



Camera on or off? Appearance-based rejection sensitivity in virtual classroom and work settings

Lora E. Park, Deborah E. Ward & Nicole Koefer

To cite this article: Lora E. Park, Deborah E. Ward & Nicole Koefer (26 Jun 2026): Camera on or off? Appearance-based rejection sensitivity in virtual classroom and work settings, *Self and Identity*, DOI: [10.1080/15298868.2026.2693616](https://doi.org/10.1080/15298868.2026.2693616)

To link to this article: <https://doi.org/10.1080/15298868.2026.2693616>



Published online: 26 Jun 2026.



Submit your article to this journal [↗](#)



View related articles [↗](#)



View Crossmark data [↗](#)



Camera on or off? Appearance-based rejection sensitivity in virtual classroom and work settings

Lora E. Park^a, Deborah E. Ward^b and Nicole Koefer^a

^aDepartment of Psychology, University at Buffalo, The State University of New York, Buffalo, NY, USA;

^bDepartment of Psychology, Saint Joseph's University, Philadelphia, PA, USA

ABSTRACT

The COVID-19 pandemic prompted a widespread shift to online learning and work, moving daily interactions with others into virtual spaces. In the current research, we examined how visibility of one's appearance shapes individuals' experiences in virtual settings. We investigated this question through the lens of Appearance-based Rejection Sensitivity (Appearance-RS) – a personality processing system characterized by anxious expectations of being rejected based on one's appearance. We hypothesized that individuals with higher (vs. lower) Appearance-RS would expect more negative outcomes when their appearance was visible (vs. not) during a virtual meeting. In Study 1, college students imagined introducing themselves in an online class with their camera turned either on or off. In Study 2, adults imagined joining a virtual work meeting where they had their camera on or off. Across both studies, when participants imagined having their camera on (vs. off), those with higher (vs. lower) Appearance-RS reported lower state self-esteem, which predicted less intended engagement. Thus, anticipated visibility in virtual settings may be detrimental for those who anxiously expect to be rejected based on their looks.

ARTICLE HISTORY

Received 28 October 2025

Accepted 18 June 2026

KEYWORDS

Appearance; COVID-19; motivation; online learning; rejection

The COVID-19 pandemic led to major changes in how people worked and interacted with others (World Health Organization, 2020). Due to mandatory shutdowns and social distancing measures, many in-person interactions were replaced with online substitutes. For example, in the spring of 2020, 77% of public schools in the U.S. transitioned to online distance learning, and 85% of college students had some or all their classes moved online (National Center for Education Statistics, 2022). Virtual work meetings and interactions also increased during COVID-19 (Chang et al., 2021; Karl et al., 2022); in many industries, a majority of workers worked from home during the pandemic, with many continuing to work remotely even after the pandemic subsided (Pabilonia & Redmond, 2024). For some individuals, the shift to virtual platforms was relatively seamless. For others, switching to online modes of learning and working was stressful and disruptive (Kalman et al., 2020; Leigh et al., 2021).

Whereas prior research on navigating virtual environments focused on individual differences in cognitive and spatial abilities (Chen, 2000; Chen et al., 2000; Dillon &

Watson, 1996), the present research examines how *Appearance-based Rejection Sensitivity* (Appearance-RS) affects people's psychological experiences and behavioral intentions in virtual settings. Appearance-RS is a dispositional personality processing system characterized by anxious concerns about being rejected by others based on one's physical appearance (Park, 2007). When people with higher (vs. lower) Appearance-RS are in situations where their appearance is salient (vs. not salient), they are likely to experience worse outcomes, such as feeling more rejected, isolated, and alone (Park, 2007) and showing more negative cognitive biases (Park & Harwin, 2010).

In the present research, we examine how Appearance-RS shapes individuals' responses to virtual environments in which their appearance is visible and thus, highly salient. We predict that when individuals with high Appearance-RS imagine themselves in virtual academic or workplace environments where their appearance is visible (e.g., videoconferences), they will become more self-evaluative and experience negative downstream consequences. In particular, those with higher (vs. lower) Appearance-RS may report less social connectedness, greater anxiety, and/or lower state self-esteem when they imagine their appearance is visible and salient (vs. not visible) in a virtual setting. In turn, these individuals may report decreased intentions to engage with and be involved in these settings.

Individual differences in responding to virtual environments

Research on human-computer interaction has often focused on individual differences in users' cognitive capacities, spatial abilities, memory retrieval skills, computer experience, and familiarity with online modalities to understand how people process information in virtual settings (Chen, 2020; Chen et al., 2000; Dillon & Watson, 1996; Egan, 1988). Since the COVID-19 pandemic, researchers have extended beyond cognitive capabilities to investigate how people navigate virtual environments as a function of personality variables and individual differences. For example, a longitudinal study of university students found that Big Five personality traits differentially predicted motivations for online learning during the COVID-19 pandemic, with openness to experience associated with greater intrinsic motivation and engagement (Audet et al., 2021).

As the use of videoconferencing and videocalls rose during the pandemic, there were increasing reports of appearance concerns, which may have been due to people's heightened self-focus from seeing themselves during virtual interactions (Chen et al., 2021; Cristel et al., 2020; Hart et al., 2022; Pikoos et al., 2021; Thawanyarat et al., 2022). Consistent with this idea, a study found that the percentage of time individuals spent looking at themselves during video-conferencing was related to greater appearance-based comparisons and body surveillance (Pfund et al., 2020). Indeed, many adults reported dissatisfaction with aspects of their facial appearance during the pandemic when their videoconference use increased (Pikoos et al., 2021); phrases like the "Zoom boom" and "Zoom effect" reflected trends toward increasing acceptance of and interest in cosmetic surgery to improve one's appearance (Chen et al., 2021; Pikoos et al., 2021; Thawanyarat et al., 2022). Notably, these studies suggested that heightened self-focus, rather than attentiveness to other people's faces during videoconferencing and videocalls, was likely to have contributed to increased appearance concerns and desire to modify one's appearance during the pandemic and beyond (Cristel et al., 2020).

In the present research, we propose that individuals with higher (vs. lower) Appearance-RS may be more vulnerable to feeling negative internal states – such as feeling less socially connected to others, more anxious, and evaluating themselves more negatively – than those who are less sensitive to appearance-based rejection. We further expect these negative feelings and self-evaluations to be amplified for those with high Appearance-RS in virtual settings where their appearance is expected to be visible and therefore salient (vs. not visible). In the current studies, we investigate these questions in the context of videoconferencing in hypothetical virtual classroom and work environments.

Consequences of Appearance-RS

Appearance-RS is a personality processing system in which individuals anxiously expect, readily perceive, and overreact to signs of rejection from others based on one's physical appearance (Park, 2007). To assess Appearance-RS, individuals are presented with a series of scenarios that could be interpreted as relevant to one's appearance (e.g., "You are leaving your house to go on a first date when you notice a blemish on your face"; "You are at a dance club and all your friends have been asked to dance except for you"). For each situation, participants report their level of anxious concern and expectation of rejection, which are then multiplied and averaged across scenarios to compute their Appearance-RS score.

Appearance-RS is similar yet distinct from Personal Rejection Sensitivity (Personal-RS; Downey & Feldman, 1996; Downey et al., 1998) which reflects anxious expectations of rejection across a variety of interpersonal contexts, such as making requests or discussing difficult topics with others (Downey & Feldman, 1996). Appearance-RS also reflects a tendency to anxiously expect, readily perceive, and overreact to signs of rejection, but *based specifically on one's physical appearance*. The scenarios used to assess Appearance-RS involve situations in which concerns about attractiveness may be salient, such as in dating and romantic contexts, at social events, or looking at oneself in the mirror.

Although Appearance-RS and Personal-RS are related, research has consistently shown that Appearance-RS has unique predictive validity above and beyond Personal-RS. For example, Appearance-RS is related to making more appearance-related social comparisons with others (Park, 2007), showing more symptoms of disordered eating (Park, 2007) and body dysmorphia (Calogero, Park, et al., 2010), reporting greater interest in getting cosmetic surgery (Park, Calogero, et al., 2009), feeling more rejected and alone after thinking about dissatisfying aspects of one's appearance (Park, 2007), and avoiding others when feeling sensitive to rejection based on one's looks (Park & Pinkus, 2009). Notably, these effects emerged even after controlling for Personal-RS, attesting to the unique predictive validity of Appearance-RS.

In sum, whereas past research has shown maladaptive consequences of Appearance-RS, a remaining question is *why* individuals with higher (vs. lower) Appearance-RS respond negatively when their appearance is made salient. In the current research, we suggest that when one's appearance is expected to be visible (vs. not) in a hypothetical group setting, those with higher (vs. lower) Appearance-RS will anticipate less social connectedness, report greater state anxiety, and report lower state self-esteem. These changes in internal states may be related to downstream outcomes, such as less intended

engagement in the environment. We did not have strong a priori hypotheses as to which of these internal states – social connectedness, state anxiety, or state self-esteem – would predict less intended engagement in the environment, so we explored all three in the current studies.

Current research overview

The present studies examine how individual differences in Appearance-RS shape people's psychological experiences and intended engagement in virtual settings where one's appearance is expected to be visible or not. Specifically, we investigate how people with higher (vs. lower) Appearance-RS respond to a hypothetical virtual classroom (Study 1) and workplace (Study 2) environment. We predict that when individuals with higher (vs. lower) Appearance-RS imagine being in a virtual setting where their appearance is visible (vs. not), they will report less social connectedness, greater anxiety, and lower state self-esteem. In turn, we expect one or more of these internal experiences to be related to less intended engagement in the academic and workplace environment. All study materials, data, and syntax for these studies can be found online at the Open Science Framework at https://osf.io/59me8/overview?view_only=d18699e127d94cb6878f00ad19c446ee. Sample size was based on available resources (i.e., the number of participants available to complete the study within a semester). We also conducted a sensitivity analysis in G*Power ($\alpha = .05$, power = .80) to determine the smallest detectable effect of the focal Appearance-RS $\times$ Condition interaction. Both studies were capable of detecting effects in the small-to-moderate range (Cohen, 1988; Lakens, 2013). Specifically, we were able to detect interaction effects of $f^2 = .039$ in Study 1 and $f^2 = .025$ in Study 2.

Study 1

Study 1 examined how individuals with higher (vs. lower) Appearance-RS responded to a hypothetical situation in which their appearance was visible (vs. not) in a virtual academic setting. Specifically, college students imagined joining a virtual meeting on the first day of class where the instructor asked students to turn their video camera on or off. Although this scenario was hypothetical, the study was conducted during the COVID-19 pandemic in 2021, when this type of online class environment was a reality for most students in the U.S.

Overall, we expected participants with higher Appearance-RS to report less social connectedness with their classmates, greater anxiety, and lower state self-esteem than those with lower Appearance-RS. Moreover, we expected these effects to be amplified for those asked to imagine turning their camera on (vs. off) in the virtual classroom, as their appearance would be highly salient. In turn, we tested whether one or more of these variables would be related to less intended academic engagement in the virtual classroom.

Based on past research showing overlap between Personal-RS and Appearance-RS (Park, 2007), we controlled for Personal-RS in all analyses. We also controlled for social anxiety, given that people with high levels of this trait are chronically worried about social evaluation (Alden & Taylor, 2004; Hofmann, 2007) and are likely to show self-presentational concerns in online settings (Kamalou et al., 2019).

Method

Participants and procedure

A total of 202 undergraduate students at a large public university completed the “Study of Online Interactions” in exchange for partial course credit in their introductory psychology class. The study was conducted online during the COVID-19 pandemic in the Spring of 2021, when the majority of in-person instruction in the U.S. was temporarily shut down. The study was approved by the Institutional Review Board (IRB) at the University at Buffalo; (IRB approval #STUDY00008775). Participants read the consent form online and chose to participate in the study by clicking the “I agree to participate” button. Of the sample, 58.4% identified as male, 41.1% as female, and 0.5% as non-binary; the racial composition was 52.0% White, 26.7% Asian, 7.4% Black, 4.5% Latinx, and 9.4% other races, and the majority of participants were between the ages of 18 and 24.¹

Participants were randomly assigned to read a scenario in which they imagined introducing themselves on the first day of a virtual class with their video camera turned either on or off. Participants then completed questionnaires assessing current feelings of social connectedness, state anxiety, state self-esteem, and intended academic engagement in response to the scenario. They then completed the Appearance-RS scale, covariates (i.e., trait social anxiety, Personal-RS), and demographic information.²

Materials

Experimental manipulation

Participants in the *Camera On* condition read (bolded for emphasis):

Imagine you are signing into Zoom for your first day of a new class with twenty-five other students. This class, along with other courses you are enrolled in this semester, are being held in an online format. Once you are signed in, your professor informs the class that it is expected for **cameras to be on** during class.

Now visualize yourself joining the call. You see your professor and hear them say the following: “Welcome everybody. Since today is the first day, I will be giving everyone a turn to give a brief introduction about themselves to the rest of the class. Please take the next few minutes before giving your introduction to center your camera at eye level and locate a well-lit area where the source of light is in front of you rather than behind you- so that we can all clearly see your face. To the best of your ability, visually present yourself in a professional manner – as in well groomed, appropriately dressed, and so forth – knowing that everyone will be able to see you since your camera will be kept on during the entirety of the class.”

Participants in the *Camera Off* condition read:

Imagine you are signing into Zoom for your first day of a new class with twenty-five other students. This class, along with other courses you are enrolled in this semester, are being held in an online format. Once you are signed in, your professor informs the class for **cameras to be off** during class.

Now visualize yourself joining the call. You see your professor and hear them say the following: “Welcome everybody. Since today is the first day, I will be giving everyone a turn to give a brief introduction about themselves to the rest of the class. Please take a few minutes before giving your introduction to present yourself in a professional manner

knowing that everyone will be able to hear you even though your camera will be kept off during the entirety of the class.”

Measures

Social connectedness

Participants completed a Social Connectedness Scale (adapted from Lee & Robbins, 1995) to assess felt connection with their hypothetical instructor and classmates. Specifically, participants were asked, “How would you feel if you were in this classroom environment that you just read about?” and responded to items such as, “I would feel distant from others” and “I wouldn’t feel connected with others” on a scale from 1 = *strongly disagree* to 7 = *strongly agree* (5 items, $\alpha = .95$). Responses were reverse-coded and averaged, such that higher values indicated greater feelings of social connectedness with others.

State anxiety

Participants responded to items from the State Anxiety Scale (Marteau & Becker, 1992) assessing how *calm*, *tense*, *upset*, *relaxed*, *content*, and *worried* they would feel in the scenario from 1 = *strongly disagree* to 7 = *strongly agree* (6 items, $\alpha = .88$). After positively worded items were reverse-coded, responses were averaged, such that higher values indicated greater state anxiety.

State self-esteem

Participants completed the State Self-Esteem Scale (Heatherton & Polivy, 1991) to assess their self-evaluations in response to the scenario. Specifically, they were asked: “How would you feel if you were in this classroom environment that you just read about?” with items such as, “I would feel good about myself,” “I would feel self-conscious” and “I would be worried about whether I am regarded as a success or failure” on a scale from 1 = *not at all* to 5 = *extremely* (20 items, $\alpha = .92$). After reverse-coding negatively worded items, responses were averaged such that higher values indicated higher state self-esteem.

Intended engagement

For the dependent measure, participants completed items assessing their intended level of motivation and engagement in the scenario. Sample items were: “If I were actually taking this class this semester, I would . . .” “work as hard as I could,” “participate,” and “get involved” on a scale from 1 = *strongly disagree* to 5 = *strongly agree* (16 items, $\alpha = .91$; adapted from Jang et al., 2016).

Appearance-based rejection sensitivity

As the moderator, participants completed the Appearance-RS Scale (Park, 2007) which consists of 15 scenarios in which individuals report their anxious concerns and expectations of rejection based on their looks. An example scenario is: “You are leaving your house to go on a first date when you notice a blemish on your face.” Participants report their anxiety about being rejected based on their appearance (e.g., “How concerned or anxious would you be that your date might be less attracted to you because of the way you looked?”) from 1 = *very unconcerned* to 6 = *very concerned* and their expectation of rejection based on appearance (e.g., “I would expect that my date

would find me less attractive”) from 1 = *very unlikely* to 6 = *very likely*. Appearance-RS is calculated by multiplying the degree of anxious concern with expectation of rejection for each scenario and then averaging these scores across situations for each participant. Higher Appearance-RS scores indicate greater sensitivity to appearance-based rejection ($\alpha = .93$).

Trait social anxiety

As a covariate, participants completed the Social Interaction Anxiety Scale (Mattick & Clark, 1998). Sample items were: “I have difficulty talking with other people” and “I worry about expressing myself in case I appear awkward” on a scale from 1 = *not at all characteristic or true of me* to 5 = *extremely characteristic or true of me* (20 items; $\alpha = .94$).

Personal rejection sensitivity

As a covariate, participants completed a brief version of the Rejection Sensitivity Adult Questionnaire (Downey & Feldman, 1996) which assesses personal rejection sensitivity via a series of six scenarios in which individuals report their anxious concerns and expectations of rejection in general. An example scenario is: “You ask a friend to do you a big favor.” Participants then report their level of anxiety (e.g., “How concerned or anxious would you be over whether or not your friend would do this favor?”) using a response scale from 1 = *very unconcerned* to 7 = *very concerned* and their expectation of rejection (e.g., “I would expect that they would willingly agree to help me out”) from 1 = *very unlikely* to 7 = *very likely*. Personal-RS is calculated by multiplying the degree of anxious concern with rejection expectation (after reverse-scoring the expectation items) for each scenario and then averaging these scores across situations for each participant. Higher scores reflect greater general sensitivity to rejection ($\alpha = .74$).

Data analyses

Given that the measures in this study used different response scales, we first standardized all variables before creating composites. Table 1 reports zero-order correlations among the study variables. First, we conducted a series of hierarchical regression analyses to

Table 1. Zero-order correlations among study variables (Study 1 & Study 2).

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Appearance-RS	–	–.13	.22**	–.42***	–.24***	.42***	.51***	–.07	.15*
2. Social Connectedness	–.21***	–	–.04	.04	.41***	–.02	–.02	.06	.12
3. State Anxiety	.20***	–.59***	–	–.62***	–.42***	.14*	.30***	–.03	.18*
4. State Self-esteem	–.49***	.47***	–.63***	–	.41***	–.26***	–.51***	–.02	–.11
5. Intended Engagement	–.18**	.59***	–.65***	.57***	–	–.11	–.28***	.04	.05
6. Personal-RS	.25***	–.09 ⁺	.11 ⁺	–.13*	–.00	–	.24***	.02	.13
7. Trait Social Anxiety	.46***	–.12*	.21***	–.47***	–.26***	.06	–	–.02	.11
8. Age	–.15**	.08	–.11	.24***	.28***	.05	–.30***	–	.02
9. Gender	.06	–.02	.01	–.11 ⁺	–.03	.10	–.03	–.21***	–

Note. All variables reported above were collected after the experimental manipulation across both studies. Personal-RS = personal (general) rejection sensitivity. Intended engagement = academic engagement in Study 1, job engagement in Study 2. Gender was coded as 1 = women, –1 = men. There was 1 participant in Study 1 and 6 participants in Study 2 who identified as non-binary and are not included in the correlations for gender reported above, although they were included in all other correlational analyses and subsequent analyses. Correlations in the upper diagonal region report values from Study 1 ($N = 202$); correlations in the lower diagonal region report values from Study 2 ($N = 316$). * $p < .05$, ** $p < .01$, *** $p < .001$.

examine whether participants with higher (vs. lower) Appearance-RS reported less social connectedness, greater state anxiety, and lower state self-esteem in the visible appearance (i.e., camera on) condition compared to the not visible (i.e., camera off) condition.

Specifically, we entered main effects of Appearance-RS and camera condition (camera on vs. off) at Step 1, covariates (trait social anxiety, personal-RS) at Step 2, and the Appearance-RS $\times$ Condition interaction – controlling for the other two-way interactions between each covariate and camera condition – at Step 3. Based on the results of these analyses, we conducted moderated mediation analyses to test whether one or more of these variables were related to participants' intended academic engagement in the class. Results of hierarchical regression for all analyses are reported in [Table 2](#).

Results

Social connectedness

Results showed a significant main effect of camera condition in predicting social connectedness. Specifically, participants assigned to the camera on condition felt more socially connected than those in the camera off condition. This effect remained significant even after controlling for social anxiety and personal-RS. In addition, when controlling for these variables, participants with higher Appearance-RS felt less socially connected overall than those with lower Appearance-RS.

State anxiety

Results showed a significant main effect of Appearance-RS, such that participants who were more sensitive to appearance-based rejection reported higher state anxiety overall. This effect became non-significant when controlling for trait social anxiety and personal-RS. There was also a significant main effect of camera condition, such that participants who imagined having their camera on during class felt more anxious than those who had their camera off. This effect remained significant controlling for covariates (see [Table 2](#)).

State self-esteem

Results showed significant main effects of Appearance-RS and camera condition in predicting state self-esteem. Specifically, participants with higher Appearance-RS reported lower state self-esteem, as did those assigned to the camera on condition. These effects remained significant even after controlling for social anxiety and personal-RS. However, these main effects were qualified by a significant Appearance-RS $\times$ Condition interaction.

As predicted, simple effects tests revealed that for participants with higher Appearance-RS, being in the camera on condition led to lower state self-esteem than being in the camera off condition, $B = -.36$, $p < .001$, 95% CI $[-.50, -.22]$. For those with lower Appearance-RS, camera condition was unrelated to state self-esteem, $B = -.01$, $p = .929$, 95% CI $[-.15, .13]$. Among those in the camera on condition, having higher Appearance-RS predicted lower state self-esteem, $B = -.03$, 95% CI $[-.51, -.16]$. In the

Table 2. Results of hierarchical multiple regression analyses (Study 1 & Study 2).

	Social Connectedness		State Anxiety		State Self-esteem		Intended Academic Engagement	
	B and p-values: Step 1; Step 2; Step 3 [95% CI at each step]	Step 3	B and p-values: Step 1; Step 2; Step 3 [95% CI at each step]	Step 3	B and p-values: Step 1; Step 2; Step 3 [95% CI at each step]	Step 3	B and p-values: Step 1; Step 2; Step 3 [95% CI at each step]	Step 3
Appearance-RS								
Study 1	-.17, $p = .055$; -.24 , $p = .027$; -.24 , $p = .028$ [-.34, .00] [-.45, -.03] [-.46, -.03]	.24 , $p = .001$; .06, $p = .535$; .06, $p = .477$ [.10, .39] [-.12, .23] [-.11, .24]			-.38 , $p < .001$; -.15 , $p = .019$; -.16 , $p = .013$ [-.49, -.27] [-.27, -.03] [-.28, -.03]		-.23 , $p < .001$; -.13 , $p = .109$; -.13 , $p = .110$ [-.35, -.10] [-.28, .03] [-.29, .03]	
Study 2	-.26 , $p < .001$; -.23 , $p = .004$; -.23 , $p = .004$ [-.39, -.13] [-.39, -.07] [-.39, -.07]	.23 , $p < .001$; .12, $p = .086$; .11, $p = .104$ [.11, .34] [-.02, .26] [-.02, .25]			-.45 , $p < .001$; -.32 , $p = .019$; -.31 , $p < .001$ [-.54, -.37] [-.41, -.22] [-.41, -.21]		-.17 , $p < .001$; -.08 , $p = .175$; -.07 , $p = .231$ [-.28, -.07] [-.20, .04] [-.19, .05]	
Camera Condition								
Study 1	.27 , $p < .001$; .28 , $p < .001$; .28 , $p < .001$ [.15, .39] [.16, .40] [.16, .40]	.24 , $p < .001$; .26 , $p < .001$; .26 , $p < .001$ [.14, .35] [.16, .35] [.16, .36]			-.17 , $p < .001$; -.18 , $p < .001$; -.18 , $p < .001$ [-.25, -.09] [-.25, -.11] [-.25, -.12]		.02, $p = .687$; .01, $p = .792$; .01, $p = .792$ [-.07, .11] [-.08, .10] [-.08, .10]	
Study 2	.10, $p = .057$; .10, $p = .062$; .10, $p = .063$ [-.00, .39] [-.01, .20] [-.01, .20]	.19 , $p < .001$; .19 , $p < .001$; .19 , $p < .001$ [.10, .28] [.05, .34] [.11, .28]			-.14 , $p < .001$; -.14 , $p < .001$; -.14 , $p < .001$ [-.20, -.07] [-.20, -.07] [-.20, -.08]		.01, $p = .737$; .01, $p = .710$; .01, $p = .711$ [-.06, .09] [-.06, .09] [-.06, .09]	
Social Anxiety								
Study 1	.10, $p = .349$; .13, $p = .232$ [-.11, .31] [-.08, .34]	.33 , $p < .001$; .35 , $p < .001$ [.15, .50] [.18, .53]			-.40 , $p < .001$; -.43 , $p < .001$ [-.52, -.27] [-.55, -.31]		-.20 , $p = .010$, -.19 , $p = .015$ [-.35, -.05] [-.35, -.04]	
Study 2	-.04, $p = .613$; -.05 , $p = .529$ [-.21, .12] [-.22, .12]	.20 , $p = .007$; .23 , $p = .003$ [.05, .34] [.08, .37]			-.31 , $p < .001$; -.33 , $p < .001$ [-.41, -.21] [-.43, -.22]		-.23 , $p < .001$, -.27 , $p < .001$ [-.36, -.11] [-.40, -.14]	
Personal-RS								
Study 1	.07, $p = .527$; .06, $p = .562$ [-.14, .27] [-.15, .27]	.07, $p = .395$; .09, $p = .322$ [-.09, .24] [-.09, .26]			-.09, $p = .118$; -.11 , $p = .083$ [-.21, .02] [-.22, .01]		-.00, $p = .974$; -.03 , $p = .678$ [-.15, .14] [-.18, .12]	
Study 2	-.06, $p = .481$; -.05 , $p = .522$ [-.21, .10] [-.21, .11]	.10, $p = .147$; .09, $p = .200$ [.09, .20] [-.05, .23]			-.04, $p = .403$; -.03 , $p = .540$ [-.14, .06] [-.13, .07]		.03, $p = .584$; .04, $p = .564$ [-.09, .15] [-.08, .15]	
Social Anxiety × Condition								
Study 1	-.07, $p = .520$ [-.28, .14]	.01, $p = .880$ [-.16, .19]			.00, $p = .989$ [-.12, .12]		-.07, $p = .346$ [-.23, .08]	
Study 2	-.07, $p = .397$ [-.24, .10]	.14, $p = .065$ [-.01, .29]			-.06, $p = .264$ [-.16, .04]		-.17, $p = .009$ [-.30, -.04]	
Personal-RS × Condition								
Study 1	-.02, $p = .885$ [-.23, .20]	.03, $p = .723$ [-.14, .20]			-.02, $p = .719$ [-.14, .10]		-.10, $p = .191$ [-.25, .05]	
Study 2	.06, $p = .466$ [-.10, .22]	-.04, $p = .535$ [-.18, .09]			.01, $p = .839$ [-.09, .11]		.02, $p = .769$ [-.10, .14]	
Appearance-RS × Condition								

(Continued)

Table 2. (Continued).

	Social Connectedness	State Anxiety	State Self-esteem	Intended Academic Engagement
	B and <i>p</i> -values: Step 1; Step 2; Step 3 [95% CI at each step]	B and <i>p</i> -values: Step 1; Step 2; Step 3 [95% CI at each step]	B and <i>p</i> -values: Step 1; Step 2; Step 3 [95% CI at each step]	B and <i>p</i> -values: Step 1; Step 2; Step 3 [95% CI at each step]
Study 1	.17, <i>p</i> = .120 [−.05, .39]	.16, <i>p</i> = .072 [−.02, .34]	-.18, <i>p</i> = .005 [−.30, −.06]	.08, <i>p</i> = .301 [−.07, .24]
Study 2	.07, <i>p</i> = .419 [−.09, .22]	.04, <i>p</i> = .603 [−.10, .17]	-.11, <i>p</i> = .023 [−.21, −.02]	.04, <i>p</i> = .554 [−.08, .15]
Study 1				
Step 1	<i>R</i>² = .11, <i>F</i>(2, 199) = 11.67, <i>p</i> < .001	<i>R</i>² = .14, <i>F</i>(2, 199) = 16.80, <i>p</i> < .001	<i>R</i>² = .25, <i>F</i>(2, 199) = 32.88, <i>p</i> < .001	<i>R</i>² = .06, <i>F</i>(2, 199) = 6.34, <i>p</i> = .002
Step 2	ΔR^2 = .01, $\Delta F(2, 197) = 66$, <i>p</i> = .517	ΔR^2 = .06, $\Delta F(2, 197) = 7.45$, <i>p</i> < .001	ΔR^2 = .14, $\Delta F(2, 197) = 22.00$, <i>p</i> < .001	ΔR^2 = .03, $\Delta F(2, 197) = 3.41$, <i>p</i> = .035
Step 3	ΔR^2 = .01, $\Delta F(3, 194) = 89$, <i>p</i> = .446	ΔR^2 = .03, $\Delta F(3, 194) = 2.14$, <i>p</i> = .097	ΔR^2 = .04, $\Delta F(3, 194) = 4.61$, <i>p</i> = .004	ΔR^2 = .01, $\Delta F(3, 194) = 90$, <i>p</i> = .443
Study 2				
Step 1	<i>R</i>² = .06, <i>F</i>(2, 313) = 9.29, <i>p</i> < .001	<i>R</i>² = .09, <i>F</i>(2, 313) = 15.70, <i>p</i> < .001	<i>R</i>² = .28, <i>F</i>(2, 313) = 59.83, <i>p</i> < .001	<i>R</i>² = .03, <i>F</i>(2, 313) = 5.39, <i>p</i> = .005
Step 2	ΔR^2 = .00, $\Delta F(2, 311) = 35$, <i>p</i> = .702	ΔR^2 = .03, $\Delta F(2, 311) = 4.45$, <i>p</i> = .012	ΔR^2 = .08, $\Delta F(2, 311) = 18.07$, <i>p</i> < .001	ΔR^2 = .04, $\Delta F(2, 311) = 7.02$, <i>p</i> = .001
Step 3	ΔR^2 = .01, $\Delta F(3, 308) = 62$, <i>p</i> = .605	ΔR^2 = .02, $\Delta F(3, 308) = 1.99$, <i>p</i> = .115	ΔR^2 = .02, $\Delta F(3, 308) = 3.86$, <i>p</i> = .010	ΔR^2 = .02, $\Delta F(3, 308) = 2.53$, <i>p</i> = .058

Note. 95% CI = 95% [confidence interval appears in brackets]. Camera condition was coded as 1 = Camera On, −1 = Camera Off. Personal-RS = personal rejection sensitivity reflecting general rejection sensitivity. Bolded values are significant. Δ = change in *R*² or *F*². Controlling for age and gender in the regression analyses did not significantly change the results of the Appearance-RS × Condition interaction at Step 3 for social connectedness, state anxiety, state self-esteem, or intended engagement in Study 1. In Study 2, controlling for age and gender did not change the significance of the Appearance-RS × Condition interaction except for state self-esteem which became marginally significant, *B* = −.09, *p* = .061, 95% CI [−.18, .00]. However, all simple effects tests for state self-esteem remained similar as reported in Study 2.

camera off condition, Appearance-RS was unrelated to state self-esteem, $B = .02$, $p = .811$, 95% CI $[-.15, .20]$.

Intended academic engagement

Results showed a significant main effect of Appearance-RS, such that participants with higher (vs. low) Appearance-RS reported less intended engagement in the classroom. However, this effect became non-significant when controlling for covariates.

Moderated mediation analyses

Next, we conducted moderated mediation analyses using Hayes' (2022) PROCESS macro (model 7). Given that the only significant interaction to emerge was the Appearance-RS $\times$ Condition interaction predicting state self-esteem, we examined whether Appearance-RS (X variable) interacted with camera condition (moderator) to predict state self-esteem (mediator) to predict intended academic engagement (Y variable), controlling for social anxiety and Personal-RS (covariates).³ Results are summarized in Table 3.

Results showed that the index of moderated mediation was significant. Tests of indirect effects revealed that for participants in the camera on condition, having higher Appearance-RS

Table 3. Results of moderated mediation analyses predicting intended engagement (Study 1 & Study 2).

$X \rightarrow M$ path	Study 1			Study 2		
	Effect	p -value	95% CI	Effect	p -value	95% CI
Condition $\rightarrow$ State Self-esteem	-.17	<.001	[-.25, -.09]	-.14	<.001	[-.20, -.07]
Moderating effect of W on $X \rightarrow M$ path						
	Study 1			Study 2		
	Effect	p -value	95% CI	Effect	p -value	95% CI
Appearance-RS $\times$ Condition $\rightarrow$ State Self-esteem	-.14	.015	[-.25, -.03]	-.13	.002	[-.21, -.05]
$M \rightarrow Y$ path (with all variables in the model)						
	Study 1			Study 2		
	Effect	p -value	95% CI	Effect	p -value	95% CI
State Self-esteem $\rightarrow$ Intended Engagement	.38	<.001	[.24, .53]	.64	.001	[.53, .75]
Index of Moderated Mediation DV: Intended Engagement						
	Study 1			Study 2		
	Effect		95% CI	Effect		95% CI
Camera Condition	-.10		[-.20, -.02]	-.17		[-.29, -.06]
Conditional Indirect Effects of Appearance-RS on Dependent Variable						
	Study 1			Study 2		
Camera On Condition	-.20		[-.32, -.10]	-.29		[-.38, -.20]
Camera Off Condition	-.10		[-.21, -.03]	-.11		[-.21, -.02]

Note. Condition was coded as Camera Condition was coded as 1 = Camera On, -1 = Camera Off. DV = Dependent Variable. Paths reflect unstandardized coefficients with 95% confidence intervals in brackets. Bolded values are significant. X = Appearance-RS, W = moderator (camera condition), M = mediator (state self-esteem). Analyses control for trait social anxiety and Personal-RS. The index of moderated mediation and tests of indirect effects remained significant even after controlling for age and gender in Study 1 and Study 2.

was related to lower state self-esteem, which was related to less intended academic engagement. In the camera off condition, Appearance-RS was also related to lower state self-esteem and intended engagement, but the effects were relatively weaker in magnitude.

Discussion

Study 1 tested whether Appearance-RS, camera condition, and their interaction uniquely predicted feelings of social connectedness, state anxiety, and state self-esteem in the context of a hypothetical virtual classroom, with downstream consequences for intended engagement. Overall, participants with higher Appearance-RS reported less social connectedness with others – even after controlling for general rejection sensitivity and trait social anxiety – consistent with past work showing that people with high Appearance-RS feel more lonely, isolated, and avoid others, especially in situations when they feel unattractive (Park, 2007; Park & Pinkus, 2009).

Contrary to hypotheses, we did not find that participants with higher Appearance-RS felt less socially connected when they were asked to turn their camera on during a hypothetical virtual class meeting. Perhaps turning one's camera on in this scenario was not vivid or threatening enough to reduce high Appearance-RS participants' feelings of social connectedness. In fact, results showed that the camera on condition actually *increased* people's sense of connection with others, which may have attenuated high Appearance-RS participants' responses to their appearance being visible in the camera on condition.

When examining the combination of Appearance-RS and camera condition, participants with higher Appearance-RS reported lower state self-esteem when they imagined their camera being on (vs. off), whereas those with lower Appearance-RS did not differ in their feelings of momentary self-esteem as a function of their camera being on or off. And although we did not find significant effects of Appearance-RS or camera condition on intended academic engagement, results of moderated mediation analyses showed that participants with higher Appearance-RS in the camera on condition reported a significant drop in state self-esteem, which was related to less intended engagement and involvement in the class. Notably, for these analyses, results emerged above and beyond effects of trait social anxiety and general rejection sensitivity, reflecting the unique predictive validity of Appearance-RS.

Study 2

In Study 1, college students with high Appearance-RS experienced a drop in their state self-esteem when they imagined their appearance being visible (vs. not) in a virtual classroom. To determine the generalizability of these findings, Study 2 examined the influence of Appearance-RS – and having one's appearance visible or not – among older adults in a hypothetical virtual work environment. Similar to Study 1, we predicted that participants with higher Appearance-RS would report less social connectedness, greater state anxiety, lower state self-esteem, and less intended job engagement, especially when they imagined their camera on (vs. off) during a virtual work meeting. We expected these findings to emerge even after controlling for trait social anxiety and general rejection sensitivity.

Method

Participants and procedure

A total of 316 participants from ResearchMatch – a virtual survey platform that recruits volunteers from across the U.S. to participate in studies – completed the study online. This study was also conducted during the COVID-19 pandemic (in the Fall of 2021), when many adults shifted to working from home due to mandatory shutdowns. The study was approved by the IRB at the University at Buffalo (IRB approval #STUDY00008775). Participants read the consent form online and chose to participate in the study by clicking the “I agree to participate” button. Of the sample, 19.6% identified as male, 78.0% as female, and 1.9% as non-binary; the racial composition was 86.0% White, 2.5% Asian, 5.4% Black, 0.6% Latinx, and 5.4% mixed or other races. Participants’ ages ranged from 18 to 75 + years old with most participants between the ages of 25–34 and 55–64.⁴

Participants were randomly assigned to read a scenario in which they imagined joining a virtual work meeting and being asked to turn their camera either on or off for the duration of the meeting. Participants then completed questionnaires assessing felt social connectedness, state anxiety, state self-esteem, and intended job engagement in response to the scenario. They then completed the Appearance-RS scale, covariates (i.e., trait social anxiety, Personal-RS), and demographics.

Experimental manipulation

Participants in the *Camera On* condition read (bold added for emphasis):

Imagine you are signing into Zoom for your first meeting with a team of coworkers since you began working from home. This meeting, along with others you will regularly attend as part of your position, are now being held in an online format. Once you are signed in, your supervisor informs you and your colleagues that it is expected for **cameras to be on** during meetings. Now visualize yourself joining the call. You see your supervisor and hear them say the following:

“Welcome everybody. Since today is the first day meeting in this new format and we have some new members, I will be giving everyone a turn to give a brief introduction about themselves to the rest of the team. Please take a moment before giving your introduction to center your camera at eye level and locate a well-lit area – where the source of light is in front of you rather than behind you – so that we can all clearly see your face. To the best of your ability, visually present yourself in a professional manner – as in well groomed, appropriately dressed, and so forth – knowing that everyone will be able to see you since your camera will be kept on during the entirety of the meeting. Also, just so you

know, for the rest of the time we will be meeting from a distance, you can all keep your cameras on during meetings and discussions.

Participants in the *Camera Off* condition read:

Imagine you are signing into Zoom for your first meeting with a team of coworkers since you began working from home. This meeting, along with others you will regularly attend as part of your position, are now being held in an online format. Once you are signed in, your supervisor informs you and your colleagues that it is expected for **cameras to be off** during meetings. Now visualize yourself joining the call. You see your supervisor and hear them say the following:

“Welcome everybody. Since today is the first day meeting in this new format and we have

some new members, please take the next few minutes before we begin to present yourself in a professional manner knowing that everyone will be able to hear you even though your camera will be kept off during the entirety of the meeting. Also, just so you know, for the rest of the time we will be meeting from a distance, you can all keep your cameras off during meetings and discussions.”

Measures

Participants completed the same questionnaires as in Study 1, adapted to reflect current thoughts and feelings related to the virtual work setting. The measures included *social connectedness* (5 items, $\alpha = .96$), *state anxiety* (6 items, $\alpha = .91$), and *state self-esteem* (20 items, $\alpha = .94$). *Intended job engagement* included the prompt, “If I were actually in this online workplace environment . . .” “I would work as hard as I could” and “I would get involved” (16 items, $\alpha = .93$). Participants also completed the *Appearance-RS Scale* (15 items, $\alpha = .94$), covariates of *trait social anxiety* (20 items, $\alpha = .94$) and *Personal-RS* (6 items, $\alpha = .75$), and demographic information.⁵

Data analysis

As in Study 1, we first standardized all variables given that response scales varied across measures. Table 1 reports zero-order correlations. As in Study 1, we ran a series of hierarchical multiple regression analyses to examine whether participants with higher Appearance-RS reported less feelings of social connectedness, greater state anxiety, and lower state self-esteem in the visible appearance (i.e., camera on) condition compared to the not visible (i.e., camera off) condition. In turn, we examined whether one or more of these variables predicted intended job engagement above and beyond effects of social anxiety and Personal-RS.

Table 2 reports the results of hierarchical regression analyses. Based on the results of these analyses, we ran moderated mediation analyses to test whether one or more of these variables were related to participants’ intended job engagement.

Results

Social connectedness

As shown in Table 2, results showed a significant main effect of Appearance-RS in predicting social connectedness. Similar to Study 1, participants with higher (vs. lower) Appearance-RS reported feeling less socially connected to others overall. These effects remained even after controlling for trait social anxiety and Personal-RS.

State anxiety

Results showed significant main effects of Appearance-RS and camera condition, such that participants with higher Appearance-RS reported greater state anxiety, as did those in the camera on condition. The effect of Appearance-RS became non-significant, however, when controlling for trait social anxiety and personal-RS.

State self-esteem

Results showed significant main effects of Appearance-RS and camera condition in predicting state self-esteem. Specifically, participants with higher Appearance-RS reported lower state self-esteem, as did those assigned to the camera on condition. These effects remained significant even after controlling for social anxiety and Personal-RS. However, these main effects were qualified by a significant Appearance-RS $\times$ Condition interaction.

Simple effect tests revealed that for participants with higher Appearance-RS, being in the camera on (vs. off) condition predicted lower state self-esteem, $B = -.25$, $p < .001$, 95% CI $[-.36, -.13]$. For participants with lower Appearance-RS, camera condition was unrelated to state self-esteem, $B = -.02$, $p = .674$, 95% CI $[-.14, .09]$. Among participants in the camera on condition, having higher Appearance-RS predicted lower state self-esteem, $B = -.42$, $p < .001$, 95% CI $[-.56, -.28]$. In the camera off condition, Appearance-RS was also related to lower state self-esteem, but the effect was relatively weaker than in the camera on condition, $B = -.20$, $p = .004$, 95% CI $[-.33, -.07]$.

Intended job engagement

Results showed a significant main effect of Appearance-RS, such that participants with higher Appearance-RS reported lower intended job engagement. This effect became non-significant when controlling for covariates.

Moderated mediation

We next conducted moderated mediation analyses using Hayes' (2022) PROCESS macro (model 7) to test whether camera condition moderated the effect of Appearance-RS on state self-esteem and, in turn, intended job engagement. We entered Appearance-RS scores as the independent variable (X), camera condition as the moderator (W), state self-esteem as the mediator (M), and intended job engagement as the dependent variable (Y), controlling for trait social anxiety and Personal-RS.⁶ Table 3 reports the findings.

Results showed that the index of moderated mediation was significant. Tests of indirect effects showed that in the camera on condition, higher Appearance-RS predicted lower state self-esteem, which was related to less intended job engagement. In the camera off condition, Appearance-RS was also related to lower state self-esteem, which was related to less intended engagement, although this effect was weaker in magnitude compared to the camera on condition.

Discussion

As in Study 1, individual differences in Appearance-RS, camera condition, and their interaction uniquely predicted responses to a hypothetical virtual work environment. Consistent with Study 1, participants with higher Appearance-RS felt less social connectedness overall. Also, in line with Study 1, Appearance-RS and camera condition

significantly interacted to predict state self-esteem. Specifically, the more sensitive participants were to appearance-based rejection, the lower was their state self-esteem when they imagined having their camera on (vs. off) during a virtual work meeting. In contrast, participants who were not highly sensitive to appearance-based rejection did not show significant differences in their state self-esteem based on camera settings. Likewise, when participants imagined having their camera on, higher Appearance-RS was related to lower state self-esteem. Although the association between higher Appearance-RS and lower state self-esteem also emerged in the camera off condition, the magnitude of this effect was relatively weaker than in the camera on condition.

Although we found no direct effects of Appearance-RS or camera condition on intended job engagement, results of moderated mediation analyses were consistent with the findings of Study 1. Specifically, participants with higher Appearance-RS in the camera on condition reported a significant drop in their state self-esteem, which was related to less intended job engagement. This finding emerged above and beyond effects of social anxiety and Personal-RS, highlighting the unique predictive validity of Appearance-RS.

General discussion

Since the COVID-19 pandemic, virtual classes and work meetings have become increasingly common. In the current research, we investigated how individual differences in anxious expectations of appearance-based rejection influenced momentary self-evaluations and intended engagement in environments where one's appearance was expected to be visible versus not.

In Study 1, college students with higher Appearance-RS reported lower state self-esteem when they imagined having their camera on (vs. off) in a virtual classroom. Lowered state self-esteem – in response to having one's camera on (vs. off) – was in turn related to lower intended academic engagement in the virtual classroom. Importantly, these effects emerged even after accounting for effects of trait social anxiety and general rejection sensitivity. Study 2 extended these findings with adults who imagined being in a virtual work meeting with their camera on or off. Those with higher Appearance-RS who imagined turning their video camera on (vs. off) during the work meeting reported lower state self-esteem, which was related to less intended engagement and involvement at their job.

Given these hypothetical virtual contexts involved being visible or not to others, concerns about appearance are likely to have been salient. Indeed, when one envisioned their camera being off – i.e., when their appearance was *not* visible – the association between Appearance-RS and state self-esteem was either not significant (Study 1) or relatively weaker (Study 2). Together, these findings suggest that while Appearance-RS is a vulnerability factor, the negative effects of this personality processing system are heightened in situations where concerns about one's appearance are activated.⁷

The current findings build upon past research showing that people with high Appearance-RS are vulnerable to negative outcomes when appearance concerns are made salient. For example, individuals with high Appearance-RS who received bogus negative feedback about their appearance (vs. their intelligence) reported greater desire to avoid social interactions, even with close others (Park & Pinkus, 2009). Findings from

a daily diary study further showed that on days when participants felt more sensitive to rejection based on their appearance, they showed more social withdrawal (Park & Pinkus, 2009). In sum, when people with high Appearance-RS experience heightened attention and focus on their appearance, they may seek to avoid and distance themselves from others or the situation to protect themselves from additional threats (see Park, 2010; Park et al., 2023, for reviews).

In particular, the present studies contribute to the literature by demonstrating a potential reason *why* individuals with high Appearance-RS show decreased desire to engage with others in virtual academic and work contexts. Specifically, in response to having one's appearance visible (vs. not visible) in an online setting, those with higher (vs. lower) Appearance-RS reported more negative self-evaluations in the form of lowered self-esteem, which was related to less intended engagement in the academic or work environment.

Limitations and future directions

A limitation of the present studies is that they used hypothetical scenarios versus real-life situations. Although further research is needed to investigate whether people's imagined reactions translate into actual behavior, previous research has shown that people with high Appearance-RS respond more negatively to real-life situations where they experience ambiguous rejection when their appearance is visible. In one such study, participants had a conversation with another "participant" (a research confederate) with their appearance visible or not (Park & Harwin, 2010). Specifically, in the visible condition participants talked to their partner face to face; in the non-visible condition, they talked to their partner with a divider between them so they could only hear (but not see) each other. Afterwards, all participants were told their partner did not want to continue with the remainder of the study, which involved having another conversation. Results showed that participants whose appearance was visible (vs. not) during the first part of the study reported more negative affect and more negative cognitive biases after this ambiguous experience of rejection. Such findings suggest that, when appearance is visible to others, people with high Appearance-RS react more strongly to ambiguous instances of rejection.

Although participants in the current studies did not experience rejection *per se*, it seems possible that in real-life situations, people with high Appearance-RS could experience more negative outcomes when their appearance is made visible, especially if they perceive cues of rejection from others. For example, if participants with high Appearance-RS were to speak or give a presentation during a Zoom meeting and their appearance was visible to others (vs. not), perhaps they would be more likely to be affected by ambiguous social cues that could be interpreted as rejecting (e.g., yawning, looking away).

Such findings would be consistent with the social evaluative threat model (Park et al., 2023) which proposes that some individuals – including those with high Appearance-RS – show heightened vigilance for detecting threat in the social environment that amplifies their reactions to threats. Further, given that those with higher Appearance-RS rate themselves lower in attractiveness (Park, 2007), it seems plausible that in real-life situations (e.g., in a virtual academic or workplace context), having one's video camera on (vs.

off) could induce feelings of threat as indicated by lower state self-esteem or reduced engagement. Future research could test this possibility directly.

In sum, we do not know whether the effects of Appearance-RS and having one's appearance visible in classroom or work settings would differ in the real-world, in actual virtual meetings or in face-to-face, in-person meetings. It seems plausible that effects could be stronger in real-life meetings (virtual or otherwise) where one's academic or job performance and evaluations have meaningful consequences. However, previous research found significant effects of Appearance-RS even when participants were asked to simply recall prior experiences, suggesting that the mere activation of past instances of appearance-based rejection can influence current thoughts, feelings, and behavioral intentions (Park, Calogero, et al., 2009).

On the other hand, it could be that appearance concerns are stronger in virtual meetings versus face-to-face meetings, because people can see themselves on the screen during virtual meetings but not during in-person meetings. Future research could investigate how reducing the visibility of one's own face in virtual meetings (e.g., hiding self-view on one's screen) compares to virtual meetings where self-view is on and in-person meetings.

Whereas the current study focused on adults' responses to hypothetical virtual environments, future research could also examine how youth and adolescents react to online learning environments. Many preschools and K-12 institutions were forced to shut down due to the COVID-19 pandemic (Unesco, 2020; U.S., Department of Education, 2020–2021) which negatively impacted student learning (Colvin et al., 2022; Cortés-Albornoz et al., 2023; Ford et al., 2021). Although many factors contributed to declines in student learning and performance with the shift to remote learning, Appearance-RS – especially among adolescents – may be an important variable to consider when studying how state self-esteem influences subsequent academic engagement. For example, while some studies suggest that the amount of time spent videoconferencing is not consistently related to appearance concerns, the amount of time one spends looking at oneself (e.g., via self-view during videoconferencing) does relate to increased appearance concerns (Hart et al., 2022). Future research could also use a measure of Appearance-RS to examine this construct among adolescents (Bowker et al., 2013) and explore the impact of other types of virtual settings in which appearance may be salient, such as in online dating contexts or telehealth interactions between doctors, therapists, and patients.

Finally, we acknowledge that the current studies were conducted during the COVID-19 pandemic (Spring 2021, Fall 2021), when people's in-person, face-to-face interactions with others were limited due to stay-at-home orders and social distancing guidelines. Indeed, people's social belongingness needs were thwarted during the pandemic, as reflected in increased reports of loneliness, social isolation, and psychological distress during this period (Derrer-Merk et al., 2022; McCallum et al., 2021). It makes sense, then, that in Study 1 (conducted in Spring 2021), participants reported feeling *greater* social connectedness when they imagined their camera being on (vs. off) during a class meeting, presumably because doing so would provide more opportunities to interact with others versus having one's camera turned off.

On the other hand, given that things were slowly starting to return to normal when Study 2 was conducted (in Fall 2021), social connectedness may have begun to be fulfilled

in other ways, such as through increased in-person interactions. Thus, having one's camera on may not have affected social connectedness as much as it did in Study 1. Indeed, if we ran these studies today, having one's camera on (vs. off) might not affect social connectedness as much given the abundance of opportunities of interacting with others face-to-face. However, the effects on state self-esteem might still emerge, such that people with high Appearance-RS may still be likely to feel insecure about the way they look when their appearance is visible to others in a social setting.

Conclusion

Across educational and work spheres, people have increasingly relied upon virtual platforms to meet, communicate, and interact with others. In the present studies, we found that individuals with higher (vs. lower) Appearance-RS felt less socially connected overall in hypothetical virtual environments. Furthermore, simply imagining having one's camera on (vs. off) in a virtual meeting lowered high Appearance-RS participants' state self-esteem, which was related to less intended engagement in the virtual environment. Importantly, the findings for Appearance-RS were not redundant with trait social anxiety or general rejection sensitivity, supporting the unique predictive validity of Appearance-RS. Thus, individuals who readily perceive their appearance as a source of rejection are at increased risk of feeling negatively about themselves, which relates to decreased motivation and intentions to engage in virtual academic and work environments.

Notes

1. Age was assessed as an ordinal variable using ranges (e.g., 18 to 24 years old).
2. There were no significant effects of the experimental manipulation (camera on vs. off) on Appearance-RS, trait social anxiety, or personal-RS (all $ps = .553$ to $.893$).
3. When we dropped trait social anxiety and personal-RS from the analyses, the Appearance-RS $\times$ Condition interaction and the results of moderated mediation remained significant.
4. Age was assessed on an ordinal scale using age ranges.
5. There were no significant effects of the experimental condition (camera on vs. off) on Appearance-RS, trait social anxiety, or personal-RS (all $ps = .386$ to $.852$).
6. When we dropped trait social anxiety and personal-RS from the analyses, the Appearance-RS $\times$ Condition interaction and the results of moderated mediation remained significant.
7. Although we did not directly assess the salience of appearance concerns in the present studies, the state self-esteem scale did include a subscale reflecting participants' current evaluations of their appearance. When examining this particular subscale, there were significant Appearance-RS $\times$ Condition interactions in both studies, such that participants with higher Appearance-RS who had their camera on reported lower appearance state self-esteem, whereas this was not the case for those with lower Appearance-RS.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Alden, L. E., & Taylor, C. T. (2004). Interpersonal processes in social phobia. *Clinical Psychology Review*, 24(7), 857–882. <https://doi.org/10.1016/j.cpr.2004.07.006>
- Audet, É. C., Levine, S. L., Metin, E., Koestner, S., & Barcan, S. (2021). Zooming their way through university: Which big 5 traits facilitated students' adjustment to online courses during the COVID-19 pandemic. *Personality & Individual Differences*, 180, 110969. <https://doi.org/10.1016/j.paid.2021.110969>
- Bowker, J. C., Thomas, K. K., Spencer, S. V., & Park, L. E. (2013). Examining appearance-based rejection sensitivity during early adolescence. *Journal for Research on Adolescence*, 23(2), 375–388. <https://doi.org/10.1111/jora.12003>
- Calogero, R. M., Park, L. E., Rahemtulla, Z. R., & Williams, K. C. D. (2010). Predicting excessive body image concerns among British university students: The unique role of appearance-based rejection sensitivity. *Body Image*, 7(1), 78–81. <https://doi.org/10.1016/j.bodyim.2009.09.005>
- Chang, Y., Chungjen, C., & Shen, L. (2021). Telecommuting during the coronavirus pandemic: Future time orientation as a mediator between proactive coping and perceived work productivity in two cultural samples. *Personality & Individual Differences*, 171, 110508. <https://doi.org/10.1016/j.paid.2020.110508>
- Chen, C. (2000). Individual differences in a spatial-semantic virtual environment. *Journal of the American Society for Information Science*, 51(6), 529–542. [https://doi.org/10.1002/\(SICI\)1097-4571\(2000\)51:6<529::AID-ASIS>3.0.CO;2-F](https://doi.org/10.1002/(SICI)1097-4571(2000)51:6<529::AID-ASIS>3.0.CO;2-F)
- Chen, C., Czerwinski, M., & Macredie, R. (2000). Individual differences in virtual environments-introduction and overview. *Journal of the American Society for Information Science*, 51(6), 499–507. [https://doi.org/10.1002/\(SICI\)1097-4571\(2000\)51:6<499::AID-ASIS>3.0.CO;2-K](https://doi.org/10.1002/(SICI)1097-4571(2000)51:6<499::AID-ASIS>3.0.CO;2-K)
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>
- Colvin, M. K., Reesman, J., & Glen, T. (2022). The impact of COVID-19 related educational disruption on children and adolescents: An interim data summary and commentary on ten considerations for neuropsychological practice. *Clinical Neuropsychology*, 36(1), 45–71. <https://doi.org/10.1080/13854046.2021.1970230>
- Cortés-Albornoz, M. C., Ramírez-Guerrero, S., García-Guáqueta, D. P., Vélez Van Meerbeke, A., & Talero-Gutiérrez, C. (2023). Effects of remote learning during COVID-19 lockdown on children's learning abilities and school performance: A systematic review. *International Journal of Educational Development*, 101, 102835. <https://doi.org/10.1016/j.ijedudev.2023.102835>
- Cristel, R. T., Demesh, D., & Dayan, S. H. (2020). Video conferencing impact on facial appearance: Looking beyond the COVID-19 pandemic. *Facial Plastic Surgery and Aesthetic Medicine*, 22, 238–239. <https://doi.org/10.1089/fpsam.2020.0279>
- Derrer-Merk, E., Ferson, S., Mannis, A., Bentall, R. P., & Bennett, K. M. (2022). Belongingness challenged: Exploring the impact on older adults during the COVID-19 pandemic. *PLOS ONE*, 17(10), e0276561. <https://doi.org/10.1371/journal.pone.0276561>
- Dillon, A., & Watson, C. (1996). User analysis in HCI: The historical lessons from individual differences research. *International Journal of Human-Computer Studies*, 45(6), 619–637. <https://doi.org/10.1006/ijhc.1996.0071>
- Downey, G., & Feldman, S. I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality & Social Psychology*, 70, 1327–1343. <https://doi.org/10.1037/0022-3514.70.6.1327>
- Downey, G., Freitas, A. L., Michaelis, B., & Khouri, H. (1998). The self-fulfilling prophecy in close relationships: Rejection sensitivity and rejection by romantic partners. *Journal of Personality & Social Psychology*, 75(2), 545–560. <https://doi.org/10.1037/0022-3514.75.2.545>
- Egan, D. (1988). Individual differences in human-computer interaction. In M. Helander (Ed.), *Handbook of human-computer interaction* (pp. 543–568). Elsevier Science Publishers.

- Ford, T. G., Kwon, K., & Tsotsoros, J. D. (2021). Early childhood distance learning in the U.S. during the COVID pandemic: Challenges and opportunities. *Children & Youth Services Review*, 131, 106297. <https://doi.org/10.1016/j.childyouth.2021.106297>
- Hart, L. M., Mitchison, D., Fardouly, J., & Krug, I. (2022). Zoomers: Videoconferencing, appearance concerns, and potential effects on adolescents. *Current Opinion in Pediatrics*, 34(4), 320–325. <https://doi.org/10.1097/MOP.0000000000001141>
- Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Vol. 3). The Guilford Press.
- Heatherton, T. F., & Polivy, J. (1991). Development and validation of a scale for measuring state self-esteem. *Journal of Personality & Social Psychology*, 60, 895–910. <https://doi.org/10.1037/0022-3514.60.6.895>
- Hofmann, S. G. (2007). Cognitive factors that maintain social anxiety disorder: A comprehensive model and its treatment implications. *Cognitive Behaviour Therapy*, 36, 193–209. <https://doi.org/10.1080/16506070701421313>
- Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning & Instruction*, 43, 27–38. <https://doi.org/10.1016/j.learninstruc.2016.01.002>
- Kalman, R., Esparza, M. M., & Weston, C. (2020). Student views of the online learning process during the COVID-19 pandemic: A comparison of upper-level and entry-level undergraduate perspectives. *Journal of Chemical Education*, 97(9), 3353–3357. <https://doi.org/10.1021/acs.jchemed.0c00712>
- Kamalou, S., Shaughnessy, K., & Moscovitch, D. A. (2019). Social anxiety in the digital age: The measurement and sequelae of online safety-seeking. *Computers in Human Behavior*, 90, 10–17. <https://doi.org/10.1016/j.chb.2018.08.023>
- Karl, K. A., Peluchette, J. V., & Aghakhani, N. (2022). Virtual work meetings during the COVID-19 pandemic: The good, bad, and ugly. *Small Group Research*, 53(3), 343–365. <https://doi.org/10.1177/10464964211015286>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863. <https://doi.org/10.3389/fpsyg.2013.00863>
- Lee, R. M., & Robbins, S. B. (1995). Measuring belongingness: The social connectedness and the social assurance scales. *Journal of Counseling Psychology*, 42(2), 232–241. <https://doi.org/10.1037/0022-0167.42.2.232>
- Leigh, G., Templet, T., & Watson, C. (2021). Feelings on remote education in the era of coronavirus pandemic, a pilot study. *Teaching and Learning in Nursing*, 16(4), 332–337. <https://doi.org/10.1016/j.teln.2021.07.001>
- Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the spielberger state-trait anxiety inventory (STAI). *British Journal of Clinical Psychology*, 31(3), 301–306. <https://doi.org/10.1111/j.2044-8260.1992.tb00997.x>
- Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy*, 36(4), 455–470. [https://doi.org/10.1016/s0005-7967\(97\)10031-6](https://doi.org/10.1016/s0005-7967(97)10031-6)
- McCallum, S. M., Cleave, A. L., Cherbuin, N., Farrer, L. M., Gulliver, A., Shou, Y., Dawel, A., & Batterham, P. J. (2021). Associations of loneliness, belongingness and health behaviors with psychological distress and wellbeing during COVID-19. *Journal of Affective Disorders Reports*, 6, 100214. <https://doi.org/10.1016/j.jadr.2021.100214>
- National Center for Education Statistics. (2022, August). U.S. education in the time of COVID. Institute of Education Sciences report. Retrieved online on September 9, 2025, from, <https://nces.ed.gov/surveys/annualreports/pdf/Education-Covid-time.pdf>
- Pabilonia, S. B., & Redmond, J. J. (2024, October). The rise in remote work since the pandemic and its impact on productivity. *Beyond the Numbers: Productivity*, 13(8), U.S. Bureau of Labor Statistics. Retrieved September 8, 2025, from, <https://www.bls.gov/opub/btn/volume-13/remote-work-productivity.htm>.

- Park, L. E. (2007). Appearance-based rejection sensitivity: Implications for mental and physical health, affect, and motivation. *Personality and Social Psychology Bulletin*, 33, 490–504. <https://doi.org/10.1177/0146167206296301>
- Park, L. E. (2010). Responses to self-threat: Linking self and relational constructs with approach and avoidance motivation. *Social and Personality Psychology Compass*, 4, 201–221. <https://doi.org/10.1111/j.1751-9004.2009.00247.x>
- Park, L. E., Calogero, R. M., Harwin, M. J., & DiRaddo, A. (2009). Predicting interest in cosmetic surgery: Interactive effects of appearance-based rejection sensitivity and negative appearance comments. *Body Image*, 6(3), 186–193. <https://doi.org/10.1016/j.bodyim.2009.02.003>
- Park, L. E., & Harwin, M. J. (2010). Visible vs. non-visible rejection: Consequences of appearance-based rejection sensitivity. *Journal of Research in Personality*, 44(1), 128–132. <https://doi.org/10.1016/j.jrp.2009.10.001>
- Park, L. E., Naidu, E., Lemay, E. P., Canning, E. A., Ward, D. E., Panlilio, Z. A., & Vessels, V. (2023). Social evaluative threat across individual, relational, and collective selves. In B. Gawronski (Ed.), *Advances in experimental social psychology* (Vol. 68, pp. 139–199). Academic Press.
- Park, L. E., & Pinkus, R. T. (2009). Interpersonal effects of appearance-based rejection sensitivity. *Journal of Research in Personality*, 43, 602–612. <https://doi.org/10.1016/j.jrp.2009.02.003>
- Pfund, G. N., Hill, P. L., & Harriger, J. (2020). Video chatting and appearance satisfaction during COVID-19: Appearance comparisons and self-objectification as moderators. *International Journal of Eating Disorders*, 53(12), 2038–2043. <https://doi.org/10.1002/eat.23393>
- Pikoos, T. D., Buzwell, S., Sharp, G., & Rossell, S. L. (2021). The Zoom effect: Exploring the impact of video calling on appearance dissatisfaction and interest in aesthetic treatment during the COVID-19 pandemic. *Aesthetic Surgery Journal*, 41(12), NP2066–NP2075. <https://doi.org/10.1093/asj/sjab257>
- Thawanyarat, K., Francis, S., Kim, T., Arquette, C., Morrison, S., & Nazerali, R. (2022). The Zoom effect: A Google trends analysis. *Aesthetic Surgery Journal*, 42(1), NP76–NP82. <https://doi.org/10.1093/asj/sjab347>
- Unesco, U. (2020). COVID-19 educational disruption and response. UNESCO. <https://en.unesco.org/news/covid-19-educational-disruption-and-response>
- World Health Organization. (2020, August). Coronavirus disease (COVID-19) pandemic. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>