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# Can't Look Away – The Effects of Social Media Cues Signaling Social Evaluation on the Attention Allocation of Socially Anxious Individuals

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## **Declaration of the use of AI**

We declare that we did not use AI for any part of the work related to the manuscript submitted.

## **Data Availability**

Data of this study are openly available in Open Science Foundation (OSF) at [https://osf.io/n2xv/?view\\_only=c2873b4bccbd4a6091775cf497acb2ff](https://osf.io/n2xv/?view_only=c2873b4bccbd4a6091775cf497acb2ff) (see Project named "attention allocation when using Social Media Platforms (SMPs)"; File name "Data – Instagram Study").

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## Abstract

**Background:** Research on attention allocation to signs of social feedback in social anxiety has mainly shown attentional avoidance. Yet, our social world is vastly changing. Physical in-person encounters are no longer the sole medium for social interactions, as social media platforms (SMP's) fulfil a significant part of social life. Still, assessing attention allocation to indicators of social evaluation/feedback in social anxiety in this novel environment is still scarce.

**Methods:** Socially anxious (n=30) and nonanxious participants (n=30) completed a reading comprehension task while an Instagram page (unrelated to the task) was concurrently visible on the computer screen. Critically, the Instagram page included an image reflecting participants' personal features (a personalized portfolio), which received "ongoing" mock social evaluation (in the form of "Likes") while participants completed the reading comprehension task. Using eye-tracking methodology, we monitored participants' attention allocation to the Instagram page, computing the total number of visits to, and the total time spent on, the Instagram page. We then divided the Instagram page to three complementing areas – the "Like" icon; the personalized portfolio image; and the rest of the page – and repeated the same analyses.

**Results:** Socially anxious participants exhibited greater attention allocation to the Instagram page, manifesting in both attentional indices (visits, dwell time), which was specifically driven by the Like icon. Results were not affected by participants' daily Instagram usage time.

**Conclusion:** Socially anxious individuals are biased toward signs of social evaluation/feedback when on SMPs, diverging from prior research on attention allocation during 'concrete/real' social evaluative contexts.

*Keywords:* social anxiety; social media; social evaluation; attention allocation; eye tracking

## 1. Introduction

Social anxiety disorder (SAD) is a debilitating psychiatric disorder characterized by intense and persistent fear and avoidance elicited by a wide range of social situations (American Psychiatric Association, 2013; Fehm et al., 2005). As emphasized in the diagnostic and statistical manual of mental disorders (DSM-5; American Psychiatric Association, 2013), these feared situations are those in which the individual feels they may be exposed to possible scrutiny, evaluation, or judgment by others, leading to extreme avoidance of socially relevant situations (Stein & Stein, 2008). SAD is a highly prevalent psychopathology, with a lifetime prevalence rate of 4-13% (Leichsenring & Leweke, 2017; Mennin et al., 2002; Stein et al., 2017), and is often chronic and debilitating negatively impacting one's social, occupational, and academic functioning (Stein & Stein, 2008; Wittchen, 2000).

Cognitive models of SAD suggest that different biases in information processing may play a major role in the etiology and maintenance of the disorder (Clark & McManus, 2002; Clark & Wells, 1995; Heimberg et al., 2014; Heinrichs & Hofmann, 2001; Rapee & Heimberg, 1997), including biases in selective attention allocation to socially-relevant information in one's environment (Clark & Wells, 1995; Rapee & Heimberg, 1997; Wells, 1995). Specifically, some models suggest heightened attention allocation to socially relevant cues, including hypervigilance (which enhances detection of these cues) and difficulty to disengage from these cues once detected (Heimberg et al., 2014; Rapee & Heimberg, 1997); other models suggest attentional avoidance of such information (i.e., diverting one's attention away from these cues; Wells et al., 1995); and some put forward a vigilance-avoidance pattern of attention allocation, namely, an initial engagement with, followed by subsequent avoidance of, socially relevant information in one's environment (Mogg et al., 2004). Indeed,

research on attentional allocation in social anxiety via advanced eye-tracking methodology has shown aberrant attention allocation processes in the disorder using different experimental approaches (for a review see Chen & Clarke, 2017). One such approach is *the social evaluation approach* in which participants' attention allocation is gauged during social evaluative situations (e.g., during/after giving a public speech; Lin et al., 2020). Using this approach, research has consistently found attentional avoidance of cues that signal social evaluation or feedback, whether positive or negatively valenced (for a review of additional 'social evaluation' studies see Chen & Clarke, 2017). For example, Chen et al. (2015) asked socially anxious and control participants to give a brief impromptu speech in front of a pre-recorded audience displaying either positive or threatening feedback gestures, while their gaze was continuously monitored. Results showed that socially anxious participants were more avoidant of the social feedback compared with controls (Chen et al., 2015). Importantly, compared to other approaches in the field (e.g., the competing stimuli approach; Lazarov et al., 2016; Lazarov et al., 2018), the social evaluation approach most closely echoes the DSM-5 definition of feared social situations (i.e., those in which the individual may be exposed to possible scrutiny, evaluation, or judgment by others), strengthening its ecological validity (Chen & Clarke, 2017). Indeed, cognitive models of SAD (Clark et al., 2005; Heimberg et al., 2014) have also emphasized that biases in information processing, including in attention allocation, would be most prominent during social-evaluative situations, when anxiety and distress are heightened.

Zooming in on extant research in SAD conducted under the social evaluation approach shows that most studies have examined attention allocation using experimental tasks that mimic social evaluative situations occurring in the 'real' concrete social world (e.g., during public speaking; (Rubin et al., 2022); while in one-on-one interactions; Stopa & Clark, 1993), nicely corresponding with SAD definitions as stated above (American

Psychiatric Association, 2013; Yen et al., 2012). Yet, the social world we live in is vastly changing (Elias et al., 2021). In conjunction with the rapid advancement in technology, physical in-person encounters are no longer the sole medium for social interactions to take place, with technology-based social media platforms (SMP) becoming a significant part of daily social life (Perrin, 2015; Shanmugasundaram & Tamilarasu, 2023). For example, Instagram, a prominent widely-used SMP, has over 1.4 billion active users worldwide, gaining immense popularity (Statista, 2024b) especially among younger generations (Statista, 2024a). Using such platforms, users create personal profiles, communicate with other users, maintain social relationships, plan social events, and meet new people (Elias et al., 2021; Ellison et al., 2007). Most relevant for the present context, most SMPs also include an evaluative “Like” mechanism for receiving and/or providing instant social evaluation and judgment, clearly diverging from feedback given in the ‘real’ physical world (Lieberman & Schroeder, 2020).

Reverting back to social anxiety, existing research indicates that SMP use can have both beneficial and detrimental psychological effects for socially anxious individuals. On the positive side, individuals with elevated social anxiety often show a preference for online over face-to-face interactions (Pierce, 2009), as online interaction reduces anxiety and social demands (Erwin et al., 2004), and afford greater control over self-presentation (Erwin et al., 2004; Lee & Stapinski, 2012; Madell & Muncer, 2006; Shepherd & Edelman, 2005; Young & Lo, 2012). Conversely, a growing body of evidence has also linked SMP usage to a range of negative psychological outcomes in social anxiety, such as passive and maladaptive patterns of SMP usage; a greater risk for SMP addiction (Weinstein et al., 2015) and a pattern of problematic use (Elias et al., 2021; Lee & Stapinski, 2012). These may, in turn, contribute to the exacerbation of social anxiety symptoms (Caplan, 2005; Erwin et al., 2004; O’Day & Heimberg, 2021; Rauch et al., 2014; Shaw et al., 2015).

While much research has accumulated on SMP usage and social anxiety over recent years, less has been done to better understanding the manner in which socially anxious individuals actually allocate their attention while using SMPs, with extant research showing avoidance of socially relevant information (Elias et al., 2021; McGowan et al., 2025). For example, Elias et al. (2021) presented socially anxious and control participants a genuine Facebook page which included both social relevant and neutral pictures, while monitoring their gaze. Results showed that socially anxious participants dwelled less (i.e., devoted less attention) on the socially relevant pictures, indicative of avoidance of social information. McGowan et al. (2025) assessed the visual attention allocation of young females with different levels of anxiety symptoms while they viewed different Instagram profile pages (of other users) with varying follower counts and likes. Results showed that with increasing anxiety symptoms, participants showed more attentional avoidance patterns reflected in shorter dwell time on cues of social media status compared to the overall profile. While these studies provide valuable initial insights into the attention allocation of socially anxious individuals when using SMPs, no study to date has explored the specific effects of social feedback given via SMP on the attention allocation of socially anxious participants. Critically, social evaluation features in SMPs (e.g., number of 'likes') have been shown to have profound impact on the way one feels about oneself (O'Keeffe & Clarke-Pearson, 2011; Van der Veen et al., 2016), having the potential to elicit negative self-perceptions and cognitions (Slavich et al., 2010; Valkenburg et al., 2006). Given the increasing usage of SMPs in daily social life, investigating attention allocation of socially anxious individuals while being socially evaluated in this novel social environment seems imperative, as this may yield different findings compared to past research using the social evaluation approach.

Aiming to address this gap in knowledge, the present study explored attention allocation using the social evaluation approach during SMP usage in social anxiety. To that

aim, we created a common social media usage scenario in which participants receive online constant feedback/evaluation regarding their personal features while concurrently engaging in an unrelated task. Briefly, student participants with high and low levels of social anxiety were required to complete a computerized reading comprehension task while an Instagram profile page (unrelated to the task) was concurrently visible on the computer screen. Critically, this Instagram page also included an image (i.e., a 'personal portfolio' image) reflecting participants' personal characteristics/features (e.g., favorite music, eye color, hair color, etc.), which was prepared based on a personal questionnaire completed the day before. Importantly, this personal portfolio image received "ongoing" (mock) social evaluation (in the form of "likes") while participants were engaged in the reading comprehension task. Using eye-tracking methodology, we examined participants' attention allocation to the Instagram area of the screen. We specifically chose Instagram as the SMP to be used in the present study, rather than other SMPs, for two main reasons. First, Instagram has billions of users (Statista, 2024b), especially in the age range of the current study's participants (see Participants section). Second, unlike other SMPs which have evolved into more informative platforms (e.g., Facebook, X), Instagram is considered a highly socially evaluative platform incorporating various tangible indicators of social feedback (e.g., follower counts, likes; McGowan et al., 2025), and hence may more adequately serve the purposes of the present study.

Building on previous eye-tracking research on attention allocation in social anxiety during social evaluative situations (Chen et al., 2016; Chen et al., 2015; Howell et al., 2016) and during general usage of SMPs (Elias et al., 2021; McGowan et al., 2025), we hypothesized that socially anxious participants, compared with control participants, would allocate less attention to the Instagram part of the screen, reflecting greater avoidance of potential social feedback. We also explored the time course of attention allocation throughout

the task (i.e., a time-course analysis) to elucidate potential temporal changes in attention allocation over time.

## 2. Method

### 2. 1. Participants

Participants belonged to one of two groups: students with high (HSA) and low (LSA) levels of social anxiety. Six hundred and seventy-one first-year students completed the Liebowitz Social Anxiety Scale questionnaire (LSAS; Liebowitz, 1987) at the beginning of the school year. Students with an LSAS score  $\geq 63$  constituted the HSA group ( $n=30$ , 27 females,  $M_{age}=23.33$ ,  $SD=2.43$ , range=20–33). While an LSAS score  $>30$  is considered the clinical cutoff on this scale (Mennin et al., 2002), we set our cutoff score at 63 as this score was found to yield no false positive identification of SAD (Mennin et al., 2002), enabling the enrollment of participants that most closely resemble the clinical population of interest (Lazarov et al., 2016). The LSA control group consisted of students scoring at the bottom of the sampling pool, contingent on scoring  $\leq 20$  on the LSAS ( $n=30$ , 21 females,  $M_{age}=25.33$ ,  $SD=6.87$ , range=21–48), reflecting minimal social anxiety. Three additional recruitment criteria were considered. First, we verified that all participants had an Instagram account and were familiar with this SMP. Second, as the task involved a reading comprehension task, we excluded participants with an ADHD diagnosis to clearly tap attention allocation processes related to social anxiety levels. Finally, we only invited participants with normal or corrected-to-normal vision, excluding usage of multi-focal eyewear, to prevent eye-tracking calibration difficulties. All participants provided informed consent and received course credit for their participation. The study protocol was approved by the Institutional review board of Tel Aviv University where the study took place (IRB number: 0006965-3; Approval date: 06/26/2024).

## **2. 2. Measures**

Social anxiety was assessed using the LSAS (Liebowitz, 1987) and the Social Phobia Inventory (SPIN; Connor et al., 2000); depression via the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001); and trait anxiety via the State-Trait Anxiety Inventory-Trait subscale (STAI-T; Spielberger et al., 1970). Current mood states were assessed using Visual Analog Scales (VASs), commonly used in research for this purpose (Abend et al., 2014). See Supplementary Material for a detailed description of each measure.

## **2.3. The Instagram Procedure**

### **2.3.1 Phase 1 – The personal portfolio**

Participants were asked to fill out a short personal questionnaire, via the Qualtrics platform, the day before their arrival at the lab. The questionnaire comprised of six personal questions – four about personal preferences (preferred music genre, movie genre, pet animal, and clothing style) and two about personal features (e.g., hair and eye color). A personal portfolio image was then prepared for each participant, based on the specific answers given. This "personal portfolio" image (see Figure 1 for an example) was then used as the basis on which the "ongoing" (mock) social evaluation ("likes") was given, and as such appeared as part of the Instagram profile page (see Figure 2; right-hand side, top left corner) during the task (see Phase 2 below)

### **2.3.2. Phase 2 – The Instagram task**

An actual Instagram profile page of the lab was set up specifically for the current study (see Figure 2; right-hand side). As customary on Instagram, the profile page consisted of a profile icon (top left), profile description (top right), and different pictures (bottom) –

these included five socially neutral pictures, and the personal portfolio image of the participant prepared during Phase 1 described above.

Upon arriving at the lab, participants were told that during the experiment they would be required to carefully read a short academic text about the establishment of forestry resources in the 60's (echtman, 2017), on which they would be later tested (i.e., they will need to answer several comprehension questions). It was specifically emphasized that performance on this comprehension test was highly predictive of future academic success and achievements (Sayag, Under Review). Participants were then informed that the text would be presented on the left side of the screen (See Figure 2; left side) for 3.5 minutes and were advised to use the entire time provided to increase their chances of succeeding on the test.

Next, prior to starting the actual comprehension task, participants were reminded of the short personal questionnaire they completed the day before and were informed that based on their answers a personal portfolio image was prepared. They were then shown an example of such an image (not their own) with an explanation of its six components (see Figure 1 for an example). Participants were then told that their personal portfolio image was just uploaded to the lab's private Instagram page, which is only visible to lab members. They were also told that while reading the text, twenty lab members will review their personal portfolio image and would have the option to respond to it by giving a "like" if they believed the portfolio belonged to someone that they would want to join the lab. In practice, all participants "received" 10 likes, delivered at a changing rate, which was the same across participants<sup>1</sup>. Next, participants were informed that the lab's Instagram page would appear alongside the text on the right side of the screen (Figure 2). They were then shown an example of the

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<sup>1</sup> Like 1 (+1 second); Like 2 (+40 seconds; 41 seconds in total); Like 3 (+20 seconds; 61 seconds in total); Like 4 (+15 seconds; 76 seconds in total); Like 5 (+16 seconds; 92 seconds in total); Like 6 (+13 seconds; 105 seconds in total); Like 7 (+60 seconds; 165 seconds in total); Like 8 (+11 seconds; 176 seconds in total); Like 9 (+5 seconds; 181 seconds in total); Like 10 (+60 seconds; 241 seconds in total).

display screen, explicitly showing participants the left side of the screen (presenting the text essay) and the right side (showing the lab's Instagram profile page), including the specific location where the likes would appear (see Figure 2; red square). Finally, participants were reminded that their goal is to comprehend the short academic text as best as they could for the subsequent comprehension test. During the task itself, the textual essay and the lab's Instagram profile page were displayed concurrently on the screen for 3.5 minutes, during which participants could freely view the computer screen<sup>2</sup>.

Following the completion of the reading task, participants were asked, using a 0-100 VAS, to assess how much they were preoccupied with the fact that their personal portfolio was being evaluated by lab members while reading the text. Participants were also asked to estimate the average time they spent using Instagram in their daily lives and whether they considered themselves to be passive or active Instagram users (i.e., engaging in activities such as uploading photos or stories, commenting etc.).

#### **2.4. Eye-tracking measures**

Eye data was processed using EyeLink Data Viewer software (SR-research, Ottawa, Ontario, Canada). Fixations were defined as at least 100 ms of stable fixation within 1-degree visual angle (Lazarov et al., 2016; Lazarov et al., 2018; Lazarov et al., 2017).

Two indices of attention allocation to the Instagram page were computed. First, we counted the number of times each participant diverted their gaze from the text area of the screen to the Instagram area of the screen. Put differently, for each participant we counted the number of saccades that started at the text area and terminated (with a fixation) at the

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<sup>2</sup> The 3.5-minute viewing time was based on a pilot study conducted within our laboratory, showing this time period to be sufficient for all pilot participants (n=30) to read the entire essay at ease.

Instagram area. We term this index *Visits*. We also computed the *total dwell time* spent on the Instagram page by aggregating the durations of all corresponding fixations.

To further explicate significant group differences in attention allocation to the Instagram page, we further divided the Instagram area of the screen into three complementing areas of interest (AOIs): (1) the "Like" icon signaling social feedback (the Like AOI); (2) the participant's personal portfolio image (the Portfolio AOI); and (3) the rest of the Instagram page (the General AOI). We then computed the same eye-tracking measures per AOI, namely, visits and total dwell time. As total dwell time per AOI included all fixations made within the AOI, regardless of the origin of the preceding saccade (i.e., including, for example, fixations resulting from saccades between different AOI's within the Instagram area of the screen, such as when moving from the Portfolio AOI to the Like AOI), we also computed *dwell time per visit* by only aggregating, for each visit, the duration of fixations made within the AOI following the saccade from the text area of the screen.

## 2.5. Apparatus

Eye-tracking data was collected and recorded using the remote head-free high-speed EyeLink Portable-Duo apparatus and the recently developed WebLink screen recording software (SR- research, Ottawa, Ontario, Canada). Participants were seated approximately 700mm away from the screen. Real-time monocular eye-tracking data were recorded continuously throughout the task at 500 Hz, with a 1920X1080-pixel display resolution.

## 2.6. General Procedure

Participants completed the personal portfolio phase the day before arriving at the lab. Upon their arrival, they were given the instructions of the Instagram task as described above. Participants then completed the two VASs assessing current mood states, following which

they were positioned in front of the eye-tracking monitor for a 5-point calibration, followed by a 5-point validation procedure, establishing precise reference data for gaze position calculations. Calibration was repeated if visual deviation exceeded  $0.5^\circ$  per calibration point on either the X or Y axis. Following the calibration procedure, participants completed the Instagram task and then completed the same VASs for a second time. Next, participants completed the reading comprehension test by answering ten comprehension questions, such that scores ranged between 0 and 10 for each participant and then completed the self-report questionnaires, also providing information on their age, gender, and race (see Measures above). Finally, participants were debriefed and thanked for their participation.

## 2.7. Data analysis

To compute the required sample size for the present study we used the effect size reported by a previous eye-tracking study on attention allocation to social feedback which used a similar study design, albeit in a ‘real-world’ concrete situation (e.g., tracking eye gaze to social feedback during a public speaking task), comparing attention indices between a group of socially anxious and control participants (Chen et al., 2016). As the study of Chen et al. (2016) reported the effect size for between groups comparisons on both positive and negative social feedback, we used the lower of two (Cohen’s  $d=0.67$ ) taking a conservative approach. The power analysis was performed using G\*Power 3.1.9.4 (Faul et al., 2007), and showed that a sample of 58 (29 participants in each group) has a power of 80% to detect a between-group difference (in attention allocation). To ascertain a large enough sample, we opted to recruit 30 participants per group, for a total sample size of 60 participants.

All statistical tests were two-sided, using  $\alpha$  of .05. Effect sizes for significant findings are reported using  $\eta^2_p$  for ANOVAs and *Cohen’s d* for mean comparisons. Multiple

comparisons were corrected using the Bonferroni correction, adjusting the p significance value accordingly.

### **2.7.1. Demographic and clinical characteristics**

Independent sample t-tests compared groups on descriptive characteristics (e.g., LSAS, SPIN, PHQ-9, STAI-T, age), pre-task current mood states (the two VAS scores), and average daily Instagram usage (in minutes). Chi-square tests were used to compare groups on gender ratio and on active (vs passive) Instagram usage.

### **2.7.2. Task-related indices**

*Attention allocation.* Group differences in attention allocation to the Instagram Page (i.e., number of visits, total dwell time) were examined using one-way ANOVA.

Group differences in attention allocation to the Instagram page per AOI were examined using a repeated-measures analysis of variance (ANOVA) with group (HSA, LSA) as a between-subject factor and AOI (Like, Portfolio, General) as a within-subject factor. Follow-up between-groups simple effect analyses per AOI were conducted to further explore significant interactions.

As groups significantly differed on average daily Instagram usage, this was entered as a covariate for significant findings.

*Current mood states.* To explore group differences in mood states from before to after the Instagram task, a repeated-measures ANOVA was used, with group (HSA, LSA) as a between-subject factor and time (pre-task, post-task) as a within-subject factor.

*Preoccupation levels.* An independent sample t-test was used to compare groups on level of preoccupation while completing the reading comprehension task (preoccupation with the fact that their personal portfolio was being evaluated by lab members).

**Test scores.** An independent sample t-test was used to compare groups' scores on the comprehension test.

### 2.7.3. Exploratory time course analysis

To better understand the time course of attention allocation throughout the task and pinpoint the emergence of group differences noted in the aforementioned analysis, we conducted an exploratory time-course analysis for significant findings. Specifically, we divided the overall task/viewing duration of 210 seconds (the 3.5 minutes viewing time) into three equal 70-second epochs (Basel et al., 2023) and then added Epoch as another within-subject variable (i.e., Epochs 1 to 3) to the above noted analyses of attention allocation (to the Instagram Page as whole and per AOI). It is important to note, however, that given the small sample size and the potential for Type I error these analyses are deemed exploratory in nature.

## 3. Results

Data of this study are openly available in Open Science Foundation (OSF) at [https://osf.io/n2xv/?view\\_only=c2873b4bccbd4a6091775cf497acb2ff](https://osf.io/n2xv/?view_only=c2873b4bccbd4a6091775cf497acb2ff) (see Project named "attention allocation when using Social Media Platforms (SMPs)"; File name "Data – Instagram Study").

### 3.1. Demographic and clinical characteristics

Demographic and clinical characteristics (mean, standard deviation, and range) per group are described in Table 1. Not surprisingly, significant group differences emerged on all clinical measures as well as on the pre-task current mood states (anxiety and depression). No differences emerged for age or gender ratio. While no significant group differences were found for active (vs. passive) usage of Instagram,  $\chi^2=0.66$ ,  $p=.42$ , groups significantly

differed on average daily Instagram usage time,  $t(58)=3.24$ ,  $p=.002$ , *Cohen's d*=.84, with HSA participants spending more time using Instagram than LSA participants.

### 3.2. Attention allocation measures

#### 3.2.1. Overall attention allocation to the Instagram page

**Number of visits.** A significant group difference emerged for number of visits,  $F(1,58)=8.92$ ,  $p=.004$ ,  $\eta^2_p=.13$ , with the HSA group making more visits to the Instagram area,  $M=6.80$ ,  $SD=6.59$ , compared with the LSA group,  $M=3.00$ ,  $SD=2.27$ . This group difference remained significant following the introduction of Instagram daily usage as a covariate,  $F(1,57)=7.87$ ,  $p=.007$ ,  $\eta^2_p=.12$ .

**Total dwell time.** A significant group difference also emerged for total dwell time,  $F(1,58)=9.64$ ,  $p=.003$ ,  $\eta^2_p=.14$ , with the HSA group dwelling longer on the Instagram area,  $M=6.80$ ,  $SD=7.79$ , compared with the LSA group,  $M=2.18$ ,  $SD=2.37$ . Again, this finding remained significant following the introduction of Instagram daily usage as a covariate,  $F(1,57)=4.79$ ,  $p=.033$ ,  $\eta^2_p=.08$ .

#### 3.2.2. Attention allocation to the Instagram page per area

**Number of visits.** Breaking up the Instagram area into the three complementing AOIs (Like, Profile, General; see Figure 3a) revealed a significant group-by-AOI interaction,  $F(2,58)=7.35$ ,  $p<.001$ ,  $\eta^2_p=.11$ , which remained significant when adding daily Instagram usage as a covariate,  $F(2,114)=6.94$ ,  $p=.001$ ,  $\eta^2_p=.11$ . Follow-up simple effects analysis comparing the two groups per AOI showed that the HSA group made significantly more visits to the Like AOI than the LSA group,  $F(1,58)=8.50$ ,  $p=.005$ ,  $\eta^2_p=.13$ . Conversely, no group differences emerged for the Portfolio AOI,  $F(1,58)=4.95$ ,  $p=.03$ , or the General AOI,  $F(1,58)=0.12$ ,  $p=0.73$ .

**Total dwell time.** Unlike the number of visits, breaking up total dwell time per the three complementing AOIs (Figure 3b) revealed a non-significant group-by-AOI interaction,

$F(2,58)=1.02, p=0.36$ . Here, only a main effect of group emerged,  $F(1,58)=9.64, p=.003, \eta^2_p=.14$ , showing that the HSA group dwelled longer than the LSA group across AOIs.

**Total dwell time per visit.** Examining the dwell time per visit (Figure 3c) showed a significant group-by-AOI interaction,  $F(2,58)=5.44, p=.006, \eta^2_p=.09$ , which remained significant following the introduction of usage time as a covariate,  $F(2,58)=4.16, p=.018, \eta^2_p=.07$ . Follow-up simple effect analysis per AOI showed a similar results pattern to the one described above for visits per AOI, namely, the HSA group dwelled significantly longer on the Like AOI than the LSA group,  $F(1,58)=7.32, p=.009, \eta^2_p=.11$ , while no group differences emerged for the Portfolio AOI,  $F(1,58)=2.40, p=.13$ , or the General AOI,  $F(1,58)=2.44, p=0.12$ .

### 3.2.3. Exploratory time course analysis

**Overall attention allocation to the Instagram page.** A significant group-by-epoch interaction effect was noted for visits (Figure 4a),  $F(2,58)=8.02, p<.001, \eta^2_p=.12$ . Follow-up simple effects analysis comparing the two groups per Epoch revealed no group differences for the first epoch,  $F(1,58)=1.84, p=.18$ . Conversely, a significant difference emerged for the second,  $F(1,58)=10.75, p=.002, \eta^2_p=.16$ , and third,  $F(1,58)=7.67, p=.008, \eta^2_p=.12$ , epochs, showing that the HSA group made significantly more visits than the LSA group in Epoch 2 and 3. For total dwell time only a trend-level significant group-by-epoch interaction effect emerged (Figure 4b),  $F(2,58)=2.97, p=.056, \eta^2_p=.05$ .

**Attention allocation to the Like AOI.** For visits (Figure 4c), results showed a significant group-by-epoch interaction,  $F(2,58)=4.63, p=.01, \eta^2_p=.07$ . Follow-up simple effects analysis per epoch showed no group difference for the first epoch,  $F(1,58)=2.30, p=.14$ , and significant differences for the second,  $F(1,58)=17.08, p<.001, \eta^2_p=.23$ , and the third,  $F(1,58)=8.60, p=.005, \eta^2_p=.13$ , epochs. For total dwell time per visit (Figure 4d), only a main effect of group emerged,  $F(2,58)=12.27, p<.001, \eta^2_p=.17$ , with HSA participants

dwelling longer per visit than LSA participants across epochs. No group-by-epoch interaction was noted,  $F(2,116)=0.75, p=0.47$ .

### 3.3. Additional task-related indices

#### 3.3.1. Current mood states

No significant group-by-time interaction effect emerged for either current anxiety,  $F(1,58)=1.41, p=0.24$ , or depression,  $F(1,58)=1.20, p=.28$ , indicating that the task had no differential effect on the two groups. Not surprisingly, a main effect of group emerged for both current anxiety,  $F(1,58)=17.75, p<.001, \eta^2_p=.23$ , and depression,  $F(1,58)=6.43, p=.01, \eta^2_p=.10$ , with the HSA group scoring significantly higher than the LSA group on both mood states (anxiety, depression) across time points. For current depression, a main effect of time also emerged, indicating a significant reduction from before to after the task across groups,  $F(1,58)=8.15, p=.006, \eta^2_p=.12$ .

#### 3.3.2. Preoccupation levels

While the HSA group scored higher than the LSA group on preoccupation levels (HSA:  $M=23.33, SD=21.68$ ; LSA:  $M=15.07, SD=23.53$ ), this difference did not reach significance,  $t(58)=1.41, p=.16$ . Yet, exploring the association between level of preoccupation and indices of attention allocation using Pearson correlations showed a positive correlation with both the number of visits to, and the total dwell time on, the Instagram area of the screen,  $r=.31, p=0.02$  and  $r=.294, p=0.02$ , respectively. As our main analysis showed group differences to be mainly driven by the Like AOI, we repeated the correlation analysis specifically for this AOI. Here, too, a positive correlation emerged for number of visits,  $r=.29, p=.02$ , and total dwell time,  $r=.38, p=.003$ .

#### 3.3.3. Test scores

No group differences emerged on the test comprehension scores,  $t(58)=1.04, p=.30$  (LSA group:  $M=7.23, SD=1.36$ ; HSA group:  $M=6.83, SD=1.60$ ).

#### 4. Discussion

In a world where social media constitutes a significant portion of daily social life (Hussain & Griffiths, 2018; Hussain et al., 2019), the present study examined attention allocation patterns of socially anxious and non-socially anxious individuals while being under a social evaluative situation on a social media platform, namely, Instagram. Briefly, participants read a short academic text while being simultaneously exposed to potential social feedback on Instagram in the form of “Likes” given to their personal portfolio image. Participants’ attention allocation to the Instagram page was continuously recorded, computing participants’ number of visits to, and the total time spent on, the Instagram page. Results showed that socially anxious participants exhibited greater attention allocation to the Instagram page, manifesting in both number of attentional shifts to the Instagram page (i.e., visits) and time spent on it (i.e., dwell time), which was specifically driven by the area of the screen showing the ‘Like’ icon. Results were not affected by participants’ daily Instagram usage time. Finally, an exploratory time course analysis showed that group differences in attention allocation emerged in the second epoch of the task (out of three epochs) and remained consistent till the end of the task.

As just mentioned, results showed significant group differences in attention allocation to the Instagram page, but in the opposite direction of our a-priori prediction of avoidance – social anxious participants made more attentional shifts from the text to the Instagram part of the screen reflecting attentional capture or vigilance, and also spent more time dwelling on it, indicative of sustained attention (Lazarov et al., 2016; Lazarov et al., 2018). These results differ from a previous study exploring actual attention allocation patterns of socially anxious participants while using another SMP, namely, Facebook, in which attentional avoidance of socially relevant stimuli emerged (Elias et al., 2021). What may explain this divergence in

findings? One possibility is related to the approach of attention assessment – unlike the current study in which attention allocation was explored during social evaluation, the study of Elias et al. (2021) used the competing stimuli approach, presenting socially relevant and neutral pictures, with no social evaluation features. Another possibility is related to the SMP used to assess attention allocation. In the study of Elias et al. (2021) a Facebook page was used, while the current study utilized Instagram. Specifically, While Facebook, a text-oriented platform, is considered nowadays to mainly serve informative purposes (Sindermann et al., 2020), Instagram, a visually focused platform, inherently facilitates social evaluation (McGowan et al., 2025). Hence, the discrepancy in findings between the two studies may stem from either differences in the experimental paradigms employed (for a review see Chen & Clarke, 2017), and/or the nature of the social media platforms used. Future research could attempt to tease apart the two, for example, by replicating the original Facebook study but within Instagram, or alternatively, by replicating the present study within Facebook.

Present findings (of avoidance) are also at odds with previous eye-tracking studies conducted under the social evaluative approach, which consistently show an attentional avoidance pattern among socially anxious individuals (Chen & Clarke, 2017; Chen et al., 2016; Chen et al., 2015; Howell et al., 2016). What may explain this second divergence? One possible and noticeable explanation could be the context or the situation in which social evaluation was given and attention allocation explored – during social evaluative situations occurring in the ‘*real*’ concrete social world (e.g., during public speaking; (Rubin et al., 2022); during a one-on-one interaction; Stopa & Clark, 1993) vs during usage of a *social media* platform. Several specific features differentiating the two contexts are important to note. First, social evaluation on social media platforms is usually provided solely via the presence or absence of the feedback itself, that is – the "like" icon is either given (reflecting a positive feedback) or not (reflecting either no feedback or a negative one). Moreover, the

evaluators usually remain unseen and even unknown. Conversely, during in-person social evaluation the evaluator is physically present, and feedback is usually visible throughout the social encounter and provided via several information ‘channels’ beyond that of direct communication – body language, physical gestures, and facial expressions (Hall et al., 2019). Second, on social media platforms one does not ‘know’ when and if feedback will be given. For example, participants in the present study received 10 likes in total (which increased from none at a changing rate), such that they could not ‘know’ if, how many, and when likes would be given. Hence, all one could do in this situation is to repeatedly check (i.e., attend to) the number of likes on the Instagram page. A second possible explanation might be related to the nature of the socially evaluated ‘product’. Specifically, in the present study social evaluation was given regarding participants’ personal features and preferences, which may have increased the significance of the evaluation itself. Conversely, in past social-evaluation studies the social evaluation was related to performance, such as during one-on-one conversation (Stopa & Clark, 1993) or while delivering a speech (Rubin et al., 2022), and less related to personal or private features one has no control over.

Several additional results strengthen our interpretation that the increased attention allocation to the Instagram page among socially anxious participants may reflect the specific effects of social evaluation/feedback. First, breaking up the Instagram page to three complementing, yet distinct, areas (i.e., the Like area, the personal portfolio area, the rest of the page) showed that the above-described pattern of increased attention allocation to the Instagram page was specifically driven by the Like area of the screen, that is – the exact area that signals social evaluation. Specifically, compared with control participants, socially anxious participants made more visits to the like area, reflecting attentional capture or vigilance (Gamble & Rapee, 2010; Garner et al., 2006; Stevens et al., 2011), with each visit also being longer (i.e., dwell time per visit), reflecting difficulty in attention disengagement

(Buckner et al., 2010; Lazarov et al., 2016; Schofield et al., 2012; Wieser et al., 2009).

Interestingly, these group differences did not emerge for the two other AOIs – the personal portfolio image and the general AOI. This results pattern highlights the idea that the primary concern of the HSA participants was the social feedback itself, rather than the social media platform (i.e., the Instagram page) at large. Second, level of preoccupation with being socially evaluated (while reading the text) was positively associated with attention allocation indices – the higher preoccupation was, the greater one's attention was allocated to the Instagram page, and specifically to the like area of the screen. This suggests that attention allocation may reflect an attentional manifestation of ruminative thinking or mental preoccupation (Lazarov et al., 2019). Finally, there was no group difference in mood changes from before to after the Instagram task, not for anxiety nor for depression. This suggests that the task in itself did not have a differential effect on groups' current mood states and hence cannot serve as an alternative explanation for emergent findings.

Exploring the time course of attention allocation showed that group differences emerged in the second epoch and persisted into the third, which were not evident in Epoch 1. Importantly, given that the number of Likes received per epoch was the same (i.e., three in Epochs 1 and 2, four in Epoch 3), it is unlikely this finding is related to the timing of 'like' deliverance. Rather, this 'unfolding' group difference in attention allocation over time may be related to a corresponding increase in experienced anxiety during the task, which may have led socially anxious participants to perform *safety behaviors* – actions intended to alleviate experienced anxiety while still being part of the anxiety-provoking social situation (Piccirillo et al., 2016). In the present context these may have manifested in constantly monitoring and checking one's number of likes. A second potential effect of heightened anxiety among HSA participants during the task may be *reduced inhibitory control* – the ability to suppress or manage dominant or automatic responses, in this case, attentional capture by the Instagram

page (Berggren & Derakshan, 2013; Cisler & Koster, 2010; Wood et al., 2001). Echoing this suggestion, research has shown an association between increased anxiety levels and deficits in inhibitory control (Berggren & Derakshan, 2013; Cisler & Koster, 2010; Wood et al., 2001). Yet, as the present study assessed current anxiety levels only before and after the task, not during the task, future research should replicate the present procedure while also directly monitoring participants' anxiety levels during the task by using, for example, psychophysiology indices (e.g., skin conductance levels; Lazarov et al., 2010). Another potential contributing factor for the 'unfolding' of group difference in attention allocation over time is deficits in emotional regulation which may have also been at play. Specifically, research has shown that deficits in emotional regulation are often prevalent among socially anxious individuals when in social-relevant situations (Dryman & Heimberg, 2018; Hermann et al., 2004; Hofmann, 2004; Werner et al., 2011), and that these deficits may be further intensified by biased attention allocation toward perceived threats in one's environment (reflected here by increased attention allocation to the Instagram area and specifically to the like AOI), potentially increasing and perpetuating one's anxiety over time (Jazaieri et al., 2015). To better explore this possibility, future research could incorporate measures of emotional regulation within the present paradigm, via emotion regulation questionnaires or specific tasks. While providing some interesting insights, the results of the time course analysis should be taken with caution given their exploratory nature due to the relatively small sample size and the potential for Type I error.

Several limitations related to the nature of the sample used in this study should be acknowledged, affecting the generalizability of emergent findings. First, participants were individuals with high and low levels of social anxiety, not a clinical sample of SAD participants. Hence, present results cannot be readily generalized to clinical population, who may show different attentional patterns due to elevated symptomology and reduced

functioning (Kudryk et al., 2024). Yet, several considerations should be noted in this regard: (1) we used a recruitment cutoff score of 63 on the LSAS as an inclusion criterion for the HSA group, a score that has been reported as yielding no false positive identification of SAD (Mennin et al., 2002). Indeed, this cutoff score resulted in an average score of 70.70 on the LSAS, which is well within the clinical range of this scale (Mennin et al., 2002; Rytwinski et al., 2009); (2) subclinical SAD is associated with significant emotional distress and impairment across various life domains (Crişan et al., 2016; Merikangas et al., 2002; Schneier et al., 2002; Stein et al., 1994); (3) prior research on attention allocation in social anxiety among analogue samples (i.e., comparing participants with high and low levels of social anxiety) have yielded replicable results when using clinical samples (Lazarov et al., 2016; Lazarov et al., 2021); and (4) as noted above, SMP usage is continuously on the rise (Perrin, 2015; Shanmugasundaram & Tamilarasu, 2023), becoming an integral part of daily social life, especially among younger generations and student populations (Statista, 2024c). For those with elevated levels of social anxiety this may pose quite a challenge. Hence, understanding the relationship between social evaluation features on SMPs, attention allocation, and social anxiety symptoms holds valuable clinical implications beyond the scope of merely clinical SAD. Nonetheless, future studies should replicate the present one among individuals with a clinical SAD diagnosis. Second, the present study was conducted with a homogeneous sample of White university students of similar culture and background. Social media usage, including attention allocation, may vary across different user groups (Alsaleh et al., 2019; Schaffer & Debb, 2020). Finally, the current sample was predominantly composed of female students, which may also restrict the generalizability of our findings to men. Yet, epidemiology research has shown SAD to be more prevalent in women than in men, indicating a potential inherent discrepancy also reflected in the present sample

(American Psychiatric Association, 2013; Kessler et al., 1994). Still, future studies should aim for a more gender-balanced sample, thereby enhancing the relevance of present findings.

Several additional limitations related to the study and task design should also be noted. First, limited information was collected on the nature of participants' Instagram use – only self-reported daily usage time and nature (i.e., active/passive). Future research should be more comprehensive in assessing the nature of participants' usage of SMPs, especially given mixed results on the effects of SMP usage. On the one hand, social media can serve as a coping tool for socially anxious individuals, offering less threatening forms of interaction compared to face-to-face setting (Pierce, 2009), while on the other hand this tendency was also found to be associated with passive social media use that can worsen one's symptoms (Caplan, 2005; Erwin et al., 2004; Lee & Stapinski, 2012; Madell & Muncer, 2006; O'Day & Heimberg, 2021; Pierce, 2009; Rauch et al., 2014; Shaw et al., 2015; Shepherd & Edelman, 2005; Young & Lo, 2012). A second possible limitation lies in using a 'controlled' Instagram page with standardized number and timing of likes. While enabling experimental rigor, it may not fully capture the variability of real-world social media interactions, where evaluative feedback can include not only likes, but also comments, lack of responses, or even negative reactions (Prichard et al., 2021), thereby potentially lowering the ecological validity of present findings. Future research could address this limitation by incorporating more elaborative feedback options and mechanisms, either separately or in conjunction. A third possible limitation is the 10-item exam used to test participants' reading comprehension. While descriptive statistics showed that HSA participants scored lower than LSA participants, this group difference did not reach significance (while significant group differences did emerge for the attention allocation indices). One possibility is that the text and/or the comprehension test were too easy, potentially introducing a ceiling effect (both groups averaged around 7/10 correct questions, with a standard deviation being around 1.0),

thereby not being sufficiently sensitive to detect subtle performance-related effects which may have existed. Relatedly, the present study recruited student participants, who, despite their social challenges, often function quite adequately on an academic level. To address this limitation, future research could use either a more demanding text or a more difficult exam. Alternatively, more cognitively demanding tasks could be used, tasks in which performance is continuously gouged such that diverting one's attention is more directly and immediately detrimental to one's performance on the task (e.g., visual search tasks; for a review see Wolfe, 2020). Fourth, as explained earlier, we specifically chose to use the SMP Instagram, as compared with other SMPs it more readily elicits social comparison through its visual nature and interactive feedback features (McGowan et al., 2025). Still, current findings may not generalize to other SMPs which serve different purposes or use other forms of feedback and evolution. Future research could replicate the present study within other SMPs and also explore the effects of other features (both evaluative and general), such as stories, reels, algorithmically curated feeds, and interactive components such as commenting (McGowan et al., 2025; Sindermann et al., 2020). Finally, the present study used self-reports to assess several variables related to Instagram usage and self-evaluation of performance during the task (e.g., daily use, use nature, preoccupation levels). However, self-reports may be subjected to recall bias and/or under/over-reporting (Quinio & Lam, 2021). Future studies could use more objective measures such as monitoring SMP usage in real time via social media monitoring tools (Coyne et al., 2023).

#### **4.1. Conclusions**

The present study challenges previous findings demonstrating attentional avoidance of socially relevant information in social anxiety. By using an Instagram environment featuring continuous social evaluation, the study's experimental design represents an innovative and

ecologically valid approach to rigorously investigate attention allocation behavior among socially anxious individuals within a social media context. As the present study is the first, as far as we know, to explore the effects of potential social evaluation/feedback on SMP on attention allocation patterns among socially anxious individuals. As such, additional research is still clearly needed, especially regarding the possible effects of the social feedback itself (e.g., the “like” mechanism) as research in the area is still scarce. For example, future research could manipulate the “like” deliverance ratio (e.g., giving all 20 likes at the start or at the end of the procedure) to pinpoint its specific effects, or alternatively, could offer participants the choice of whether or not to receive/view the ongoing feedback, which could more readily tap behavioral, not only attentional, avoidance. The social ‘importance’ of the feedback could also be varied by manipulating its “meaning” – as indicating, for example, interest in going on a romantic date or being chosen for a high-end social club, rather than wanting someone to become one’s lab member. Still, in our continually developing digitized social world, we believe that the current study and its findings may broaden our understanding of the effects of social evaluation when using SMPs on attention allocation of socially anxious individuals. As SMPs are increasingly becoming a major platform for social functioning, we believe that research on attention allocation on SMPs should also be generalized to the general population, beyond the current focus on socially anxious individuals.

This present study also has some potential clinical implications. First, psychoeducation – a well-established and pivotal component in the treatment of SAD (Pelissolo et al., 2019) – could also address behavior as it transpires in the digital social world, including the feature of attention allocation. This is especially important as most current practices primarily emphasize real-world social contexts, overlooking the world of SMPs. For example, therapists could discuss more clearly with their patients the effects that

potential social feedback may have on their attention allocation patterns, which may subsequently affect their performance and wellbeing. Using the present study as an example, the vigilance of socially anxious participants (i.e., monitoring and checking one's number of likes) could be presented as a compensatory safety (attentional) behavior intended to alleviate experienced anxiety (Piccirillo et al., 2016). Present findings may also be relevant in the context of attention bias modification (ABM) protocols which target and modify aberrant attentional processes in the hope to alleviate symptoms (Heeren, Mogoş, et al., 2015; Lazarov et al., 2017; Ollendick et al., 2019). While extensive research has examined various ABMT protocols in social anxiety (Hakamata et al., 2010; Heeren, Mogoase, et al., 2015; Lazarov et al., 2018; Lazarov et al., 2017; Neophytou & Panayiotou, 2024), none have incorporated attention allocation processes transpiring during SMP usage. Finally, concerning society at large, present findings could also be integrated within educational programs aimed at informing younger generations as to the potential detrimental effects of SMP usage, and more specifically that of social feedback.

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Table 1  
*Demographic and Psychopathological Characteristics by Group*

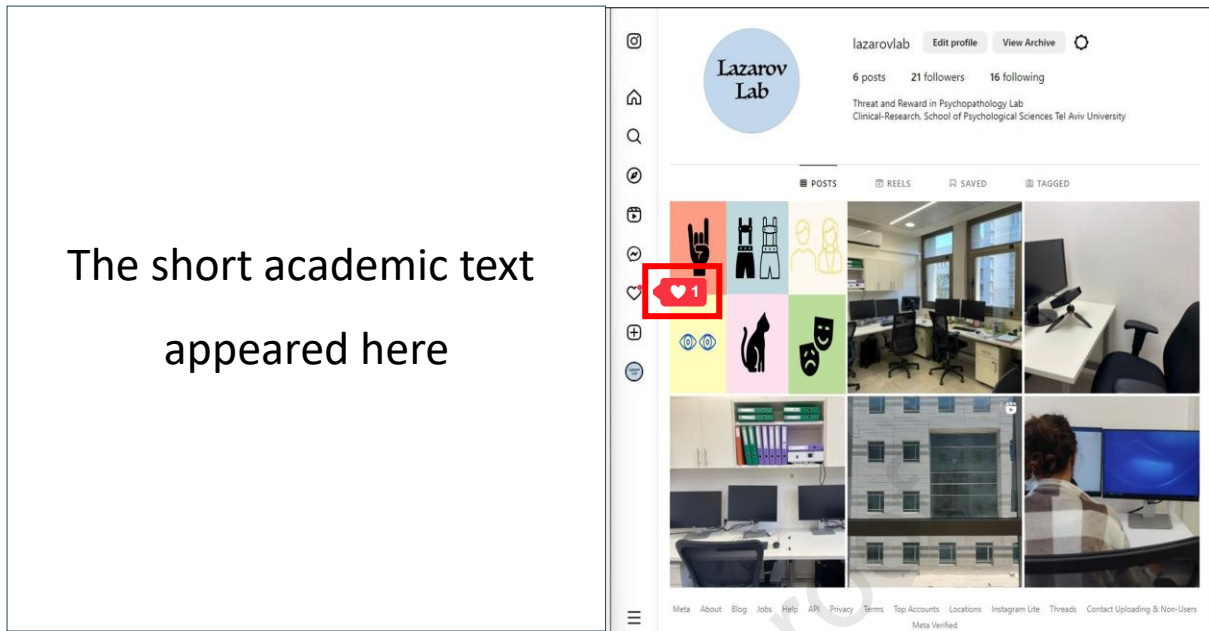
Measure	<u>LSA group (n=30)</u>		<u>HSA group (n=30)</u>	
	<i>M</i>	<i>SD (range)</i>	<i>M</i>	<i>SD (range)</i>
Age	25.33 <sup>a</sup>	6.87 (21-48)	23.33 <sup>a</sup>	2.43 (20-33)
Gender ratio (W:M)	9:21 <sup>a</sup>	-	3:27 <sup>a</sup>	-
LSAS	14.73 <sup>a</sup>	11.09 (3-59)	70.70 <sup>b</sup>	19.14 (41-111)
SPIN	6.20 <sup>a</sup>	4.54 (1-22)	35.93 <sup>b</sup>	11.56 (18-61)
PHQ-9	4.67 <sup>a</sup>	3.59 (0-12)	9.97 <sup>b</sup>	5.26 (1-21)
STAI-T	40.30 <sup>a</sup>	8.02 (29-58)	58.97 <sup>b</sup>	10.50 (43-78)
VAS Pre - Anxiety	9.37 <sup>a</sup>	18.12 (0-75)	30.37 <sup>b</sup>	25.69 (0-80)
VAS Pre – Depression	9.97 <sup>a</sup>	14.04 (0-50)	22.40 <sup>b</sup>	21.10 (0-70)
Average usage time (minutes per day)	47.07 <sup>a</sup>	32.59 (1-120)	89.17 <sup>b</sup>	63.27 (1-200)
Instagram usage (active:passive)	21:9 <sup>a</sup>	-	18:12 <sup>a</sup>	-

(\* ) All participants were White.

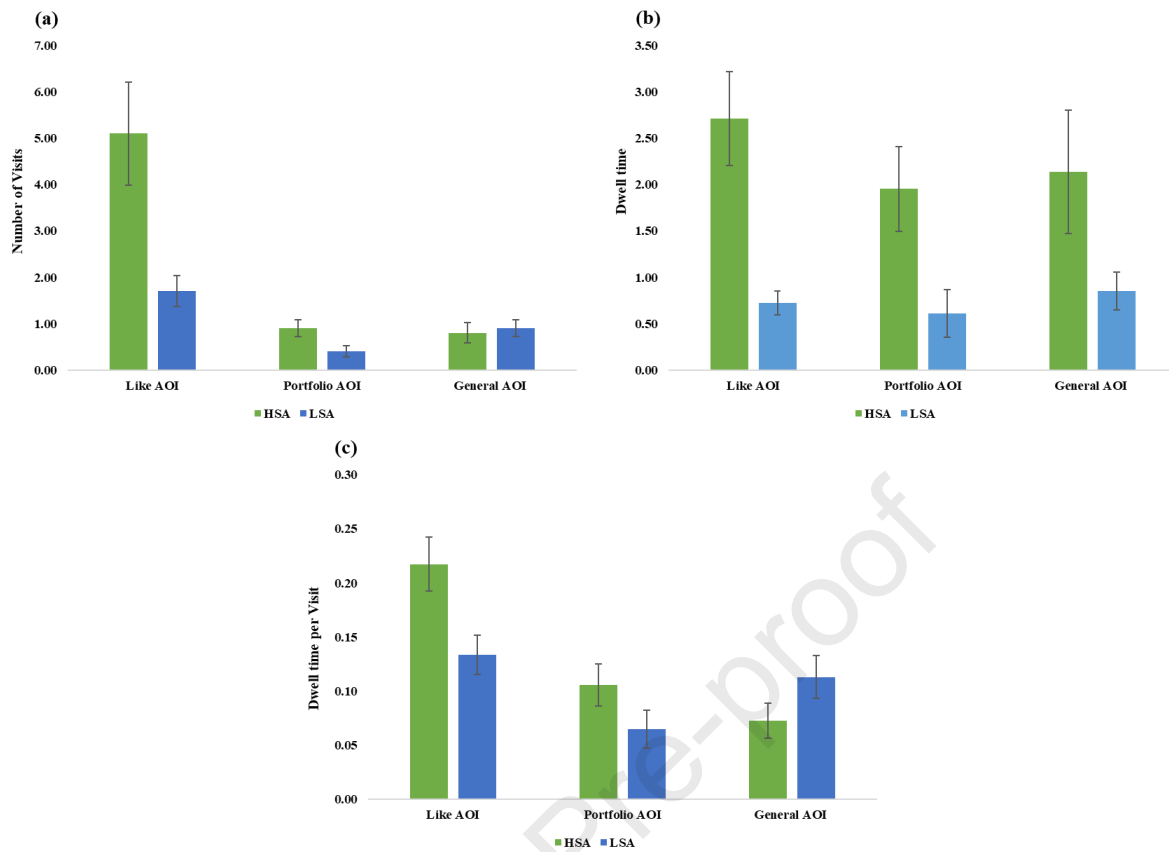
*Note.* Different superscripts signify differences between groups at  $p < .009$ . LSA, low social anxiety; HSA, high social anxiety; LSAS, Liebowitz Social Anxiety Scale; SPIN, Social Phobia Inventory; PHQ-9, Patient Health Questionnaire-9; STAI-T, State-Trait Anxiety Inventory-Trait; VAS, visual analogue scale.



**Figure 1.** An example of a personal portfolio image (from top left moving clockwise: preferred music, preferred clothing style, hair color, preferred movie genre, preferred pet animal, eye color).

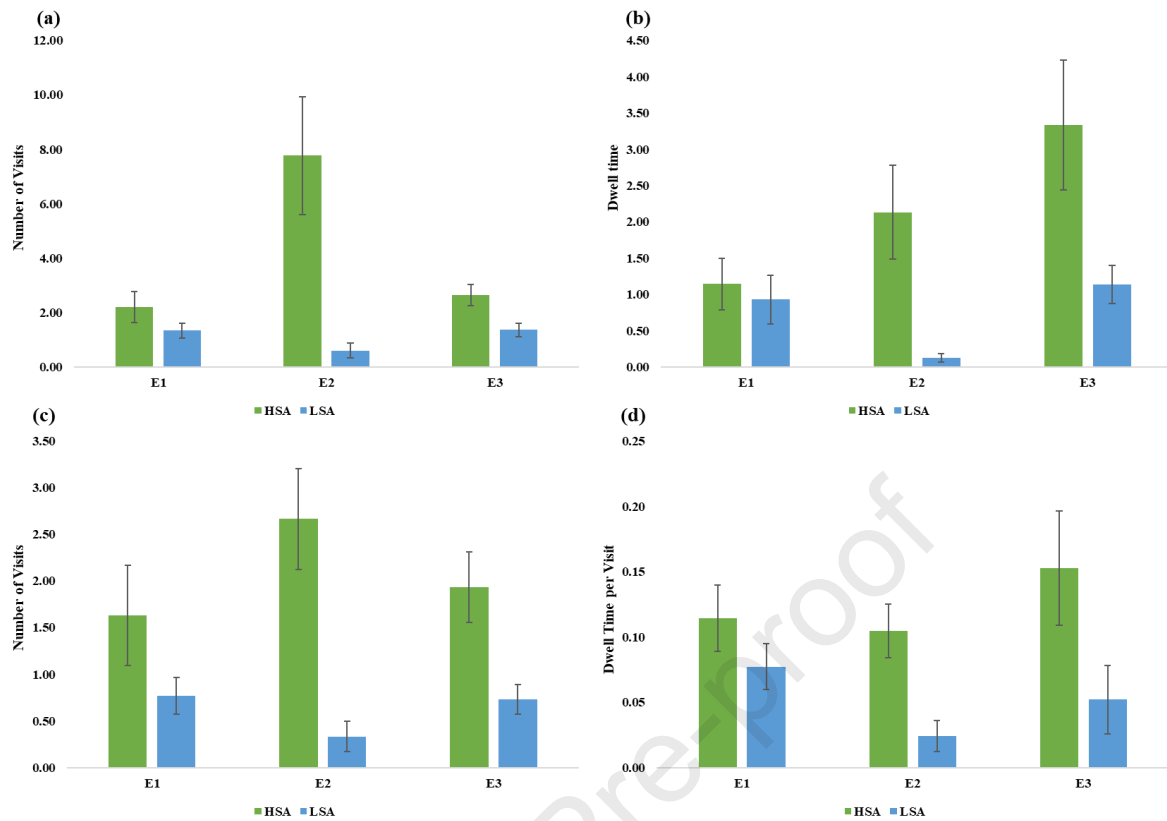


**Figure 2.** The computer display during the Instagram task. On the left – the short academic text; On the right – The lab’s Instagram profile page (top left, profile icon; top right, profile description; bottom part, different photos, including the participant’s personal portfolio image on the top left corner). The red square is shown here to denote the location of the “likes” – it did not appear in actual experiment.



**Figure 3.** Attention allocation indices by Group and Area of interest (AOI) for: (a) Number of visits; (b) Dwell time (in seconds); (c) Dwell time per Visit (in seconds). Error bars denote standard error of the mean.

*Note.* HSA, high social anxiety; LSA, low social anxiety



**Figure 4.** Attention allocation indices by Group and Epoch for: (a) Number of visits to the Instagram page; (b) Dwell time (in seconds) on the Instagram page; (c) Number of visits to the Like AOI; (d) Dwell time per visit on the Like AOI. Error bars denote standard error of the mean.

*Note.* HSA, high social anxiety; LSA, low social anxiety; E1, Epoch 1 (0-70 seconds); E2, Epoch 2 (71-140 seconds); E3, Epoch 3 (141-210 seconds)

## Highlights

- Socially anxious participants allocated more attention to the Instagram page
- This increased attention allocation manifested in both saccade and fixation data
- Attention allocation was driven by the “like” icon signaling social evaluation
- Group differences in attention allocation emerged in the second time epoch
- Results were not affected by participants’ daily Instagram usage time

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**Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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