Exploring Design Principles for Sharing of Personal Informatics Data on Ephemeral Social Media

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People often do not receive the engagement or responses they desire when they share on broad social media platforms. Sharers are hesitant to share trivial accomplishments, and the emphasis on data often results posts that audiences find repetitive or unengaging. Ephemeral social media's focus on self-authored content and sharing trivial accomplishments has the potential to ameliorate these challenges. We explore design principles for incorporating personal informatics data like steps, heart rate, or duration in data-driven stickers as a first step towards integrating these data into ephemeral social media. We examine the effect of a sticker's presentation style, domain, domain-relevance, and background through three surveys with 506 total participants. We uncover the importance of domain-relevant backgrounds and stickers, identify the situational value of stickers styled as analogies, embellished, and badges, and demonstrate that data-driven stickers can make ephemeral content more informative and entertaining, discussing implications for platforms and tools.

CCS Concepts: • **Human-centered computing → Human-computer interaction (HCI)**; User Studies; Social media

KEYWORDS

Ephemeral social media; Social sharing; Snapchat; Stories; Personal Informatics; Personal Data

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1 INTRODUCTION

Apps and devices that track personal informatics data such as physical activity in Fitbit, location in Swarm, or music listening history in Spotify are increasingly allowing people to share that data with others online. Many apps support sharing data with friends or strangers who use the

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Figure 1. Current ephemeral social media supports adding some experiential data about a person such as time of day, temperature and tagged location, or the music currently being listened to.

same app (e.g., leaderboards on Fitbit, Spotify's friends feed) as well as sharing that data with a broader audience of friends and family who may not have experience tracking the same data (e.g., over a social network like Facebook or Twitter or over SMS [17,45,46]). These sharing experiences can support people in being held accountable to their goals [14,56], getting advice [40,44,54], and celebrating their achievements [69] and can support audiences in learning more about the person sharing [8,36] or feeling more connected to them [5,26].

Prior work suggests that sharing personal informatics data over broad-purpose social platforms like Facebook, Twitter, Instagram, and SMS has the potential to help people reach a more diverse audience and communicate aspects of their identity [19,45]. However, in practice, people are often concerned that their activities and accomplishments are too trivial to share to their broad networks on these platforms [18,45,47]. Sharing audiences similarly express limited interest and rarely respond to such content [19,37], often because it appears system-generated rather than authored by the sharer. As a result, people do not receive the responses they seek when they use social platforms to share their self-tracked data [45].

Sharing personal informatics data on ephemeral social media platforms such as Snapchat and the Story features of Instagram and Facebook have the potential to provide the similar benefits to accountability and advice while mitigating some of the concerns people often have. People often use ephemeral platforms to share more mundane life events with closer networks [9,41,60,66], potentially ameliorating sharer's concerns that shared questions or accomplishments are too trivial for the audience. Ephemeral social media emphasizes user-generated content through annotation of images or videos annotated with text or stickers, further addressing concerns that shared personal informatics data system-generated. Ephemeral platforms often support adding experiential data, such as location, weather, and time of day (Figure 1). Apps like Pandora, Spotify, Netflix, Fitbit, and Strava include features to let people share data they are collecting on ephemeral platforms (e.g., what they are watching or listening to, how far they have walked or run), typically exporting the data as a background image which can be annotated in the ephemeral platform.

In this work, we examine and extend how current systems support exporting self-tracked data to explore design principles for sharing personal informatics data on ephemeral social media. We specifically explored and evaluated the design of overlays (e.g., stickers) in five commonly-tracked and often-shared domains. Our three sticker presentation techniques (badges, embellished, and analogy) draw on techniques to make data interpretable, relatable, and memorable [7,11,29,30]. We conducted three online surveys with 506 total participants to understand how content with personal informatics data's domain, domain-relevance, presentation style, and background effects interest and attitude towards the content. Takeaways from these studies can inform how personal informatics data can be integrated into overlays available on ephemeral platforms. We contribute:

- A design space for how personal informatics data can be incorporated into ephemeral social media. We specifically identify three strategies: stickers with badges, embellishments, and analogies. We explore these design ideas by developing stickers for five domains (steps, music, heart rate, calories, and duration)
- An empirical evaluation of how people's perceptions of overlays vary on four dimensions: presentation style, data domain, relevance of the overlay to that data domain, background. Our findings suggest that: (1) domain-relevant backgrounds and stickers are more useful and entertaining; (2) some data domains detract from the shared content; and (3) all three presentation styles are circumstantially useful.

2 Background

This work builds on prior approaches to sharing personal informatics data, studies of ephemeral social media, and techniques for making measurements more interpretable.

2.1 Sharing Personal Informatics Data

Personal informatics examines the idea of collecting personally relevant information for later self-reflection or self-knowledge [35]. Although people often collect the data for self-improvement (e.g., to set a goal, to be aware of their current practices), others self-track for curiosity or to support later reminiscence [20]. There is no agreed-upon definition of what kinds of data can, or cannot support self-knowledge [63]. In practice, personal informatics examines people collecting a variety of data relating to personal wellbeing including physical activity, sleep, and food, as well as non-wellbeing metrics such as productivity, location, and finances.
Prior work has examined social media sharing practices in many domains in which people track data about themselves, including physical activity [15,19,26,45,46,57], biometrics (e.g., heart rate) [17,37,38], food [14,21,39], location [5,6,36], music [53,59], and finances [12]. When people share, they often aim to celebrate achievements (e.g., weight loss) [31,56], demonstrate struggles (e.g., in managing a chronic illness) [54], or curate a certain image of themselves (e.g., as athletic or adventurous) [25]. However, people often fear their accomplishments or struggles are not significant enough to warrant sharing on social media [18,45,47].

Some apps for collecting personal data facilitate reaching people who do not use the app, such as through broad social networking platforms like Facebook and Twitter (e.g., [45,46]) or through direct communication via SMS or Email (e.g., [37,45]). This broader sharing allows people to share with and receive feedback from friends and family, people whose support can be particularly meaningful [47]. However, people tend to receive more support and advice when

sharing among close ties [5,26,38]. Prior work has suggested that data sharing systems should therefore support configurable and informal groups [22,65].

Sharers of personal informatics data often desire more audience response [19,45]. Many apps automatically push data to social platforms when it is collected (e.g., when food is logged in MyFitnessPal or a run in RunKeeper which audiences often view as impersonal [19,37], especially when it involves canned messages or generic badges. Instead, they prefer when the sharer authors a message or post themselves, such as by explaining the importance of the moment or including a picture [19]. Custom authoring around self-tracked data has begun to be explored systems like DataSelfie, which enables mapping data to visual elements like colors or sizes in images [32].

2.2 Ephemeral Social Media

Compared to archival social media (e.g., Facebook and Twitter feeds), ephemeral social media becomes unavailable to the audience after a specified amount of time. In Snapchat, direct messages are typically visible for a few seconds (<10), while network-accessible "Stories" are viewable for 24 hours. Stories often include multiple posts in sequence, enabling someone to share multiple stages of an event or activity as it unfolds. Ephemeral platforms are usually used among smaller, closer networks [9,60,66] to share more mundane, everyday events [9,41,60,66] than archival platforms. People often find activities and accomplishments around tracked data too minor to share to archival social media [18,45] and likely not of interest to the broad audiences there [19,47]. Since smaller networks and sharing everyday events are typical on ephemeral platforms, they have the potential to better serve people's goals for sharing self-tracked data [22].

Although most ephemeral social media posts emphasize photo- and video-based content [50,66], people often annotate that content with text, filters, or stickers to add context. Annotations are widely used: one study showed 75% of Snaps sent included text or a drawing alongside media [50]. People use these annotations to clarify meaning [9,60] and better explain their situation [9], similarly to how they use contextual information on other social platforms [6,28,36]. Alhabash & Ma report that self-documentation and self-expression motivate people to use Snapchat more than archival social media platforms like Facebook and Twitter [1]. The annotation features of ephemeral social media help people author stories and posts which express aspects of their personality [2]. Annotations could be effective in helping people author content which feels personal from their self-tracked data.

Today, ephemeral platforms include a few filters and stickers which add personal data. Snapchat, Instagram, and Facebook stories support adding location, weather, and time, like in Figure 1. Other apps like Pandora, Spotify, Netflix, Fitbit, and Strava include features to let people share self-tracked or personal data specific to these apps on ephemeral platforms (e.g., what they are watching or listening to, how far they have walked or run). Like in Figure 1 (right), these apps typically export the data with a background image which can be annotated in the ephemeral platform, rather than the context being annotations. Although this focus on the data itself draws attention to that information, people tend to find seeing pictures alongside self-tracked data more interesting [19].

A few research apps have explored ephemeral messaging of self-tracked data, finding that the shared data can help support connectedness and awareness [5,6,38]. These systems often use abstract representations of the data, such as sending a bouncing ball which reflects a

person's heart rate [38] or a vibration signal when a person arrives at a tagged location [5]. These abstract representations help facilitate playfulness [38] and peace of mind [5].

2.3 Making Numeric Data Interpretable and Memorable

Shared personal informatics data is often numeric in nature (e.g., step counts, heart rate in beats per minute, calories consumed). However this numeric emphasis can come across as impersonal [19], and people often struggle to make sense of raw numbers and measurements [48]. The information visualization field has examined many methods for presenting numbers in broadly-interpretable ways. A common strategy is re-unitizing the measurement using familiar, real-world objects [13]. Relevant analogies can help people comprehend measurements, such as comparing distances to nearby or well-known landmarks [3,33] and weights or sizes to those of common objects [30]. Another strategy is to remove graphs entirely, instead summarizing the numbers in a natural-language sentence [10].

When visualizing measurements, Tufte argues that chartjunk, or any sort of visual embellishment, makes it more difficult to draw accurate conclusions from the data [58]. Versions of embellishments often occur in graphic design and news media, where graphs are embedded into animals or objects to draw attention [7]. In spite of the potential risks to interpretability, embellishment can be used to drive engagement and interest in data visualization [29]. Embellished visualizations also tend to be more memorable [7,11]. When graphic designers imagined representations of step activity, they used embellishments to quickly convey the data type and highlight accomplishments [3].

A numeric visualization's memorability and attractiveness is often in tension with its interpretability and accuracy [43]. Visualizations designed for scientific communities tend to emphasize utility. But Pousman & Stasko argue that in casual settings, such as a person sharing their habits on social media, visualizations should aim to be engaging without the same level of regard for utility or interpretability [51].

3 Design of Personal Data-Driven Overlays

We explored the design space of displays of personal driven data through studying prior approaches and creating our own, similar to other open-ended design explorations of self-tracking systems [24]. We sketched overlay ideas and representative use scenarios on paper, iteratively refining ideas through discussion as a group and informally evaluating by showing our ideas to others. Our initial ideas were motivated by narrative visualizations [52] of one's own data (e.g., year-end Strava and Fitbit reports), animations showing passage of time or training montages (e.g., flipping calendars or climbing up stairs), and public data displays like at sporting events or public art (e.g., noise meters or sand timers). When we reviewed these examples, we considered how they would need to be adapted for the ephemeral medium and how they could be generalized. We arrived at four principles for designing overlays, aiming for overlays to be:

- *Playful*: to align with platform and casual visualization norms [51], we made our overlays bright and lighthearted. Although traditional charts are common in sharing features [19], we avoided them because we felt people might view them as too serious for the platform. We aimed to align our designs with Snapchat's aesthetic, but kept them general enough to fit other ephemeral platforms (e.g., we did not include Bitmoji or other Snapchat-specific features).

- *Succinct*: posts are typically available for 10 seconds or less, so we aimed to use simple shapes and reduce text.
- *Relatable*: we aimed to develop overlays which used easily-recognizable objects and required minimal location or cultural context. For example, we used everyday objects and well-known animals. Our overlays catered to American audiences in practice, such as comparing duration to the length of a football game and showing calorie information on a fork.
- *Broad*: we aimed for each overlay to apply to many scenarios. For example, calorie badges initially annotated the calorie count on stickers of food, but pilot participants found it odd to overlay a sticker of a burger on a picture of a person eating Chinese food.

3.1 Overlay Design Parameters

With these principles in mind, we refined our overlay concepts. We identified four parameters on which overlays can vary: presentation style, domain, domain-relevance, and background. We then developed overlays which varied on these parameters. Figure 2 shows examples of the overlays we developed with variance on each parameter, while Figure 3 shows two instantiations of one overlay design.

3.1.1 Presentation Style

We identify three distinct graphical styles for overlays, each informed by a body of prior literature:

Badge overlays annotate objects with the specific tracked value, for example a shoe or ribbon with "5,793 steps" written on it. Badge overlays draw inspiration from shareable badges in research and commercial tracking apps (e.g., Fitbit [45]) and typical stickers in commercial ephemeral platforms.

Embellished overlays present common objects as charts, picking one dimension to be the axis and shading the object partway according to the tracked value. We aimed for embellishments to be related to either the tracked value or to frequently-measured amounts. For example, we used the tracked data "11 plays of The Beatles" to shade a pair of headphones or a speedometer about halfway between endpoints of 0 and 20. Embellished overlays are motivated by prior work on chartjunk, which suggests that the technique may make charts more memorable [7,11].

Analogy overlays re-express tracked values as better-known quantities through comparisons. We aimed to use household or well-known objects or animals for our comparisons. For example, one overlay compared a tracked amount of 2 hours, 42 minutes to the length of "Star Wars" (1.3x the value). Another analogy compared the same value (162 minutes) to just under a minute per pound of a stove (~210 pounds [42]). Analogies draw from prior work suggesting re-expressions and natural-language sentences can help make measurements more understandable [10,30].

3.1.2 Domain

People often track and share personal data in a range of domains for varied motivations [19]. We selected domains which can support the varied reasons people share personal informatics data. We specifically designed for five domains: *music*, *steps*, *calories*, *duration*, and *heart rate*. These domains help demonstrate how data might be used to celebrate an achievement (e.g., steps), explain more about a moment (e.g., heart rate, duration), or present a desired identity (e.g., music,

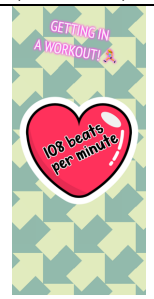
	Badge (steps)	Embellished (music)	Analogy (calories)	Relevant photo background (duration)	Abstract shape background (heartrate)
Domain-relevant					
Domain-agnostic					

Figure 2. The overlays we created varied on four dimensions: presentation style (*badge*, *embellished*, and *analogy*); domain (*music*, *steps*, *calories*, *duration*, *heart rate*), domain-relevance (*domain-relevant* or *domain-agnostic*), and background (*photo* and *shape).*

Figure 3. Two domain-relevant concepts for the *duration* domain, varied for *badge* (left) and *embellished* (right) presentation styles.

calories). Each domain refers to a commonly-tracked data unit (e.g., steps for activity, calories for food), though we acknowledge that people may prefer to add other units for the same data type.

3.1.3 Domain-Relevance

As demonstrated in previous examples, overlays can use objects or comparisons specifically related to the domain being shared or can use generic values or comparisons. For example, *domain-relevant* overlays showed music data over headphones or step data over a pair a shoes. *Domain-irrelevant* overlays used well-known and relatable objects and comparisons, such as a star or a speedometer. However, the object or comparison used in domain-irrelevant overlays is not commonly associated with the domain of focus. Although domain-relevant overlays present a more consistent message across sticker and text, domain-irrelevant overlays support applying to whatever domain is well-suited to a person's sharing goal.

The badge styles of domain-irrelevant overlays used shapes associated with achievement (e.g., a star, badge, or ribbon). Embellished styles used shapes associated with measurement (e.g., a speedometer, beaker, or thermometer). Analogies compared the tracked number to the weight of a common object or animal derived from re-expression aggregators (e.g., 108 BPM is ~1 beat per pound of an octopus, 11 plays of The Beatles is ~1 play per pound of a bowling ball) [30,42,64].

3.1.4 Background

Most commercial applications which support exporting personal data from their own apps (e.g., Pandora, Fitbit) to ephemeral platforms share the content over a background of *abstract shapes*

(Figure 1, right). Alternatively, people tend to use stickers generated natively on ephemeral social media over a *relevant photo* (Figure 1, left). We made the abstract shape style with public CSS patterns [61], centering the overlay to take up the bulk of the screen (Figure 2). We used Creative Commons photos from Flickr for the relevant photo style, shrinking the overlays and moving them away from the center to avoid hiding the picture. Because most Snaps include text captions [50], we wrote captions to explain the image or data for both background styles.

4 Evaluation of Data-Driven Overlays

In ephemeral social media today, overlays can be added to direct messages sent to a specific person (e.g., a Snap) or to messages seen by anyone who chooses to look at the content and has been given access (e.g., an Instagram or Snapchat story). We evaluated our overlays in both scenarios, aiming to answer: **How does an overlay's (1) domain and context (e.g., *domain, background*) and (2) presentation (*presentation style, domain-relevance*) impact people's perception of shared ephemeral messages and stories? (3) Do people find direct messages or stories with well-regarded overlays more entertaining, informative, or interesting than those without them?** Answering these questions will help develop guidelines for ephemeral overlays driven by personal data and determine their utility.

We conducted three studies to answer these research questions. Study 1 examined how the form of overlays effect people's perceptions when directly messaging someone, such as from Snapchat's friend's list. Study 2 examined the effect of the form of overlays in "Story" features where audiences decide to view, such as Instagram or Snapchat stories. Study 3 compared overlays which followed the guidelines from Studies 1 and 2 against a baseline with no sticker. The studies used similar experiment design, response measurements, and recruitment methods. We therefore first describe methods across all three studies, briefly explaining each study's differences in subsequent sections.

4.1 Experiment Designs

We used a factorial study design to answer our research questions. We selected this study design to enable varying domain, context, and presentation and evaluating its influence on participant perception and preferences. Participants first consented to participate in the study. They then identified one person who they frequently Snap with to imagine as their conversation partner. They then gave feedback on 6-8 Snaps, answering some demographic questions upon completion.

Stickers and scenarios varied in 120 ways, with each study including a subset of dimensions:

- 5 domains: music, steps, calories, duration, heart rate
- 2 background styles: relevant photo, abstract shapes
- 3 presentation styles: plain, embellished, analogy
- 2 relevance levels: domain-relevant, domain-irrelevant
- 2 message formats: direct messages, stories

All stickers showed the same value for a given domain (e.g., "*5,793 steps*", "*11 plays of the Beatles*"). We chose values which felt attainable for most people in their daily lives as to not draw attention to an overly high or low value.

We further sought to control our study for factors which we expected would impact people's perception of Snaps. We aimed to minimize the impact of aesthetic preferences and relatability of Snaps, such as color clash between an overlay and a background or connecting more with an

analogy to horses than to bears. We therefore generated three overlays for each specific style (e.g., three domain-relevant time embellished, Figure 3). We similarly aimed to minimize the impact of relatability to a particular scenario (e.g., an office worker relating more to a Snap about time in meetings), generating three scenarios for each domain. For example, we wrote captions and found appropriate backgrounds for heart rate Snaps about exercising, running to catch a bus, and giving a presentation. Finally, people tend to be more concerned about self-image when sending content and more judgmental when they are receiving it [19,47]. We therefore sought to control for the impact of role, randomly-assigning participants to be either sharers or recipients for the study. For these reasons, we included 24 control variables:

- 2 roles: sharers, recipients
- 3 overlay instantiations of each domain-presentation-relevance combination
- 3 scenarios/captions

The three studies varied different parameters of the sticker design and scenario space (Table 1). We examine variations in sticker presentation in Study 1 (RQ1-2), narrowing presentation focus in Study 2 but evaluating a new message format (RQ2), and compare message formats in Study 3 using well-received sticker presentation parameters (RQ3). All studies included the same control variables.

Study	Independent variables	Message format
Study 1 (RQ1-2)	Domain Domain-relevance Presentation style Background	Direct messages
Study 2 (RQ2)	Domain-relevance Presentation style	Stories
Study 3 (RQ3)	Presentation style (+ "no sticker") Message format	Direct messages & Stories

Table 1. The three studies explored different aspects of the overlay design space, together answering our research questions.

To avoid causing confusion by frequently switching study contexts, each participant kept one randomly-assigned domain (in Study 1 only) and role for each of the Snaps (i.e., between subjects). Specific overlay instantiations were randomly assigned per-sticker. Participants saw each independent variable (background style, presentation style, relevance level) and control variable (scenarios/captions) an equal number of times, randomly ordered (i.e., within subjects). The supplemental materials include all stickers, scenarios, and backgrounds used in the studies.

4.2 Response Measurements

We use a mix of quantitative and qualitative measures to understand participant opinions on each scenario. Participants rated each scenario on two questions from each of four widely-used scales from online marketing and advertising literature, modified to our domain. Participants also described how they would feel about sending or receiving that snap in an open-ended field. The validated scales measured (1) how *entertaining* the shared content is (e.g., "*I would find this Snap fun to send*") [68], (2) *attitude* toward the content (e.g., "*I would feel good about receiving this Snap*") [34], and (3) inclination to *use* the feature (e.g., "*I might send this Snap*") [34]. For last scale, (4) sharers rated how *invasive* they would find sharing that content (e.g., "*The value I would gain from sending this Snap is worth the information I would give away*") [67], while recipients rated how *informative* they found the content (e.g., "*I would learn a lot about my close friend or family member from this Snap*") [34]. We tailored questions to the message format in

each study (e.g., Study 2 questions used "*Snap Story*" versus "*Snap*"). Participants answered each question on a 7-item Likert scale with endpoints "Strongly Disagree" and "Strongly Agree".

4.3 Recruitment Methods

We recruited study participants from Amazon Mechanical Turk. To help ensure response quality and limit spam, we restricted participation to workers with at least 95% HIT acceptance rate and 1,000 completed HITs. We paid participants $2.00 for completing the survey, which took about 10 minutes to complete. We recruited different participants for each of the studies.
We required participants to be at least 18 years old, have a Snapchat account, and average sending or receiving at least one Snap per week. We decided to recruit on Snapchat use specifically because all content on the platform is currently ephemeral, versus other platforms where participants may make less frequent use of ephemeral features or might confuse them with the traditional feeds. It also kept the eligible study population consistent across the three studies.

We recruited 333 respondents for Study 1. We removed 13 participant responses whose self-reported demographics suggested no prior Snapchat use (e.g., 0 weekly Snaps or a fractional Snapchat score), 16 participants who gave every question the same rating on two or more scales, and 41 participants where open-ended responses were nonsensical or unrelated (e.g., "*reading about the survey page*", "*this fell is good and nice*") or were identical across many Snaps. We therefore analyzed responses from 263 participants. We recruited 160 participants for Study 2, removing 2 based on demographic responses, 14 for redundant scales, and 21 for unrelated or redundant text. We therefore analyzed 123 responses. We recruited 150 participants for Study 3, removing 9 based on demographic responses, 9 for scales, and 12 for text, analyzing 120 responses. Table 2 summarizes participant demographics for all three studies. Participants imagined sending Snaps to or receiving Snaps from close friends, family members, or partners. We were

Demographic	Study 1 (263 people)	Study 2 (123 people)	Study 3 (120 people)
Gender	98 female 162 male 2 non-binary 1 no response	47 female 75 male 1 non-binary	54 female 65 male 1 non-binary
Age	Average 32.0 Min 19 Max 75	Average 31.6 Min 18 Max 59	Average 32.9 Min 19 Max 56
How many months used Snapchat	Average 25.4 Min 1 Max 90	Average 24.5 Min 1 Max 72	Average 29.4 Min 1 Max 90
Average number of Snaps sent/received per week	Average 33.8 Min 1 Max 350	Average 46.0 Min 1 Max 1,000	Average 47.7 Min 2 Max 1,000
Snapchat score	Average 12,127 Median 2,332 Min 5 Max 312,784	Average 15,591 Median 2,233 Min 1 Max 474,102	Average 18,024 Median 4,212 Min 3 Max 157,505
Number of Snapchat friends	Average 10.8 Median 5 Min 1 Max 325	Average 13.4 Median 4 Min 1 Max 500	Average 21.1 Median 5 Min 1 Max 1000
Imagined sharer or recipient in study	42 partner 57 family 79 close friend 58 other friend 27 other/unsure	24 partner 17 family 36 close friend 28 other friend 18 other/unsure	15 partner 27 family 39 close friend 21 other friend 18 other/unsure

Table 2. We surveyed 513 Snapchat users recruited from Amazon Mechanical Turk across three studies.

occasionally unsure of the relationship when participants gave names (e.g., "*Mike*", "*Corrine*").

4.4 Analysis

We used mixed-effect ordinal logistic models in analysis, treating the Likert data as an ordinal response and taking the median response among the two questions for each scale. We opted for an ordinal response to allow for differences in intervals between successive values, but in testing found few differing significant results between ordinal and linear response models. We treated participant id as a random effect to help account for individual differences in use of or thoughts on Snapchat. We treated each of the varied parameters in our factorial study design as fixed effects. We included interaction effects between domain, presentation, and relevance, as the interaction of these factors varied the actual image of the overlays varied. For example, a domain-relevant badge might be a heart for the heart domain, but a clock for the time domain. Similarly, we presented that same clock as an embellished sticker (Figure 3). We also included a term for how many Snaps they had seen prior. We corrected for multiple comparisons in post-hoc tests used with Tukey corrections in pairwise tests and false discovery rate corrections in family-wise tests. We display confidence intervals for each response, and all displayed confidence intervals represent differences in ratings on a 7-point Likert scale.

We removed control terms in each study which had no significant effect for any of the scales to produce simpler models. The overlay instantiation had no measurable effect on any of the scales in any of the studies ($p>0.05$). The specific scenario and caption tended to impact participant opinions in Studies 1 and 3 (e.g., $p<0.001$ for inclination to use and attitude towards the content), but not in Study 2 ($p>0.05$ for all scales), suggesting that adding tracked data may be more applicable to some scenarios than others. In Studies 1 and 3, participants assigned to the recipient role were more likely to respond to a Snap more than participants assigned to the sharer role were to share (Z=3.24, $p<0.01$, 95% CI 0.28-1.12 higher; similar effect size in Study 3). This aligns with prior findings that people fear oversharing to their audiences [45,47]. In each study, participant's attitude toward the shared content lowered slightly as they saw more Snaps (in Study 1, Z=-3.00, $p<0.01$, 95% CI 0.03-0.13 lower per Snap seen; similar effect sizes in the other studies), suggesting fatigue when receiving many Snaps with shared data similar to on other platforms [19].

To analyze participant's open-ended responses to seeing each Snap, we used the quantitative results to help develop our codebook for deductive coding. We developed 12 codes for the first study, 17 for the second, 7 for the third (36 total). Codes included participants finding the sticker relatable, appreciating the presence of a background photo, and expressing a privacy concern with sending the Snap. Two researchers coded a random 10% of the open-ended responses for each study, finding agreement on most codes (κ 0.26-1, with 35/36 above 0.5 and 28/36 above 0.8) and resolving disagreements though discussion. One of the researchers then coded the remaining responses. We labeled at least one code in about half of participant responses: 49% in Study 1, 53% in Study 2, 42% in Study 3.

4.5 Limitations

By recruiting on Mechanical Turk, our participant demographics differed from platforms with ephemeral features such as Snapchat, Instagram Stories, and Facebook Stories. Relative to Snapchat and Instagram as a whole, our participants skewed male and older [49,62]. Although our participant's age distribution were closer to Facebook's demographics (e.g., high rates of use

for people around and over 30) [49], reports suggest younger people tend to create and view stories more often [55]. Participants' Snapchat score was also somewhat lower than past studies [27].

We are unsure whether these demographic differences impacted our participant's perceptions positively or negatively. Our participants' lower frequency of use may have made them less amenable to the playful nature of adding stickers to Snaps (e.g., s47, "*thankfully I have no friends that send snaps like the ones viewed in this study*"). However, the older demographic may have more purpose-driven uses of the platform where additional data from the sharer could be helpful (e.g., p97, "*I learned about [Snapchat] through my sons so they use it a lot more than I do but I use it to keep in touch with them.*"). Further work should particularly examine sticker opinions of minors, who comprise much of Snapchat's demographic [62].

Although most participants focused their feedback on the design of the overlays, some did not resonate with the content they were asked to imagine sharing or receiving. For example, participants pointed out when the data in the Snaps sounded unlike them when sharing, "*I would feel like a poser because I do not listen to the Beatles*" (p179) or unlike their social connection when receiving, "*My sister is not into Thai food. There is more to this snap taking place*" (p68).

We did not ask participants whether they had previously tracked or shared data. Some participants felt that sharing tracked data on social media did not align with their goals or ideals, aligning with prior work [19,37]. For example, some participants mentioned that they would not track the metric, "*I would not share it. I don't care about calories*" (p92) or that they would not present themselves online in that way, "*I don't like to show anxiety in my Snaps so I would feel embarrassed*" (p67). However, most participants gave feedback on the design of the overlays, suggesting most were able to imagine what it would be like to share or receive posts with self-tracked data. Deploying a fully realized system with people interested in collecting and sharing data about themselves could help answer whether including data in ephemeral posts supports people's sharing goals and how their friends and family feel about receiving them.

People often record and send videos as backgrounds on ephemeral social media in addition to static photos. Stickers are also often animated. As a first examination of people's perceptions of data-driven stickers, we opted to study only static background photos or patterns and static stickers.

5 Study 1 Results: Direct Messages

We focus on how the four dimensions impacted participant perspectives, quoting participant responses with pXX.

5.1 Presentation Style

Across domains, participants rated analogies more informative than plain or embellished stickers (Z=3.19, p<0.01 95% CI 0.06-0.44 higher). Participants appreciated the information, insight, and fun which analogy stickers provided. 11 participants liked how analogies helped them contextualize the amount, including p66: "*the information in the sticker is really interesting; really puts that distance in perspective*". p114 and 5 other participants learned something from the comparison: "*I also just learned that an average NFL game is 3 hours and 12 minutes long, so I learned a fact at the same time.*" 11 participants mentioned finding the comparison fun, even when unrelated "*I like how it gives a random item as a comparison. It could lead to some funny snaps*" (p100). However,

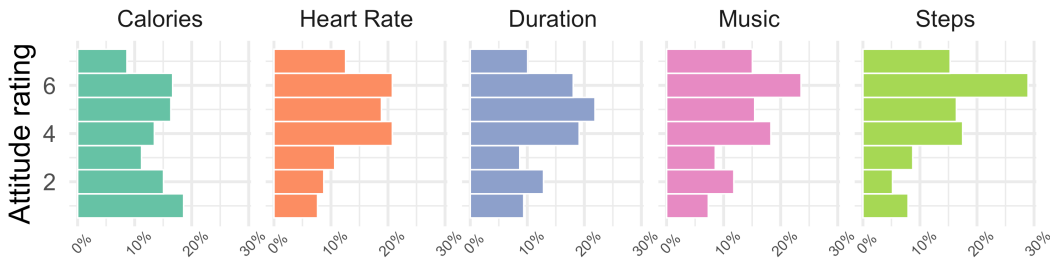


Figure 4. Participants had the highest impression of Snaps of step content and the lowest of Snaps showing calories.

5 participants mentioned that analogy stickers as felt too verbose or complex for Snapchat, such as p128: "*it's a little busy and the sticker is kinda small and hard to read.*"

Comparatively, participants felt badge and embellished stickers were less interesting. 50 and 40 participants used phrases like "*a little boring and generic*" (p71) or "*pretty bland*" (p44), to describe badge and embellished stickers, versus 16 participants for analogy stickers. However, participants found badge and embellished stickers useful for demonstrating progress "*the sticker itself is honestly very motivating because of the way that it displays progress*" (p121, 10 had a similar sentiment) and easy to interpret "*I like the design of this snap because it is not only easy to read but the sticker relate to the beats per minute of the heart. It gets the point across.*" (p111, 5 others agreed).

5.2 Domain

Participants rated adding step data to Snaps slightly higher than other domains, rating their attitude towards the content more highly (Z=2.54, p<0.05 95% CI 0.01-1.00 higher; Figure 4) and rating the content marginally more entertaining (Z=2.47, p=0.07). Participants appreciated how steps would help them share accomplishments. 3 participants in the audience role would "*cheer them on*" (p258), and 3 found the content motivational for themselves "*I need to get out and hike*" (p256). 4 participants appreciated how the self-tracked data could help a person present their goals, such as p66: "*Looks like they're going for 10 thousand steps.*"

Participants particularly rated analogies to step data more entertaining (Z=3.95, p<0.001 95% CI 0.21-0.85 higher) with a higher intention to use (Z=2.68, p<0.05, 95% CI 0.04-0.68 higher) and marginally higher attitude towards the content (Z=2.16, p=0.09) than the other presentation styles. p248 felt analogies were particularly well-suited to sharing their accomplishments: "*I like that my steps are compared to the Empire State building, it really shows that I have motivation.*"
Participants rated Snaps with calorie data worse than other domains, feeling less likely to want to send or receive those Snaps (Z=-2.99, p<0.05, 95% CI 0.09-1.20 lower), having lower attitude towards the content (Z=-3.60, p<0.01, 95% CI 0.21-1.29 lower; Figure 4), and finding the Snaps marginally less entertaining (Z=2.09, p=0.09, 95% CI 0.10 higher-0.94 lower). 10 participants felt including the calories detracted from the enjoyment of sharing or receiving food photos, such as p34: "*no reason to focus on calories when there's good food like that in front of me*" and p125 "*I would focus on the food and where they are, rather than the sticker.*" Participants also felt sharing calories was more invasive than other domains (Z=3.24, p<0.01, 95% CI 0.22-1.98 higher). p107 was "*worried that it could come across as shaming other's food choices*" (7 others expressed a similar sentiment).

Although participants primarily appreciated when data could be used to explain an accomplishment, a few participants valued how heart rate, duration, or music could be used to make content more relatable. p71 stated, "*it's very relatable in the aspect about giving a speech in front of a crowd. [The sticker] gives more tangibility to the senders current state of emotion*" (9 others expressed a similar sentiment). 4 participants commented on how the data in these domains was helpful for self-presentation, including p204 "*I'd feel proud of my music tastes and happy to share.*"

5.3 Domain-Relevance

We found no significant differences in how participants rated the domain-relevance of stickers (p>0.05 for all scales). On seeing both styles, participants generally appreciated the relatability of domain-relevant stickers. Of a domain-relevant sticker, p111 said "*the sticker relates to the beats per minute of the heart. It gets the point across*" (8 others expressed a similar sentiment). 21 participants similarly found the domain-irrelevant stickers distracting "*I would kind of question why the beaker is relevant because it doesn't seem to relate to exercise or physical activity*" (p41) or confusing "*I don't think it makes much sense? Why does it say 1 play per pound of an octopus?*" (p150).

Some participants appreciated the playfulness of the domain-irrelevant stickers. 6 participants found domain-irrelevant analogies fun, such as p270: "*this is a funny and rather amusing snap. The fact that it uses such an absurd comparison is appealing to me.*" Domain-irrelevant embellished stickers felt atypical to participants: "*I really like the beaker filled with some liquid. It looks very cool and out of the ordinary. I would definitely consider using this sticker*" (p134, 4 others agreed), while the icons made badge stickers feel celebratory "*showing my friends that I am feeling positive about the intense workload by sending a shiny star makes their days go by faster.*" (p192, 9 others agreed).

5.4 Background

Participants rated Snaps with relevant background photos higher than Snaps with abstract shapes on all scales, finding them more entertaining (Z=13.39, p<0.001, 95% CI 1.08-1.45 higher) and informative (Z=577.18, p<0.001, 95% CI 1.36-1.37 higher) with a higher attitude towards the content (Z=13.42, p<0.001, 95% CI 1.09-1.46 higher) and higher intention to use (Z=12.94, p<0.001, 95% CI 1.05-1.43 higher, Figure 5). 35 participants appreciated the background photo when it was included, and 47 participants mentioned disliking the absence of a background photo. 23 participants felt the Snaps were not as interesting when photos were not included, such as p23: "*boring. Why is this one so boring. If there's food involved show it off and let me see it. Otherwise keep it to yourself.*" p106 suggested that she would use a different platform for

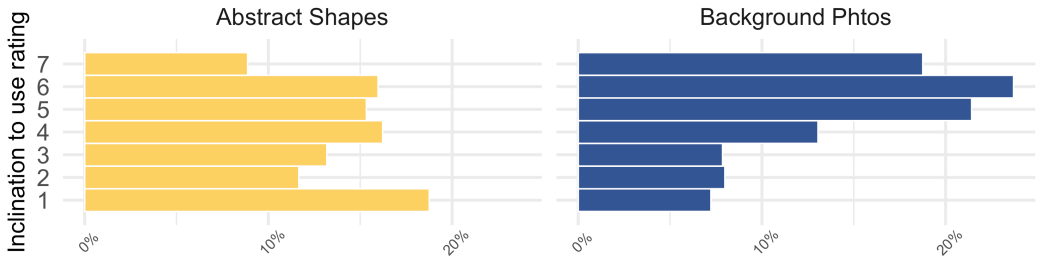


Figure 5. Participants felt they would be less likely to send or receive Snaps with abstract backgrounds than those with photos.

sharing content without photos: "*I wouldn't send this one. I like to use stickers in my snaps, but I'd just send a text if I wasn't going to take a photo.*" p9 and 4 other participants felt the background provided necessary proof: "*I think it is odd to not even have a picture of anything in the snap. I would think people may not believe me.*"

Sharers also rated Snaps over relevant background photos as more worth the invasion of privacy than Snaps over abstract shapes (Z=-6.07, p<0.001, 95% CI 0.57-1.12 higher). We suspect participants felt the utility of including a background photo outweighed potential risks. 22 participants discussed the data domain's invasiveness, but none indicated the presence of a photo increased (or decreased) the concern.

6 Study 2 Results: "Story" Features

Participant responses in Study 1 emphasized the importance of including relevant background photos and the need to avoid sensitive domains in direct message Snaps. We therefore selected one domain (steps) and one background (relevant background photos) to examine story features and further evaluate sticker design parameters. We used the same presentation styles (plain, analogy, and embellished) and domain-relevance levels (relevant and irrelevant). The factorial design in Study 2 therefore only had these 6 experimental dimensions (3 presentation styles x 2 relevance levels). Participants saw one Snap of each dimension.

Participants rated 6 stories according to the same scales used in the first study. We drew inspiration from how Instagram presents stories, presenting each image for 5 seconds before transitioning to the next. Our stories consisted of three different photos showing increasing step counts over the course of two hours (Figure 6). Because we wanted to evaluate participants' reaction to the sticker, we kept the sticker's presentation style constant across the three images while varying the amount and any sticker-specific information (e.g., progress on the embellished stickers or the specific numeric analogy). In practice, people may vary stickers according to what best fits with their circumstances.

Figure 6. In our study of story features, we varied stickers to show how a person's steps progressed over a two-hour walk.

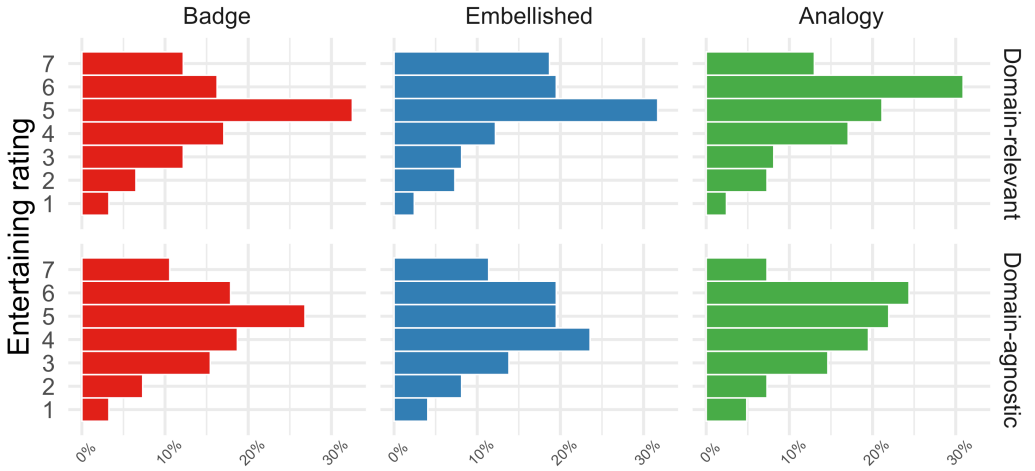


Figure 7. Participants found domain-relevant story Snaps more entertaining than domain-irrelevant ones.

Figure 7 shows participant entertaining ratings across the 6 experimental dimensions. We quote participants with sXX.

6.1 Presentation Style

We found no significant differences in how participants rated the three presentation styles (p>0.05 for all scales). 32 participants described similar relatability benefits to analogy overlays as Study 1 participants did, including s114: "*This is the best one so far. I like that the stickers give you something to compare to what the steps represent*". However, some participants felt badge and embellished stickers were better suited to demonstrating how their step count had progressed over the course of the Snaps in the story. Of an embellished sticker, s37 stated, "*I actually kind of like seeing the progression on the sticker and I feel good for my friend*" (25 other participants expressed a similar sentiment). s91 felt the bolder, less verbose stickers were a better fit for the divided attention people often give to stories "*this one is better. At least the sticker is less cluttered and the number of steps is made obvious*" (9 other participants expressed a similar sentiment). 3 participants felt analogy stickers were too hard to parse, such as s37 "*I still think it requires more thinking than should be needed for a few seconds.*"

6.2 Domain-Relevance

Participants rated domain-relevant story Snaps more entertaining (Z=2.89, p<0.01 95% CI 0.22-1.13 higher) with a higher attitude (Z=2.13, p<0.05 95% CI 0.04-0.95 higher) and higher intention to use (Z=2.38, p<0.05, 95% CI 0.10-1.01 higher) than domain-irrelevant Snaps. We found no significant interaction effects between domain-relevance and presentation style (p>0.05 on all scales).

While Study 1 participants sometimes viewed domain-irrelevant stickers as playful, the repeated exposure in stories led Study 2 participants to grow tired of the playful elements. s86 said, "*I don't really like this sticker. It's a temperature gage which has nothing to do with my progress*" (24 participants described a similar sentiment). 7 participants compared how relevant the different types of stickers felt. s93 stated, "*I don't really see the correlation between a thermometer and the amount of progress I've made towards a step count goal. The previous stickers used (the shoe, or even the star) made more sense to me. Using a thermometer is a bit reaching.*"

7 Study 3 Results: Overall Interest in Stickers

We sought to evaluate whether Snaps with overlays driven by personal informatics data provided context and entertainment over Snaps without them, comparing the overlays participants found most entertaining and useful in Studies 1 and 2 against a baseline of Snaps without stickers. Prior work has suggested that many people feel sharing tracked data in social media posts can feel impersonal and elicit less response [19,37], so we chose a baseline of no stickers to evaluate whether our best-received stickers provide enough value to be worth incorporating into future systems. If participants find value in stickers, further work could compare whether the visual medium of stickers add additional benefit over text descriptions of the same content.

All stickers were domain-relevant step overlays with a relevant background photo. We opted to include all presentation styles (analogy, embellished, and badge) as Studies 1 and 2 suggested that use case could influence style utility. Study 3 participants therefore saw 8 Snaps: 4 presentation styles (badge, embellished, analogy, no sticker) x 2 message formats (direct message, story). We quote participants with cXX.

7.1 Presentation Style

Participants tended to think sending or receiving data-driven stickers in Snaps would be valuable. Participants found Snaps which contained a sticker to be more informative (Z=3.70, p<0.001, 95% CI 0.06-0.57 higher) and entertaining (Z=3.11, p<0.001, 95% CI 0.07-0.56 higher, Figure 8) than those without. On seeing a Snap without a sticker, 6 participants explicitly commented that they wished they had the context. c68 said, "*I prefer the snaps that show the persons step count. they are informative and cooler to see than just a bunch of random pictures*", and c1 agreed, adding "*this seems very boring now without the sticker!*" 5 participants mentioned preferring Snaps without stickers. c49 said: "*I love this one without the distracting foot >_>*", while c35 felt that the sticker was "*cute but I'd rather focus on hiking*". 38 participants described Snaps sent without a sticker as boring or uninteresting, including c115 "*This just feels boring and might as well be a Facebook post.*" Comparatively, 20 participants described a Snap with a sticker as boring.

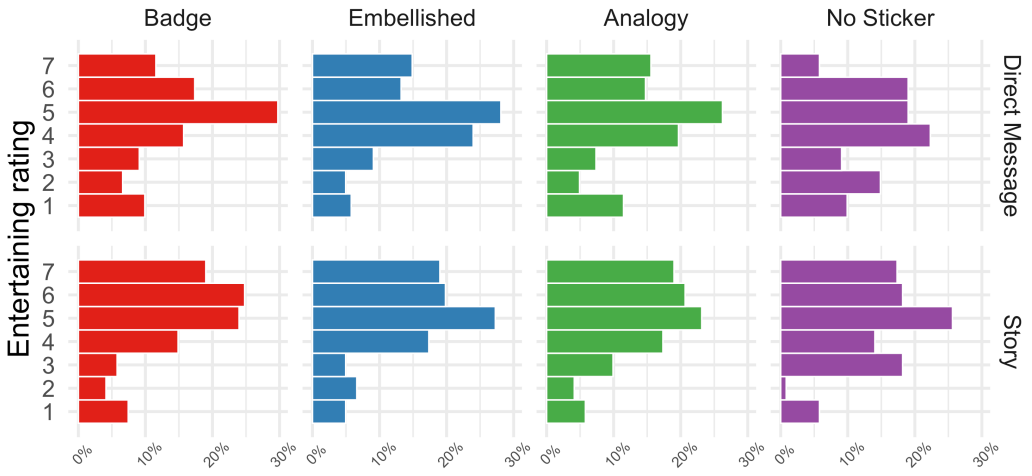


Figure 8. Participants found Snaps with stickers more entertaining than Snaps without and preferred stories over direct messages.

Although participants found Snaps containing stickers interesting, we did not observe an impact of the presence of a sticker on participant's attitude towards the content (p>0.05) or willingness to send or respond to it (p>0.05). Photos and captions tended to capture attention. 56 participants commented on the Snap's scenery without mentioning the tracked data. For example, when responding to the story in Figure 6, c59 commented "*love the lake picture and the picture of your new friends! Did you give them any names?*"

Other participants felt that including activity detracted from the quality of the Snap. 13 participants felt that the inclusion of a sticker drew too much attention to their activity, such as c50: "*I would feel like I'm too proud of my fitness activity. The sticker looks like it is trying too hard to brag about the distance I've traveled.*" c25 agreed, adding that the sticker detracted from the attractiveness of the photos he was sharing: "*I would be more inclined to send the snap to show the trail and the beauty of nature. I would not put a bunch of stickers bragging about how many steps I took.*"

We observed no significant difference in preference among the three sticker types (p>0.05 for all scales), similar to in Studies 1 and 2. Participants expressed similarly varied presentation style preferences as in the other studies. 8 participants appreciated the simplicity of badge stickers, such as c1, "*Yeah, I like the simple stickers much better,*" but 20 found them plain: "*I dont really like the foot sticker, not that interesting*" (c116). 13 participants appreciated how the embellished stickers demonstrated progress towards a goal, such as c45 "*I like that this sticker tracks my step progress so it would be a fun way to be held accountable for walking more.*", but 3 participants found the indication of a goal off-putting "*the running shoe is cute, but I don't really like how it measures how close to a goal I am*" (c42). 16 participants felt analogy stickers helped them contextualize the distance walked: "*yeah, this little golden gate bridge one is pretty cool! It kind of puts things into perspective, you know?*" (c102), while 7 found them distracting, such as c27: "*It's a very interesting sticker with a comparison of my steps to the golden gate bridge, but I think that it distracts from my actual step count, so I don't think I'd use it.*"

7.2 Message Format

Participants were more inclined to send or respond to Snaps sent via stories than direct messages, rating them more entertaining (Z=5.81, p<0.001, 95% CI 0.45-0.91 higher, Figure 8), with a more positive attitude towards the content (Z=3.58, p<0.001, 95% CI 0.19-0.65 higher), and more likely to use it (Z=4.42, p<0.001, 95% CI 0.29-0.75 higher). When stickers were not present, participants liked seeing and sharing a day's activities (e.g., "*I really like that it is a progression of pictures of their time and that would make me feel good… I would want to know where they are.*" c120, 15 others expressed a similar sentiment). When a sticker was shown, 13 participants appreciated seeing how step activity progressed over the story, including p104: "*this would make it exciting to send updates and continue walking just to see the difference.*"

We observed no significant interaction effects between presentation style and message format (p>0.05 for all scales), meaning we observed no difference in whether some stickers were more or less applicable to direct messages or stories. Although embellished stickers showed progress between Snaps, people felt plain and analogy stickers also effectively showed how a person's activity had changed. c104 said, "*I like how it compares to the Empire State Building so this would make it exciting to send updates and continue walking just to see the difference. This one is so far the best and most exciting one*" (13 others expressed a similar sentiment).

8 Discussion

Our studies suggest the potential for ephemeral social media to ameliorate some of the challenges people face when sharing personal informatics data. Although overlays did not impact participant's attitude towards shared content or willingness to share or respond to it, they found Snaps which included overlays more informative and more entertaining. Table 3 summarizes our findings with regards to our research questions.

Research Question	Main Takeaway
RQ1: impact of an overlay's domain and context	Participants found domains most useful when they helped demonstrate progress toward a goal or improved relatability. Sensitive domains can detract from the photo being sent. Participants regarded Snaps where the data is the main shared content as boring. Putting data in sticker-like overlays can be effective.
RQ2: impact of an overlay's presentation style	Domain-relevant Snaps facilitate more interest and engagement, but domain-irrelevant Snaps can still add benefit and be entertaining. Analogies are effective for interpreting progress, while embellishments and badges are useful for celebrating accomplishments. Platforms should likely support a combination.
RQ3: whether well-regarded overlays are beneficial	Data-driven stickers can add information and entertainment, but tend not to influence people's decision to share or respond. Further work could compare whether data-driven stickers add additional benefit over text descriptions of the same data.

Table 3. Takeaways from our three studies.

Participants particularly appreciated when the data domain allowed the sharer to demonstrate progress towards a goal, such as exercise throughout the day. This can be particularly effective in stories, where repeated stickers could show progress over time. Others appreciated how certain data domains made information more relatable or present a certain image of themselves. However, as echoed in prior work, the inclusion of data can be unwelcome in some sensitive domains like calories for food [16] or can come across as bragging about an accomplishment, such as in physical activity [19].

Our findings suggest that overlays are better-received when their visuals are relevant to the domain being shared and when they are used in conjunction with relevant background photos. Practically, a tool may be unable to develop domain-specific overlays which align with the plethora of domains people track about themselves which could add valuable context. Domain-irrelevant overlays such as stars or ribbons, or even odd but fun comparisons such as comparing the number to a weight, may still help a person add context in new domains. However, our findings align with prior work on non-ephemeral platforms indicating that people tend not to find sharing tracked data interesting on its own [19,37,45]. Instead, we recommend that designers leverage stickers to add context to the photos and videos people already share.

With regards to presentation style, participants' preferences varied on message format, use case, and personal aesthetic. Although many participants appreciated how analogies helped them make sense of the data, others found them overly wordy or distracting. While some participants found embellished and badge stickers too simple, others appreciated how they could be used to celebrate high amounts or goal achievement. We expect people would prefer platforms support a mix of presentation styles, allowing them to select one which aligns with their situation and preferences. Participants' attitude fatigued from seeing so many Snaps with self-tracked data displayed in similar ways. We expect variety is crucial, as is continuing to make including overlays optional.

8.1 Future Opportunities

Prior work has demonstrated the benefit of personalizing analogies for measurements, such as contextualizing a distance for a Chicago-native as "*about 5x the distance between you and*

Wrigley Field" [33]. Audience-specific overlays could lead to interpretable and interesting contextualization of data. For example, shared duration analogies could be contextualized as the time it would take to drive or walk to a nearby landmark, with audience members receiving different analogies based on their location. If an audience member collects similar data themselves, analogies could also provide comparisons (e.g., "*1.3x your current heart rate*", "*3x more that you've listened to Lizzo this week*").

Animation can be a useful way of drawing attention to trends in visualized data [23]. We imagine animated stickers could be a useful tool for demonstrating progress across Snaps shared in a story. For example, embellishments could animate from the previously-shared value to the current value as a person takes additional steps or listens to an artist more times. Animated stickers in direct messages could also drive interest in one-off direct messages, such as a stopwatch ticking up to an amount when sharing duration.

Prior work on sharing of personal informatics data examines messages where the data is the focus of what is being shared (e.g., "*Just wanted to share my heart rate with you, it is currently at 91 bpm*" [37], "*journaled 45 minutes of elliptical*" [45]). Using self-tracked data to supplement the photos people already want to share backgrounds the data slightly. We suspect this approach is still sufficient for the self-presentation and celebration goals people have when sharing tracked data [25,31,56].

Although people tend to add stickers or data-driven filters on ephemeral social media, many archival platforms also include annotation features for images and video. On archival platforms, data-driven stickers could further be used to preserve some history between successive posts, such as the amount of time spent working on a long-term project or the amount of progress towards a weight loss goal. However, prior work suggests that tensions would emerge around whether audiences are too broad to value the accomplishments [19,47]. Future work could experimentally evaluate what platforms people feel self-tracked data is best suited for.

How to support people in authoring data-driven stickers poses important design challenges. People desire the ability to flexibly represent their data [4,22], so we expect people will appreciate tools which enable them to choose from a wide array of available stickers. People may appreciate systems which allow them to choose sticker background colors or fonts which best align with how they want to use the medium to present themselves or best match the other content they are sharing [2]. Systems could also allow people to manipulate what fields data is encoded into, drawing inspiration from prior systems [32]. For example, a sticker could animate its size relative to numeric data, starting and ending small for a low step count or animating form small to large for a high one.

The principles in this paper offer initial guidelines towards integrating stickers driven by personal informatics data into ephemeral platforms. We expect testing these sticker styles with participants on an ephemeral platform would lead to useful findings on what data-sharing goals are well-served by ephemeral social media and what are better-served for other platforms.

9 CONCLUSION

We contribute design recommendations for sharing personal informatics data via overlays on ephemeral social media, demonstrating that these overlays are entertaining and informative. The badge, embellished, and analogy stickers we designed can each offer value when explaining moments or celebrating them, though preference depends on circumstance and aesthetics. When possible, the design of overlays should reflect the domain being shared and allow the sharer to use their own photo as a background. Integrating these stickers into ephemeral

platforms and evaluating them could lead to useful insights about when people find it most useful to include personal informatics data in posts to ephemeral social media.

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