate higher than women (Dannewitz & Weatherly, 2007), while other studies suggested that women rate higher on this bias (Orgaz et al., 2013). Although scholars indicate that the levels of the IOC might depend on the context of the study (Orgaz et al., 2013), to the best of our knowledge, no prior research has captured levels of IOC between female and male students in higher education. Recently, scholars have concluded that, despite the number of moderating contextual factors, men appear to be less sensitive to risk in most contexts, because they usually feel more certain about their probability of success than women do (Karmarkar, 2023). In other words, men usually believe they have higher control to succeed.

Regarding optimism, studies in higher education suggest that female students tend to be more pessimistic than male students (Icekson et al., 2020). Recent studies show that male students show higher unrealistic optimism, which can lead to overconfidence at college and lower concern with risks (Rentner & Alsulaiman, 2023). Icekson et al. (2020) indicated that special concern needs to be paid to male students, since they are more vulnerable to optimism bias. Given the hypothesized relationship between the IOC and unrealistic optimism, and the general assumption that males rate higher in the IOC (Karmarkar, 2023), we expect that, before the presentations in the classroom, male students will show higher IOC and unrealistic optimism in comparison with female students:

H4: There is a direct effect of gender on the IOC and unrealistic optimism, with males rating higher than female students on these biases in the context of higher education.

Managing the IOC: effect on unrealistic optimism and disconfirmation

Students' understanding of their own performance and the learning journey can be beneficial. During this process, guidance and support are crucial for cultivating self-regulated learning. Teachers shoulder the responsibility of assisting learners in various ways such as goal planning and monitoring, as well as helping students cope with certain feelings during the journey and the view of their own performance. Some of these negative feelings depend on individual differences, such as the IOC by different people. While some research has measured the IOC as an individual difference (Nees et al., 2021), other research has indicated that the IOC can be reduced or increased using specific stimulus (e.g., Kaufmann et al., 2019; Langens, 2007; Wouters et al., 2010; Yon et al., 2020). Therefore, the IOC can be regulated (Yon et al., 2020). On the basis of this prior research, and building on the above-mentioned hypotheses, it is expected that providing guidance to students on topics related to the IOC can reduce unrealistic optimism, and disconfirmation afterward, leading to higher satisfaction.

H5: A stimulus directed to reduce the IOC (vs. a control group) negatively influences unrealistic optimism, leading to lower disconfirmation and higher satisfaction.

When it comes to the role of gender in this context, the literature has shown differences in the way male and female students approach guidance in higher education. Females pay

more attention to guidance because they believe that their performance informs about their abilities, while males do not usually follow this cognitive approach (Malik & Saida, 2013). Male students are more prone to believe in their abilities and control over success regardless of the instructors' guidance or feedback (Icekson et al., 2020). Thus, in comparison with males, female students usually perceive guidance as an opportunity to improve and obtain higher grades, being more prone than males to apply instructors' feedback (Butler, 2014). In contrast, males usually adopt a self-confident approach and, as a result, are usually more inclined to deny the informational value of instructors' guidance (Icekson et al., 2020). We expect that, when instructors use information to mitigate the IOC, gender will moderate the effect of this stimulus, since female students will be more likely to reduce the IOC based on the instructor's information to mitigate this bias.

H6: Gender moderates the effect of a stimulus to reduce the IOC among students in higher education, with females showing a significantly higher decrease in this bias in comparison with male students.

Figure 1 presents the graphic summary of the relationships hypothesized.

Study 1—testing the effect of the IOC on students' unrealistic optimism and disconfirmation

Method

Data collection and sampling

The data was collected among bachelor (i.e., undergraduate) students at a business school in Monte-Carlo, Monaco. Participants were selected using convenience sampling. The students were part of two courses, Consumer Behavior (81% of the students in the sample) and International Marketing (19%), in the Bachelor of Business Administration. The questionnaire was in English, as this is the language for all courses at the university. In total, 210 students filled out the two questionnaires (i.e., 48% females; mean age = 18.12; SD = 0.56; nationality: 62% French, 29% Italian, 9% from other countries).

The instructor of these two courses was the same. Both courses included a group project with similar characteristics. In Consumer Behavior, they had to identify a consumer need

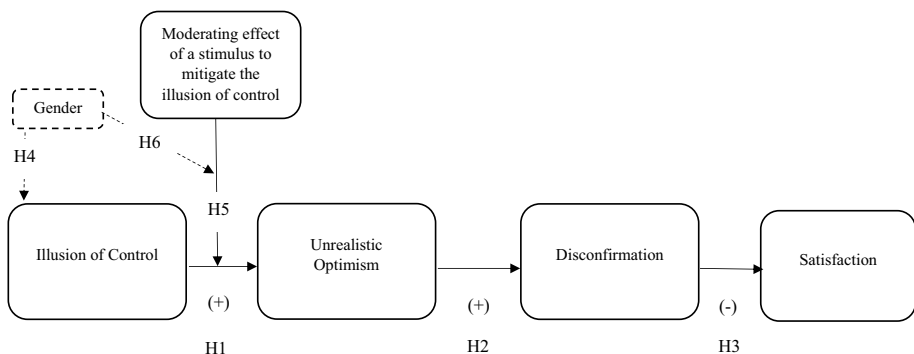


Fig. 1 Theoretical model

in Monaco and create a new product, and then identify the consumer search of information, segmentation, and positioning of the product. In International Marketing, they needed to reposition a local brand into an international brand. They were asked to choose the internationalization and growth strategy, indicate the countries where the products would be launched, adaptation of the company's products, and explain the brand positioning statement and branding attributes for the international context. Both projects included data collection and analyses to support the decisions.

Students were free to create their own groups (3–4 students). Gender and national diversity varied among the groups: although all groups included a similar number of males and females, some groups were formed by students only from France or Italy (the two most representative nations in the courses). The students received the guidelines for the project during the first lecture. Additionally, the course included two seminars (sessions of 15 min per group; attendance was mandatory). In the two seminars, the students presented the ideas for the project (seminar #1), and the data collection tool with intended research goals (seminar #2). The instructor provided feedback during these sessions.

The projects in both courses included two types of grades. First, they received an individual grade (50% of the grade for this assignment), which was based on their individual performance during the presentations. It was mandatory for all students to present a part of the project in class (e.g., introduction and data collection process), of a similar length (around 3–5 min each). They were free to choose which part of the project each group member would present. The second grade was based on the written document presented at the end of the course, which was a group grade (i.e., equal for all group members—remaining 50% of the group project grade). The present research focuses only on the individual grade of the group project, i.e., based on their individual performance during the presentations.

This individual grade was based on twenty rubrics, which evaluated aspects related to the organization (e.g., the information is presented in a logical sequence), the content (e.g., technical terms are well-defined; language appropriate for the target audience), and other aspects related to the quality of the oral presentation. Each aspect was rated from 0 to 5. The final grade was the sum of these rubrics (from 0 to 100).

The data collection was conducted in two periods: (1) one day before the presentations (measuring the IOC and unrealistic optimism with their performance during the presentations) and (2) one day after the presentations (measuring disconfirmation and satisfaction with their individual grade). Participants provided written consent each time before responding to the survey. Before answering the second questionnaire, the students had received the grades of their presentations (i.e., the individual grade; not the group grade).

Measures

IOC The IOC has been primarily measured in the literature in two different forms: (1) induced IOC (e.g., Kaufmann et al., 2019; Wouters et al., 2010; Yon et al., 2020) and (2) as an individual difference (e.g., Nees et al., 2021). The goal of this study is to identify the effect of the IOC as a personal characteristic among different students. Hence, the scale by Nees et al. (2021) was adapted to measure the IOC as an individual difference among the students.

Unrealistic optimism As mentioned during the literature review, in order to measure unrealistic optimism, it is important to differentiate between unrealistic comparative optimism

and unrealistic absolute optimism (Jefferson et al., 2017; Shepperd et al., 2013). Considering that the goal of this research is to measure unrealistic optimism before the grade was provided, the survey contained the measurement of unrealistic comparative optimism. This is, compared with an average grade (Jefferson et al., 2017; Shepperd et al., 2013). The measurement by Shepperd et al. (2013) was adapted to the context of the oral presentations in class.

Expectancy disconfirmation This construct has been traditionally measured as a subjective rating of a product/service, but it has been translated to other studies in other fields that examined expected performance (Van Ryzin, 2005). Hence, the scale by Van Ryzin (2005) was adapted to measure expectancy disconfirmation.

Students' satisfaction The scale by Alcalde and Nagel (2019) was based on the theory of satisfaction from prior research by Oliver (1997), but adapted to a study in the field of education. The mentioned scale was used to measure students' satisfaction with their presentation grades (see all items in Table 1.).

Results

Reliability and validity of the scales

Confirmatory factor analysis (CFA) was used with AMOS-SPSS. The model fit indexes, the reliability, and convergent validity of the scales are presented in Table 2.

Table 1. Items of the scales

| Time | Construct | Items |
|---|------------------------------------|---|
| <i>One day before the presentations</i> | Illusion of Control | <ul style="list-style-type: none"> ● I am capable to control the performance of my presentations and all the circumstances around it ● I have the ability to control all the variables that can affect the performance of my presentation in class ● I believe that the performance of my presentations depends exclusively on my own skills, and nothing else |
| | Unrealistic Optimism (Comparative) | <p><i>The average grade for the presentations in this course in the last five years is 75 (out of 100). Please answer the questions below:</i></p> <ul style="list-style-type: none"> ● Surely, I will do better than the average grade ● I can guarantee I will provide a presentation that will result in a much higher grade than the average ● I have absolutely no doubt I will perform well, which will surely result in a higher grade than the average |
| <i>One day after the presentations</i> | Disconfirmation | <ul style="list-style-type: none"> ● In general, I did not do as well as I expected ● I thought I would perform better in my presentation than I did ● I expected I would do better during my presentation |
| | Satisfaction | <ul style="list-style-type: none"> ● In general, I am satisfied with my grade for this presentation ● I am happy with my score in this presentation ● I feel content with my results for the presentation |

Table 2 Reliability and convergent validity—Study 1

| Factor | Indicator | Load | Robust t | Cronbach's α | CR | AVE |
|----------------------|-----------------|--------|----------|---------------------|------|------|
| Illusion of control | I-Control 1 | 0.76** | 11.900 | 0.82 | 0.83 | 0.61 |
| | I-Control 2 | 0.91** | 13.117 | | | |
| | I-Control 3 | 0.83** | 11.763 | | | |
| Unrealistic optimism | U-Optimism1 | 0.73** | 9.121 | 0.85 | 0.80 | 0.63 |
| | U-Optimism 2 | 0.87** | 12.507 | | | |
| | U-Optimism 3 | 0.87** | 12.157 | | | |
| Disconfirmation | Diconfirmation1 | 0.78** | 9.771 | 0.79 | 0.74 | 0.52 |
| | Diconfirmation2 | 0.70** | 7.633 | | | |
| | Diconfirmation3 | 0.70** | 7.421 | | | |
| Satisfaction | Satis1 | 0.67** | 9.110 | 0.78 | 0.77 | 0.53 |
| | Satis2 | 0.84** | 9.727 | | | |
| | Satis3 | 0.72** | 9.270 | | | |

$N = 210$; ** $p < 0.01$; * $p < 0.05$; chi-square = 264.32; $df = 23$; NFI = 0.910; NNFI = 0.911; GFI = 0.901; AGFI = 0.901; CFI = 0.901; IFI = 0.903; RMSEA = 0.080

As it can be observed in Table 2, all factor loadings were above the recommended value of 0.60; all Cronbach's alphas were above 0.70, which is the value recommended in the literature to accept reliability; the composed reliability index was also above 0.70; and the average variance extracted (AVE) values were superior to the recommended value of 0.50 (Nunnally & Bernstein, 1994). The discriminant validity was confirmed by testing the variance shared by each pair of factors, which was below the variance for each pair of factors (Fornell & Larcker, 1981): (i.e., Illusion/U-Optimism = 0.08; Illusion/Disconfirmation = 0.06; Illusion/Satisfaction = 0.09; U-Optimism/Disconfirmation = 0.39; U-Optimism/Satisfaction = 0.11; Disconfirmation/Satisfaction = 0.33).

Structural model

Structural equation modeling (SEM) was used with AMOS-SPSS for hypotheses verification. The results are presented in Table 3, which show significant relationships between the constructs.

The mediation effect of the students' optimism and expectancy disconfirmation

A bootstrapping procedure with 10,000 iterations using PROCESS Macro (Hayes, 2017) was performed to test the mediating effect of unrealistic optimism in the relationship of the IOC with expectancy disconfirmation, which was significant (Effect = 0.14;

Table 3 Results SEM—Study 1

| Relation | β | t | p |
|--|---------|------|------------|
| Illusion of control \rightarrow unrealistic optimism | 0.26 | 3.47 | $p < 0.01$ |
| Unrealistic optimism \rightarrow disconfirmation | 0.77 | 8.13 | $p < 0.01$ |
| Disconfirmation \rightarrow satisfaction | -0.57 | 5.75 | $p < 0.01$ |

Boot-SE=0.03; 95% CI (0.09, 0.20)). The results show a full mediation effect, since the direct effect of IOC on expectancy disconfirmation is not significant once the mediating variable is in the model ($se=0.04$; $t=0.18$; $p=0.85$) (H2 supported).

Effect of gender on the IOC and unrealistic optimism

The results show a direct effect of gender on unrealistic optimism (T -test: $t=2.15$; $p<0.05$), but not on the IOC (T -test: $t=1.76$; $p>0.05$). The significant effect of gender shows higher unrealistic optimism among male students than for female students (mean-male=3.06; mean-female=3.35) (H4 partially supported).

Study 2—providing guidance to regulate the IOC

On the basis of the findings of Study 1, the goal in Study 2 is to test a stimulus to mitigate the effect of the IOC on unrealistic optimism in the context of higher education, and examine the subsequent outcomes on disconfirmation and satisfaction. Building on the initial findings associated with the effect of gender in Study 1, the moderating role of gender is further tested in this study.

Method

This study was conducted one semester after Study 1. The same procedure as in Study 1 was followed to conduct this study, using a sample of different students (i.e., no student from Study 1 participated in this study), but from the same university ($N=204$; 61% female; mean of age = 18.6; nationality: 54% French, 35% Italian, 11% other). In this case, all students were from the same course, namely Consumer Behaviour. Since there is a large number of students that take this mandatory course every year, students that take this course are divided in different groups (i.e., this semester—Consumer Behavior A, Consumer Behavior B), with the same instructor, content, and materials, but lectures are given at different days/times. The focus of the study was the individual grade of the group project, the same as in Study 1 (see above).

The data collection process was performed as in Study 1 as well (i.e., Questionnaire #1: data collection one day before the presentations, measuring IOC and unrealistic optimism; Questionnaire #2: one day after the presentations, measuring disconfirmation and satisfaction). However, this was a two-condition experiment (differentiating two groups: (1) regulating the IOC vs. (2) control group). To be precise, during the two studies in this research, three samples were used (i.e., a sample for Study 1 ($N=210$, indicated above); while in Study 2, two groups/samples were distinguished: regulating the IOC ($N=102$) vs. control group ($N=102$) – (total N in Study 2=204)).

Before filling out the first part of the questionnaire (i.e., one day before the presentations), the course instructor provided a piece of information in class, and asked the students to consider it before presenting. The information was distributed on a one-page document, and contained four paragraphs about how to (1) define objectives before making the presentation, (2) learn and master the subject, (3) think about the whole story, and (4) be natural during the presentation. This text was identical for all participants.

For the participants in the experimental condition, there was an extra paragraph. This explained how they would not be in control of several variables such as classmates'

Table 4 Reliability and convergent validity—Study 2

| Factor | Indicator | Load | Robust t | Cronbach's α | CR | AVE |
|----------------------|-----------------|--------|----------|---------------------|------|------|
| Illusion of control | I-Control 1 | 0.91** | 21.228 | 0.88 | 0.82 | 0.65 |
| | I-Control 2 | 0.77** | 10.468 | | | |
| | I-Control 3 | 0.70** | 9.268 | | | |
| Unrealistic optimism | U-Opt1 | 0.81** | 22.202 | 0.78 | 0.79 | 0.64 |
| | U-Opt2 | 0.79** | 22.882 | | | |
| | U-Opt3 | 0.76** | 20.955 | | | |
| Disconfirmation | Diconfirmation1 | 0.85** | 22.222 | 0.82 | 0.83 | 0.69 |
| | Diconfirmation2 | 0.82** | 22.002 | | | |
| | Diconfirmation3 | 0.82** | 20.998 | | | |
| Satisfaction | Satis1 | 0.77** | 8.984 | 0.78 | 0.76 | 0.56 |
| | Satis2 | 0.77** | 8.592 | | | |
| | Satis3 | 0.73** | 8.050 | | | |

$N = 204$; ** $p < 0.01$; * $p < 0.05$; chi-square = 298.12; $df = 23$; NFI = 0.901; NNFI = 0.902; GFI = 0.911; AGFI = 0.911; CFI = 0.932; IFI = 0.932; RMSEA = 0.078

Table 5 Results SEM—Study 2

| Relation | β | t | p |
|--|---------|------|------------|
| Illusion of control \rightarrow unrealistic optimism | 0.27 | 3.48 | $p < 0.01$ |
| Unrealistic optimism \rightarrow disconfirmation | 0.75 | 8.07 | $p < 0.01$ |
| Disconfirmation \rightarrow satisfaction | -0.54 | 5.64 | $p < 0.01$ |

questions and behaviour during their presentations, the teachers' perception of particular aspects, malfunction of technology, the noise around when they present, and even personal factors, such as their own anxiety, how mentally tired they might be, or feeling unwell the day of the presentation (see Appendix). In the control group, this information did not appear.

Results

Reliability and validity of the scale

As it can be observed in Table 4, all the loadings were above the recommended value of 0.60; Cronbach's alphas above 0.70; CR above 0.70; and AVEs superior to 0.50. The discriminant validity was verified as well (i.e., Illusion/U-Optimism = 0.11; Illusion/Disconfirmation = 0.15; Illusion/Satisfaction = 0.13;

U-Optimism/Disconfirmation = 0.48; U-Optimism/Satisfaction = 0.24; Disconfirmation/Satisfaction = 0.44).

Structural model and mediating Effect

The relationships between the constructs were confirmed in this study as well (see Table 5). The mediating effect of unrealistic optimism in the relationship of IOC with

disconfirmation was confirmed in this study too (Effect=0.25; Boot-SE=0.04; 95% CI (0.18, 0.33)). The results showed a full mediating effect (direct effect: $se=0.06$; $p=0.67$).

Moderating effect of “mitigating IOC”

The results revealed that the students exposed to the information to regulate the IOC rated lower on this construct, in comparison with the control group (means of IOC: $M_{\text{Mitigating-Ilusion-Control}} = 1.69$, $M_{\text{control-Group}} = 2.41$, $t=6.59$, $p<0.01$). Differences can be observed as well for unrealistic optimism (means of u-optimism: $M_{\text{Mitigating-Ilusion-Control}} = 2.50$, $M_{\text{control-Group}} = 3.40$, $t=5.01$, $p<0.01$), disconfirmation (means of disconfirmation: $M_{\text{Mitigating-Ilusion-Control}} = 2.08$, $M_{\text{control-Group}} = 2.93$, $t=6.32$, $p<0.01$), and satisfaction (means of satisfaction: $M_{\text{Mitigating-Ilusion-Control}} = 2.40$, $M_{\text{control-Group}} = 2.04$, $t=3.34$, $p<0.01$).

To test the hypothesis that the stimulus moderates the relationship between the IOC and unrealistic optimism, a sequential moderated-mediation analysis, with moderation in the c-path in PROCESS for SPSS—model 87—was conducted. The moderating effect is confirmed ($F=77.94$; $p<0.01$). The index of moderated mediation is significant (Effect = -0.18 ; Boot-SE = -0.09 ; 95% CI (-0.24 , -0.15)). See all indices in Fig. 2.

The results of the moderation effect (i.e., conditional effects of the focal predictor at values of the moderator; Hayes, 2017) showed that the positive effect of the IOC on unrealistic optimism is only significant for the control group ($t=11.07$; $p<0.01$), but not for the experimental group ($t=1.80$; $p>0.05$). For the latter, unrealistic optimism remained always lower (see Fig. 3) (H5 supported).

Moderating effect of gender when mitigating IOC

In this case, the results show a direct effect of gender on the IOC (T -test: $t=2.71$; $p<0.05$) and unrealistic optimism (T -test: $t=2.15$; $p<0.01$), for both rating higher among male students (H4 supported). In addition, we found that gender moderates the effect of the stimulus on the levels of IOC (PROCESS-Model 3 (i.e., moderated moderation): $F=7.74$; $p<0.01$). The conditional effects of the focal predictor at values of

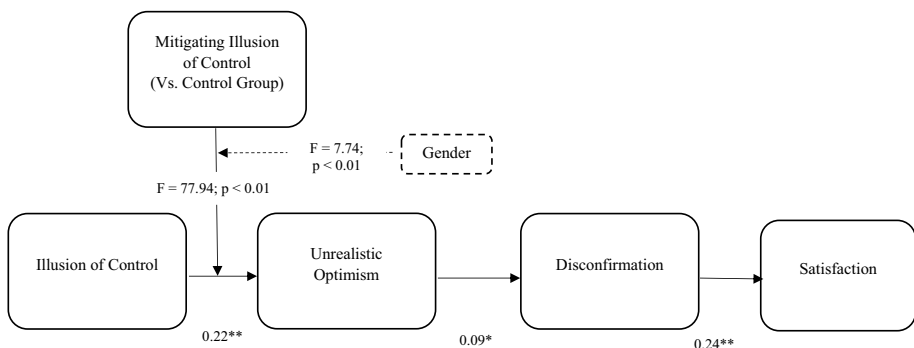


Fig. 2 Mitigating the illusion of control: moderating effect (Study 2) (PROCESS-Model 87). NOTE: Path coefficients represent standardized regression coefficients. Coefficients significantly different from zero are indicated by asterisks (** $p<0.01$; * $p<0.05$), and their associated paths are shown by solid lines; dashed lines indicate non-significant paths

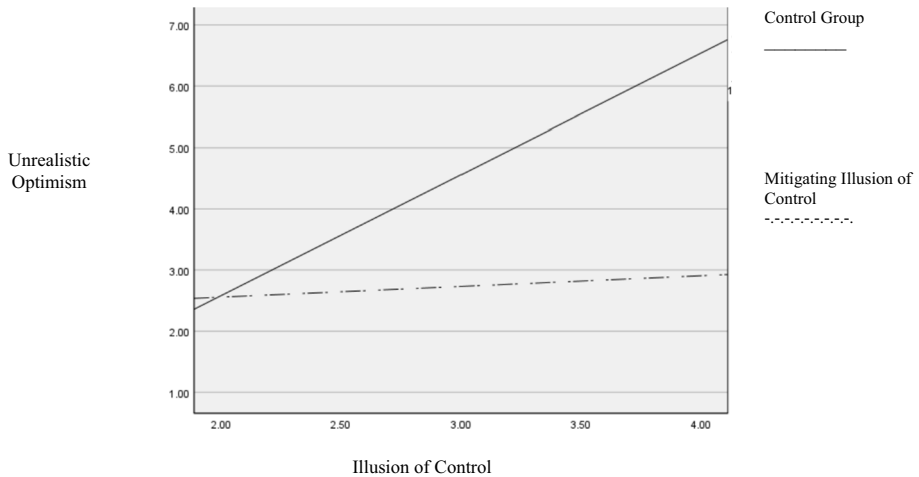


Fig. 3 The moderating role of “mitigating the illusion of control” (Study 2)

the moderator (i.e., gender) show that, while in the control group the levels of IOC are slightly higher among male than female students, when using a stimulus to mitigate the IOC before the presentations, the effect is much higher among female students than for male students (see Fig. 4). This indicates first that male students showed in general higher IOC before the presentations and, secondly, when using information to mitigate this problem, female students are more likely to reduce this bias (H6 supported).

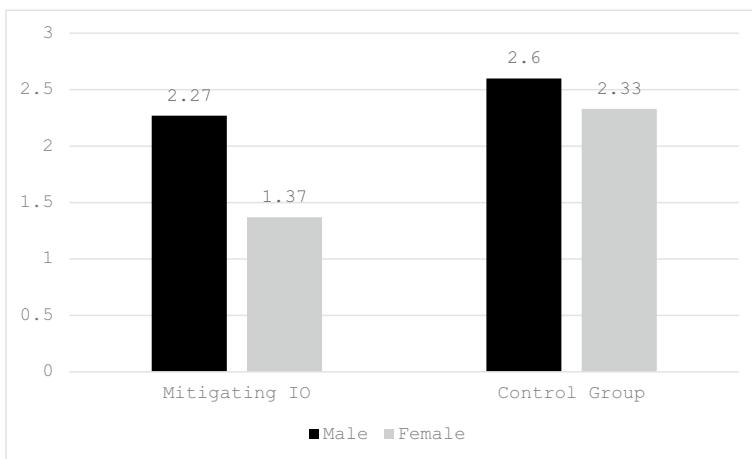


Fig. 4 Levels of IOC among groups (experimental condition vs. control group) and for male vs. female students

General discussion

The literature in higher education highlights a variety of biases that can affect students' expectations, motivation, and disappointment (e.g., Hand et al., 2017; Heffernan, 2022; Rentner & Alsulaiman, 2023; Ruthig et al., 2007; Schlee et al., 2007). Among these, some cognitive biases are associated with students' tendency to overestimate their capabilities, such as the optimistic bias (Rentner & Alsulaiman, 2023; Ruthig et al., 2007). When examining the effects of this bias in higher education, scholars presented some conflicting findings. Some authors found a negative effect on effort and preparedness (Robins & Beer, 2001), while other authors found that this bias can lead to perceived control over academic outcomes, which positively affect performance at higher education and increased well-being (Ruthig et al., 2007).

Since then, research found different results (positive vs. negative outcomes) depending on the context (e.g., Aesaert et al., 2017; Rentner & Alsulaiman, 2023). Building on prior research that indicated the key value of perceived control to understand the effect of optimism among students (Ruthig et al., 2007), and considering the mentioned conflicting results, we suggested that students' perceived control could either be realistic or unrealistic, based on their IOC towards the desired outcome. The literature review showed a lack of research on the IOC in higher education. The findings in this research shed some new light on the effect of these biases among students in higher education.

Precisely, our findings indicate that students who held higher IOC rated higher in unrealistic optimism towards their performance during presentations in class. Once they received their grades, they felt disconfirmation and, in turn, dissatisfaction (Study 1). The results of Study 2 showed that explaining to students that they will not be able to control all variables during the presentations mitigates their IOC. In turn, this guidance decreases unrealistic expectations, leading to lower disconfirmation and higher satisfaction. The results of this study show that this guidance has a more positive impact on females than on male students. Thus, while female students might need less guidance to reduce this bias, and with a simple stimulus they might reduce it, instructors should consider that male students might need more input, since this stimulus did not lead to the same effect on males' IOC.

Regarding the practical implications of the findings, it is important that educators share these considerations with their students, especially, if they come to know them well and identify IOC and unrealistic optimism among some before performing activities in class. Considering the importance of the relationship between teachers' engagement and students' satisfaction (Kangas et al., 2017), it can be further recommended that, if teachers observe students feeling disconfirmation after their presentations, they should interact with them. If the reason the student feels disconfirmation is that they had unrealistic expectations about their grades, the teacher should explain that their feelings are connected with irrational thoughts and provide a real picture of the situation. In addition, it can be explained that some of the circumstances that occurred were out of their control, and this should be accepted. This might help reduce students' IOC in the future, which can be key during other class activities and, in the long term, increase satisfaction during their journey at the university.

This research has some limitations. First, the data was collected in the classrooms. Teachers' comments might influence students' reactions. Although lecturers were aware the studies were being conducted, and provided feedback with precaution, this might still be a limitation, since some feedback might differ from others. This can lead to different reactions. Future studies should control for these possible confounding variables,

using an environment in which other people (teachers, classmates, etc.) do not interact with the students.

Secondly, the two studies were conducted in Monaco. The results might differ using other samples. Most studies on the IOC and unrealistic optimism focused on Western countries (Nees et al., 2021; Sloof & von Siemens, 2017), but some differences have been observed with individual from other regions (Heine & Lehman, 1995). The study by Heine and Lehman (1995) was the first to consider different levels of IOC among individuals from different cultures. The authors concluded that Canadians showed significantly higher unrealistic optimism, self-enhancement, and grandeur than Japanese did. These are variables related to the IOC, but are mostly valued in interdependent cultures (Heine & Lehman, 1995). Hence, it would be interesting to examine the relationships between these variables in countries where individuals might rate lower in the IOC. Studies should conduct analyses in educational environments where students from different regions share the same courses.

When it comes to demographics, the present research found differences only based on gender. Lack of diversity considering other demographics can be due to the characteristics of the samples used in the studies (i.e., participants shared similar age, nationality, same degree, and the same courses). Future research could test the effect of income (e.g., Do students from a higher socioeconomic status have higher IOC, which affect their perception and reaction in the classroom?), the type of university (private vs. public), age (e.g., Generation Y vs. Generation Z), the degree (e.g., bachelor vs. master), and the field of the studies (e.g., humanities vs. engineering).

Regarding the degree or field of the studies, it has been indicated in the literature that the IOC might lead to positive emotions and behaviour if feedback is ambiguous (Langens, 2007). It is when individuals observe objective results, different from what they expected, that they perceive disconfirmation (Armor & Taylor, 2002; Langens, 2007). Therefore, a question to answer might be if students in science, such as mathematics, for which results are usually objective, hold lower IOC than students in other fields, such as in social sciences, philosophy, art, or poetry.

Finally, one of the major reasons for students' involvement in higher education is career planning (Mondo et al., 2021). Research has found that students' optimism during higher education positively influences career planning and career exploration (Patton et al., 2004). However, no prior research has examined how the IOC and unrealistic optimism can impact future professional adaptation and career planning. Using well-established measuring tools to capture positive career planning attitudes (e.g., career adaptability and career optimism), such as the Career Futures Inventory (Rottinghaus et al., 2005), and Career Ability (including proactive personality and boundaryless mindset) (Mondo et al., 2021), future research should measure the effect of the IOC and unrealistic representations on these career-related constructs, exploring the effects of these biases not only during their studies, but also when planning their future careers.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10734-024-01212-2>.

Funding Open access funding provided by Jönköping University.

Declarations

Conflict of interest The author declares no competing interests.

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/>.

References

- Aesaert, K., Voogt, J. M., Kuiper, E., & Braak, J. V. (2017). Accuracy and bias of ICT self-efficacy: An empirical study into students' over- and underestimation of their ICT competences. *Computers in Human Behavior*, *75*, 92–102.
- Alcalde, P., & Nagel, J. (2019). Why does peer instruction improve student satisfaction more than student performance? A randomized experiment. *International Review of Economics Education*, *30*, 100–149.
- Armor, D. A., & Taylor, S. E. (2002). *When predictions fail: The dilemma of unrealistic optimism*. In T. Gilovich, D. Griffin, & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 334–347).
- Butler, R. (2014). Motivation in educational contexts: Does gender matter? *Advances in Child Development and Behavior*, *47*, 1–41.
- Dannewitz, H., & Weatherly, J. N. (2007). Investigating the illusion of control in mildly depressed and nondepressed individuals during video-poker play. *The Journal of Psychology*, *141*(3), 307–319.
- Davidson, K., & Prkachin, K. (1997). Optimism and unrealistic optimism have an interacting impact on health-promoting behavior and knowledge changes. *Personality and Social Psychology Bulletin*, *23*, 617–625.
- Fornell, C., & Larcker, D. (1981). Evaluating structural equations models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39–50.
- Hand, S., Rice, L., & Greenlee, E. T. (2017). Exploring teachers' and students' gender role bias and students' confidence in STEM fields. *Social Psychology of Education*, *20*, 929–945.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis (3rd Ed.)*. New York: The Guilford Press.
- Heffernan, T. A. (2022). Sexism, racism, prejudice, and bias: A literature review and synthesis of research surrounding student evaluations of courses and teaching. *Assessment & Evaluation in Higher Education*, *47*, 144–154.
- Heine, S. J., & Lehman, D. R. (1995). Cultural variation in unrealistic optimism: Does the West feel more vulnerable than the East? *Journal of Personality and Social Psychology*, *68*, 595–607.
- Icekson, T., Kaplan, O., & Slobodin, O. (2020). Does optimism predict academic performance? Exploring the moderating roles of conscientiousness and gender. *Studies in Higher Education*, *45*(3), 635–647.
- Jefferson, A., Bortolotti, L., & Kuzmanovic, B. (2017). What is unrealistic optimism? *Consciousness and Cognition*, *50*, 3–11.
- Kangas, M., Siklander, P., Randolph, J., & Ruokamo, H. (2017). Teachers' engagement and students' satisfaction with a playful learning environment. *Teaching and Teacher Education*, *63*, 274–284.
- Karmarkar, U. R. (2023). Gender differences in optimistic information processing in uncertain decisions. *Cognitive Affective & Behavioral Neuroscience*, *23*(3), 827–837.
- Kaufmann, M., Goetz, T., Lipnevich, A. A., & Pekrun, R. (2019). Do positive illusions of control foster happiness? *Emotion*, *19*(6), 1014–1022.
- Langens, T. A. (2007). Emotional and motivational reactions to failure: The role of illusions of control and explicitness of feedback. *Motivation and Emotion*, *31*(2), 105–114.
- Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, *32*(2), 311–328.
- Littman-Ovadia, H., & Freidlin, P. (2022). Paired learning duration and character strengths use as predictors of learning satisfaction: A dyadic longitudinal study among Chevruta students in Yeshivas. *Higher Education*, *83*(3), 655–673.
- Malik, S., & Saida, J. (2013). Gender differences in self-esteem and happiness among university students. *International Journal of Development and Sustainability*, *2*(1), 445–454.

- Mondo, M., Barbieri, B., De Simone, S., Bonaiuto, F., Usai, L., & Agus, M. (2021). Measuring career adaptability in a sample of Italian university students: Psychometric properties and relations with the age, gender, and STEM/no STEM courses. *Social Sciences*, *10*(10), 372.
- Nees, K. H., Quigley, L., & Zhang, J. (2021). Relationships among driving styles, desire for control, illusion of control, and self-reported driving behaviors. *Traffic Injury Prevention*, *22*(5), 372–377.
- Nonis, S., & Wright, D. (2003). Moderating effects of achievement striving and situational optimism on the relationship between ability and performance outcomes of college students. *Research in Higher Education*, *44*, 327–346.
- Nunnally, J., & Bernstein, I. (1994). *Psychometric theory* (Second ed.). McGraw-Hill.
- Oliver, R. L. (1997). *Satisfaction: A behavioral perspective on the consumer*. Irwin McGraw-Hill.
- Orgaz, C., Estévez, A., & Matute, H. (2013). Pathological gamblers are more vulnerable to the illusion of control in a standard associative learning task. *Frontiers in Psychology*, *4*, 306.
- Patton, W., Bartrum, D. A., & Creed, P. A. (2004). Gender differences for optimism, self esteem, expectations and goals in predicting career planning and exploration in adolescents. *International Journal for Educational and Vocational Guidance*, *4*, 193–209.
- Rakhshandehroo, M., & Ivanova, P. (2020). International student satisfaction at English-medium graduate programs in Japan. *Higher Education*, *79*, 39–54.
- Rentner, T. L., & Alsulaiman, S. A. (2023). Not me! Optimistic bias and college students' perceived susceptibility, severity, benefits, and self-efficacy in following COVID-19 preventive guidelines. *Journal of American College Health*. <https://doi.org/10.1080/07448481.2022.2079950>. Advance online publication.
- Richman, H. (2010). Optimistic bias in the university classroom. *Perspectives in Learning*, *11*, 1–18.
- Robins, R. W., & Beer, J. S. (2001). The future of optimism. *American Psychologist*, *55*, 44–55.
- Rottinghaus, P. J., Day, S. X., & Borgen, F. H. (2005). The Career futures Inventory: A measure of career-related adaptability and optimism. *Journal of Career Assessment*, *13*, 3–24.
- Ruthig, J. C., Haynes, T. L., Perry, R. P., & Chipperfield, J. G. (2007). Academic optimistic bias: Implications for college student performance and well-being. *Social Psychology of Education: An International Journal*, *10*(1), 115–137.
- Schlee, R. P., Curren, M. T., Harich, K. R., & Kiesler, T. (2007). Perception bias among undergraduate business students by major. *The Journal of Education for Business*, *82*, 169–177.
- Shepperd, J. A., Klein, W. M. P., Waters, E. A., & Weinstein, N. D. (2013). Taking stock of unrealistic optimism. *Perspectives on Psychological Science*, *8*(4), 395–411.
- Sloof, R., & von Siemens, F. A. (2017). Illusion of control and the pursuit of authority. *Experimental Economics*, *20*, 556–573.
- Van Ryzin, G. (2005). Testing the expectancy disconfirmation model of citizen satisfaction with local government. *Journal of Public Administration Research and Theory*, *16*(4), 599–611.
- Waters, E. A., Klein, W. M. P., Moser, R. P., Yu, M., Waldron, W. R., McNeel, T. S., & Freedman, A. N. (2011). Correlates of unrealistic risk beliefs in a nationally representative sample. *Journal of Behavioral Medicine*, *34*, 225–235.
- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, *39*(5), 806–820.
- Wong, W. H., & Chapman, E. (2023). Student satisfaction and interaction in higher education. *Higher Education*, *85*(5), 957–978.
- Wouters, P., Paas, F., & van Merriënboer, J. J. G. (2010). Observational learning from animated models: Effects of studying–practicing alternation and illusion of control on transfer. *Instructional Science*, *38*(1), 89–104.
- Yon, D., Bunce, C., & Press, C. (2020). Illusions of control without delusions of grandeur. *Cognition*, *205*, 104429.