



Are emoji valid indicators of in-the-moment mood?

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ABSTRACT

Despite widespread assumptions that emoji represent emotions, research findings show that we do not process emoji in a way which we would expect for emotional stimuli. As such, we might be better placed to consider them more in line with mood states rather than emotion concepts. This formed the basis for the current study in which we collected in-the-moment mood assessments ($N = 682$) using an Emoji mood scale (Emoji PANAS) to establish whether emoji might be a valid way to measure current mood. This emoji scale replicated items from standardised psychometric mood scales (Panass; Watson et al., 1988), but asked participants to report the degree to which emoji rather than words represented their current affective state. We also took measures of the Big-5-personality traits (Goldberg et al., 2006). When exploring relationships between reports of in-vivo mood based on items from the PANAS with the respective emoji on our Emoji PANAS scale, these corresponded significantly for all mood states. This suggests that mood is reported in an equivalent way irrespective of whether this is responding to word items or the respective emoji items to represent these affective states. However, when exploring these relationships for sub-samples based on participant dominant personality trait, we found some differential patterns. Namely, for those high in emotional stability and extraversion, there were few significant correlations between the items from two mood scales, indicating that emoji may not always be a useful or reliable means for reporting in-the-moment mood when disaggregating by certain personality traits which consist strong dimensions of emotionality.

Despite widespread assumptions that emoji represent emotions, existing research suggests that emoji may not be best considered to represent emotion, given that we do not seem to process these in the way we would expect for emotional stimuli (Kaye et al., 2021, 2023). That is, stimuli such as words or images which are emotional (i.e. depict emotion) or emotionally-valenced (i.e. emotion-laden or connoted) are expected to be processed more efficiently than neutral stimuli. The principle behind this relates to the fact that emotion has been found to influence cognitive functions such as decision-making (Ito et al., 1998). This has indeed been observed in research which has studied emotion words or emotion-laden words. Namely, processing advantages (e.g., quicker reaction times) are found for positive or negative words over neutral ones (Ponari et al., 2015; Vinson et al., 2014). However, studies which have tested these effects for emoji which vary from being positive or negative to neutral have not replicated these effects (Kaye et al., 2021, 2023). As such, the emerging evidence is suggestive that we do not associatively link emoji to emotion concepts such as happiness or sadness. This raises the question about whether emoji are best

considered to represent emotion, or whether they may instead be better considered as depictions or representations of mood state. This might be especially relevant in the context that emoji use and interpretation is highly diverse and idiosyncratic (see Bai et al., 2019), suggesting that the human experience afforded to them is not quite as uniform or universal as would be expected for constructs such as emotion.

Emotion and mood are well established as being inter-related but distinct concepts which fall under the broader concept of affect (Batson et al., 1992; Beedie, Terry, & Lane, 2005; Ketai, 1975). Typically, emotion refers to a reaction to a specific stimulus or event which may prompt particular action tendencies (e.g., engagement or avoidance of the target). Outputs of emotion may include a feeling, change in behaviour, facial expression, or impact on the nervous system (Barrett, 2006). However, mood is not usually specific to a target stimulus or event and instead tends to be lower intensity and more enduring (Kumar, 1997). Given that the academic literature on emoji has largely conceptualised these as emotional/emotion-depicting, methodological approaches have typically included response measurements such as

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implicit and explicit valence evaluation of emoji stimuli via lexical decision and spatial stroop tasks (Kaye et al., 2021, 2022) or measuring attentional vigilance to (negative) emoji via dot probe tasks (Wong et al., 2021). However, conceptualising emoji to depict or represent mood states perhaps requires a different methodological approach. That is, unlike emotion which concerns reactions to a specific stimulus to undertake emotional categorisation, measuring mood entails corresponding an assessment of one's own affective state to consider the extent to which the stimuli is representative of this experience. This may be considered in respect of the current time or based on one's average state over a recent time period (e.g., within the last few days, last week etc). As such, this can draw on bottom-up processing through asking participants to analyse features of their current state to report in the form of mood assessments which is somewhat distinct from undertaking emotional categorisation pertaining to a given stimulus. In this way, we might be primarily interested in people's perceptions of how the symbolism afforded these emoji relates to their affective experience(s), rather than forming an objective "truth" that a given emoji should be semantically labelled as a given state.

This formed the basis for the current study which sought to explore the extent to which Unicode emoji can be used as a valid measure of current mood to capture dimensions of positive and negative affect. Essentially, we seek to understand whether emoji can be used as a quick and valid measure of gathering data about mood state. The study of positive and negative affect has been operationalised through the use of measures such as the "Positive and Negative Affect Schedule" (PANAS; Watson et al., 1988), later renamed to the "Positive and Negative Activation Schedule" (Watson et al., 1999). This conceptualises positive affect to include states of activation and enthusiasm, and negative affect with states of deactivation and sadness. The PANAS has been found to have good validity as a measure of these affective dimensions, in addition to being able to measure these states "in-the-moment", as well as over longer temporal durations (Watson et al., 1988).

One of the challenges when asking people to categorise or rate degree of emotion or affective feeling is that may be guided by the lexicon afforded to describing these experiences (Barrett, 2006). That is, language influences our conceptual understanding of how we categorise emotions or affective states and as such, these linguistic labels may serve as top-down factors during processing of sensory or affective information (Gentner & Goldin-Meadows, 2003). As such, when responding to typical mood scales which include information about affective experiences in the form of linguistic concepts, it may be that we are evaluating affective state not only based on the bottom-up sensory or affective information to hand, but also from retrieving prior conceptual knowledge afforded to these concepts from long-term memory. Thus, we may not be accessing a pure evaluation of one's current affective state, but instead be capturing some degree of contamination from pre-existing conceptual knowledge which is attached to these linguistic labels. Therefore, affective scales which are less reliant on lexicon may be useful here to reduce this confound.

To address this, we explored the extent to which selected Unicode emoji might be useful substitutes to linguistic labels of affect. Specifically, we developed an affective state scale using emoji which aligned to each of the items on the PANAS relating to positive and negative affective dimensions. Within this, we explored the extent to which participants' intensity of current mood converged between in-vivo reports from the PANAS and Emoji PANAS. As such, as asked the following research question (RQ):

RQ1- When reporting on mood state "in-the-moment", to what extent is there correspondence in reports between each of the PANAS items and the respective emoji items on the Emoji PANAS?

Whilst there are many examples in the academic literature which use emoji on response scales to assess emotional associations such as to food (Jaegar et al., 2017, 2018; Vidal et al., 2016), no research to date has used emoji as the stimuli items themselves from which people report intensity of affective state. This might help capture more spontaneous,

bottom-up reactions, and help overcome issues which otherwise might arise when verbally "labelling" one's affective reactions (Jaegar et al., 2017).

However, when exploring affective experiences, it is important to recognise that there may be individual variations here. Namely, that affective dimensions may align with corresponding trait dimensions of emotionality. This has been discussed in respect of dominant personality traits such as those within the five-factor model of personality or the Big-5 (Costa & McCrae, 1992; Goldberg, 1993; McCrae & Costa, 1987). Namely, positive affect disposition may relate to dominant personality traits of extraversion (Shiota et al., 2006), and negative affect with neuroticism (Tellegen, 1985; Watson & Clark, 1984). However, some scholars note that these relationships are not likely to be linear, and may be more complex and differentiated in nature (Shiota et al., 2006). Specifically, there may be different reward orientations or responses within different contexts which might operate differently for different affective states. For example, the positive state of contentment implies fulfilment of seeking rewards whereas rewards from states such as awe or compassion are more distal and so likely to relate to dispositional positive affect differentially. Therefore, this raises two pertinent issues: firstly that personality traits such as extraversion and neuroticism are unlikely to correlate with all positive and negative affect states respectively. Secondly, obtaining reports of mood states in in-vivo rather than retrospectively is important to better capture the situational determinants of mood state. As such, we explored the impact of dominant personality trait on the extent to which this impacted the degree of correspondence between reports of mood from the PANAS and Emoji PANAS.

RQ2- How do dominant personality traits impact on the convergence of in-vivo mood reports between the PANAS and Emoji PANAS scales?

To address our RQs, we utilised an experience sampling methodology (ESM) approach to collect in-vivo mood over multiple time-points to ascertain the degree of correspondence between reports of positive and negative affective dimensions via the PANAS and the Emoji PANAS. Additionally, we obtained measures of Big-5 personality traits to explore the extent to which dominant traits may differentially impact on in-vivo mood assessments.

ESM is an ethnographic method which can garner participants' experiences within the context of their daily lives, typically garnered through prompts or notifications which direct them to complete short survey tasks (e.g., a buzzer to complete a paper survey, or more recently, an SMS notification prompting completion of an online survey). Historically, ESM has been used to understand happiness and optimal experiences, as-and-when they occur (Csikszentmihalyi & Hunter, 2003; Csikszentmihalyi et al., 1977; Csikszentmihalyi & Larson, 1987; Diener & Emmons, 1985). However, more recent work has highlighted the benefits for understanding contextual drivers of consumption and technology behaviours (Kaye et al., 2018; Tovmasyan et al., 2022). We argue that this method has significant merit for the current research to measure in-the-moment mood across a range of time-points to better capture a spectrum of affective experiences as part of our validation efforts.

1. Method

1.1. Design/procedure

Prior to the start of the research, it received full ethical approval from [university name redacted to maintain anonymous peer review] Research Ethics Committee. Ethical principles aligned to the British Psychological Society's Code of Human Research Ethics (2021), including requiring informed consent, withdrawal mechanisms, and participant/data confidentiality and anonymity.

We used Experience Sampling Methodology (ESM) to explore in-the-moment assessments of participants' current mood for three times per day over the period of one week. At each time-point, we obtained mood

assessments using the PANAS and the Emoji PANAS.

Once participants had agreed to take part, they were issued with an onboarding survey, which firstly included full briefing information and a consent form. Here, participants were asked to provide a Research Participant Number (RPN) which would be obtained each time a participant completed the mood assessment across the period of the study. This RPN used the format of the first letter of their first name, the first two characters of their postal code/zip code and the last three numbers of their mobile number. This was needed for the purposes of matching participant data across all time-points whilst maintaining participant anonymity. Participants were also asked to provide their mobile/cell number which we used for the purposes of issuing the momentary mood assessments across the period of the study.

Following this, the onboarding survey asked participants to complete the 50-item International Personality Item Pool (IPIP-Big-5, Goldberg, 2006) to obtain data on the Big-5 traits of openness, emotional stability, conscientiousness, extraversion and agreeableness. Once the onboarding survey had been completed, participants were informed that they would be receiving an SMS which would be the first momentary mood assessment of the study.

Across the next seven-day period, participants were sent three SMS per day in which they completed the PANAS and Emoji PANAS at each time-point to provide an in-the-moment assessment of mood. At the end of the seven-day period, participants were thanked for their time and provided a full debrief.

1.2. Participants

The total sample included 83 participants,¹ which resulted in a total of 682 data points. Participants were recruited via email newsletters to business clients and social media outreach via business platforms such as LinkedIn and Twitter. The sample consisted 11 males, 19 females, and 1 non-binary (the remainder did not disclose), of which the majority occupied the 45–54 age category (20%). The remainder were in the following age categories: 35–44 years (11%), 55–64 years (7%), 65–78 years (6%), 18–24 years (5%) and 25–34 years (4%).

1.3. Measures

1.3.1. International Personality Item Pool (IPIP)

The IPIP (Goldberg et al., 2006) was used to measure the Big-5 traits of extraversion, emotional stability, openness, conscientiousness and agreeableness. This scale has 50-items whereby each of the five traits is measured by 10 items. Each of the 50 statements are rated on a scale from 1 (extremely inaccurate) to 7 (extremely accurate). A total score was calculated per trait and used in the subsequent analyses. The IPIP has good convergent and discriminant validity (Lim & Ployhart, 2006) indicating its suitability as a valid measure of these personality traits.

1.3.2. Positive and Negative Affect Schedule (PANAS)

To measure in-the-moment mood at the various time-points of the study, we used the PANAS (Watson et al., 1988). This asks participants to consider a series of 20 mood words (10 represent positive affect and 10 represent negative affect), and asks them to rate their level of endorsement to each item on a scale of 1 (very slightly or not at all) to 5 (extremely). Example items include: enthusiastic, alert, jittery and ashamed. The PANAS has been found to have good convergent and discriminant validity as a measure of these affective dimensions, in addition to being able to measure these states “in-the-moment”, as well as over longer temporal durations (Watson et al., 1988). For the purposes of data analyses, all data points across the study period were collated per mood item.

¹ This sample size has been determined based on previous research which has utilised similar ESM designs (Kaye et al., 2018; Tovmasyan et al., 2022).

1.3.3. Emoji PANAS

We developed an Emoji PANAS for the purposes of the current study which sought to replicate the PANAS but using emoji to represent each of the respective PANAS items. The selection of emoji was primarily based on corroborating item names from the PANAS with the Unicode Emoji List to establish what emoji might map to these based on Unicode label, as well as being informed by previous studies which have solicited interpretations of Unicode emoji, including those which might be most likely to be misconstrued (Franco & Fugate, 2020; Miller et al., 2016). As such, the Emoji PANAS would included 20 items to represent the 10 positive and 10 negative affective states (see Appendix 1). For each item, participants were asked “How much do you feel this way right now?” and presented with the respective emoji, and asked to respond on a 5-point likert scale (1 = very slightly/not at all, 5 = extremely). Similar to the PANAS data, for the purposes of data analyses, all data points across the study period were collated per mood item.

2. Results

Across the full study period, we garnered a total of 682 data points of unique momentary mood assessments, and on average, participants completed 9.61 time-points from a total of 21, across the seven-day study period.

We conducted descriptive and correlational analyses to explore reports of in-vivo mood from responses on mood items of the PANAS and respective emoji of the Emoji PANAS scale. Table 1 shows the descriptive analyses of in-vivo mood for all participants across all time-points as reported via the PANAS and Emoji PANAS measures.

We next calculated descriptive statistics for each of the five personality dimensions for the sample. See Table 2 below.

Next we used Pearson correlations to analysis to assess relationships in reported mood between the PANAS items and respective Emoji PANAS items. This was conducted overall (column 1) as well as in relation to user’s dominant (highest scoring) personality trait. That is, this was to explore the extent to which prominent personality traits might result in differential strengths of relationship in reporting in-vivo mood between these two scales See Table 3.

When exploring overall relationships between reports of in-vivo mood based on mood items from the PANAS with the respective emoji on the Emoji PANAS scale, these corresponded significantly for all mood states. That is, positive correlations were found between the PANAS and Emoji PANAS items for all the positive mood states (all $p < .001$), and for

Table 1
Descriptive analyses of in-vivo mood across all time-points as reported from the PANAS and Emoji PANAS scales.

Mood State	PANAS		Emoji PANAS	
	M	SD	M	SD
Interested	3.51	1.15	2.76	1.14
Enthusiastic	3.00	1.23	3.14	1.30
Determined	3.35	1.23	2.92	1.33
Excited	2.11	1.31	3.35	1.39
Distressed	2.19	1.09	1.69	1.05
Inspired	3.14	1.29	2.79	1.38
Strong	2.93	1.25	2.49	1.31
Alert	3.09	1.12	2.79	1.20
Active	3.04	1.32	2.64	1.26
Proud	2.83	1.28	2.57	1.24
Attentive	3.43	1.14	2.45	1.18
Upset	1.71	1.06	1.81	0.97
Guilty	1.58	0.97	1.76	1.02
Scared	1.69	0.97	1.72	1.01
Hostile	1.71	1.03	1.68	1.00
Irritable	2.07	1.12	1.36	0.96
Afraid	1.49	0.99	1.59	0.99
Jittery	1.71	1.05	1.98	0.97
Nervous	1.63	1.07	1.52	0.98
Ashamed	1.44	0.95	1.64	0.95

Table 2
Descriptive analyses of personality dimensions.

Personality dimension	Total	SD
Extraversion	45.30	11.69
Agreeableness	54.40	9.20
Conscientiousness	49.63	9.53
Emotional stability	41.70	10.28
Openness to experience	53.24	8.56

each of the negative mood states (all $p < .001$). A visual summary of the correlational findings is in [Appendix 2](#).

However, when exploring how the strength of the relationship in reporting in-vivo mood between these two scales was related to participant personality traits, this showed some differential patterns. That is, for those participants high in extraversion and emotional stability, not many of the items between scales were found to be significantly correlated. For extraversion, the only positive mood item which was positively correlated between the two scales was “interested” ($r = .28, p < .001$), and for negative mood items, the significant correlations were for distressed ($r = 0.33, p < .05$), irritable ($r = 0.66, p < .05$) and nervous ($r = 0.43, p < .05$). For those high in emotional stability, the only (negative) mood items which were significantly positively correlated were distressed ($r = 0.27, p < .01$) and ashamed ($r = 1.00, p < .001$).

However, for those high in agreeableness, conscientiousness and openness, there was more evidence that in-vivo mood reports corresponded between the two scales. That is, for those high in agreeableness, positive mood items between scales which were positively correlated were: interested ($r = 0.36, p < .001$), excited ($r = 0.73, p < .001$), strong ($r = 0.72, p < .01$), alert ($r = 0.15, p < .001$), determined ($r = 0.75, p < .01$), attentive ($r = 0.42, p < .001$), and active ($r = 0.74, p < .05$). Negative mood items were: jittery ($r = 0.43, p < .05$) and afraid ($r = 0.61, p < .01$).

Similarly, many items between the two scales correlated significantly for those high in conscientiousness. Namely, positive mood items which were positively correlated were: interested ($r = 0.42, p < .001$), excited ($r = 0.77, p < .05$), enthusiastic ($r = 0.55, p < .05$), proud, ($r = 0.36, p < .01$), alert ($r = 0.37, p < .001$), attentive ($r = 0.15, p < .001$), and active ($r = 0.81, p < .05$). Negative mood items were: guilty ($r = 0.41, p < .05$), and ashamed ($r = 0.61, p < .01$).

Finally, for those high in openness to experience, positive mood items which were positively correlated were: interested ($r = 0.36, p < .001$), strong ($r = 0.73, p < .05$), and attentive ($r = 0.46, p < .001$). The

negative mood items which significantly correlated were: distressed ($r = 0.48, p < .01$), upset ($r = 0.46, p < .01$), irritable ($r = 0.58, p < .001$), nervous ($r = 0.54, p < .001$), and hostile ($r = 0.43, p < .001$).

3. Discussion

We explored whether emoji may be a valid way of representing in-the-moment affective state, and the extent to which dominant personality traits may influence the validity of these reports. To explore this, we developed an Emoji PANAS which replicated the items of the PANAS and asked participants to complete in-vivo mood assessments at various time-points per day over a period of seven days. This could help us explore whether reports of mood between the two scales corresponded to help ascertain whether emoji may be representative stimuli for mood scale assessments.

In general, we found correspondence between reports of in-the-moment mood when using items from the Emoji PANAS scale alongside their respective PANAS items. That is, significant positive correlations in mood reports were found between all items representing both positive and negative dimensions. As such, on the surface, these emoji appear to be a valid way for users to report in-the-moment mood. However, there are important caveats to this. That is, when establishing how user personality traits might affect the way emoji correspond to reporting in-the-moment mood, this revealed some differential patterns. That is, for those high in emotional stability, only the distressed emoji was significantly correlated with its respective PANAS item, indicating that for those high in emotional stability, emoji are unlikely to be a useful or reliable means for reporting in-the-moment mood. Similarly, for those high in extraversion, there was not particularly compelling evidence that emoji were used reliably to report in-the-moment mood. Namely, for positive mood, only the “interested” emoji corresponded to the respective PANAS reports, and for negative mood, this was only the case for distressed, irritable and nervous states.

It is noteworthy that these validity issues are prominent for traits of extraversion and emotional stability which have been recognised to align with dimensions of emotionality (Larsen & Ketelaar, 1989; Watson & Clark, 1997). That is, previous research suggests that extraversion predicts frequency and intensity of positive affective experiences (Bachorowski & Braaten, 1994). However, it may be that the selected emoji used to represent these various dimensions were not adequately representative of these states (or the intensity of these states) for those high in those emotionality traits. It may be that these individuals have

Table 3
Correlation coefficients in reports of in-vivo mood between PANAS and Emoji PANAS items overall and by personality traits.

	Respective Emoji PANAS item	Extraversion (n = 5)	Agreeableness (n = 39)	Conscientiousness (n = 16)	Emotional stability (n = 3)	Openness to experience (n = 20)
Interested	.42***	.28***	.36***	.42***	.90	.36***
Distressed	.53***	.33*	.46	.57	.27**	.48**
Excited	.75***	.62	.73***	.77*	.88	.73
Upset	.61*	.52	.63	.60	.31	.46**
Strong	.74***	.40	.72**	.80	.50	.73*
Guilty	.42***	.38	.32	.41*	.41	.52
Scared	.60***	.54	.54	.59	.55	.63
Hostile	.48***	.42	.42	.69	.41	.43***
Enthusiastic	.68***	.74	.77	.55*	.90	.53
Proud	.59***	.33	.69*	.36**	.92	.64
Irritable	.65***	.66*	.53	.75	.61	.58***
Alert	.40***	.61	.15***	.37***	.67	.66*
Ashamed	.42***	.50	.37*	.61**	1.00***	.45
Inspired	.72***	.61	.73*	.78	.94	.68
Nervous	.58***	.43*	.53	.70	.67	.54***
Determined	.69***	.47	.75**	.74	.83	.63
Attentive	.38***	.55	.42***	.15***	.84	.46***
Jittery	.46***	.27	.43*	.68	.73	.40
Active	.75***	.60	.74*	.81*	.87	.71
Afraid	.59***	.65	.61**	.57	-.03	.61

*** $p < .001$ ** $p < .01$ * $p < .05$.

highly attuned levels of emotional granularity, in which their affective representations of specific states allow them to clearly distinguish between different them (Barrett, 2006). In the case of emoji, these may not be presenting sufficient conceptual information about the affective state of interest in the same way linguistic labels may do, and as such, those high in these traits are not equipped to recognise their experiences of the intensity afforded to these specific states. Conversely, those who do not possess dominant traits associated with emotionality may have lower emotional granularity which means they are better positioned to make assessments based on more global feelings of pleasure or displeasure (valence) or activation (arousal) which might be more easy to access from information available from emoji stimuli (Smidt & Suvak, 2015). An interesting future direction for research might be to manipulate the physical properties of emoji stimuli to explore how this might differentially impact valence and arousal evaluations. That is, larger emoji may prompt evaluations relating to higher arousal or dominance (Bradley & Lang, 1994), and it would be intriguing here to explore whether these manipulations have differential impacts for those based on people's level of trait emotionality or emotional differentiation abilities.

Conversely, for those high in other traits the evidence was more compelling that emoji might be a valid way of reporting current mood. Namely, for those high in agreeableness, emoji items appeared to be used more reliably, particularly for positive mood reporting (with the exception of enthusiastic). Similarly, for those high in conscientiousness, the findings showed a similar pattern in that many positive mood states were reliably reported using the respective emoji (interested, excited, enthusiastic, proud, alert, attentive and active), with a few of the negative mood states being reported reliably (guilty and ashamed). Finally, for those high in openness to experience, the opposite pattern was observed. That is, there was some evidence that emoji may be a useful method of reporting in-the-moment mood, but more so for negative mood (distressed, upset, irritable, nervous and hostile) than positive mood (interested, strong and attentive). Unlike extraversion and emotional stability which are said to be traits which lead to experiences of affective states, openness is said to hold an experiential function to these experiences, and may amplify these (McCrae & Costa, 1991, 1997). Therefore those high in openness were perhaps better able to report these experiences as they may have been of higher intensity to be recognised.

Taken together, the findings suggest that caution should be afforded when assuming that emoji are a valid basis for reporting in-the-moment mood states. Our findings suggest that although these generally show good correspondence across a sample as a whole, when drawing out more idiosyncratic assessment of these, user personality traits may an important factor to include. That is, for those high in emotional stability and extraversion, it is unlikely that these specific emoji will be used to report in-the-moment mood of both positive and negative states. However, for other dominant traits, there is some evidence that emoji may be a good indicator of current mood, but perhaps only for positive mood for those high in agreeableness and conscientiousness and negative mood for those high in openness.

Appendix 1. Emoji PANAS

1. How much do you feel this way right now?

From a theoretical point of view, our findings are interesting as they suggest that an in-vivo affective dimension supports the pathway between perception of emoji and the retrieval of knowledge pertaining to affective experiences. Absence of the affective state appears to bring about challenges for emotional categorisation which may explain the wealth of null findings in the existing literature which has attempted to conceptualise emoji as distinct emotion concepts. This assertion would be supported by findings from Connell et al. (2018) who suggest that interoception (i.e., bodily sensations) play an important role in semantic representations, and may be a key mechanism for abstract concepts. As such, the presence of an affective experience when reporting on in-the-moment mood, may be the critical interoception dimension which facilitates retrieval of semantic knowledge pertaining to these affective experiences. There are many relevant implications to note regarding the directions for future research. That is, emotional categorisation paradigms may not be the most appropriate approach to study emoji. Instead, research may benefit from establishing the range of perceptual, affective and/or sensorimotor experiences associated with the use of emoji in certain contexts, to understand how we may draw upon these bottom-up processes in our appraisal how emoji relate to affective states.

4. Conclusion

Whilst the Emoji PANAS scale can be helpful to reduce linguistic confounds when reporting one's current affective state, we recommend issuing caution when using this to report in-the-moment mood, as this may not elicit linear or valid assessments in all cases. Our findings suggest that personality traits, particularly relating to emotionality are important to control for in work of this nature given this leads to differential reliability of the Emoji PANAS relative to more standard assessments of mood. However, our approach in general suggests that bottom-up processes of appraising one's current affective state are useful when making judgements about how representative emoji are to capture current affect, which offers an alternative approach from the existing research which has largely conceptualised emoji as emotion concepts rather than being mood indicators.

Author contributions

Conceptualization: LKK, CRS, Methodology: LKK, CRS, Software: CRS, Validation: LKK, Formal analysis: LKK, Investigation: CRS, Resources: CRS, Data Curation: CRS, LKK, Writing - Original Draft: LKK, Writing - Review & Editing: CRS, LKK, Visualization: LKK, Supervision: LKK, Project administration: LKK, CRS.

Declaration of competing interest

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.



Very slightly/not at all A little Moderately Quite a bit Extremely.

2. How much do you feel this way right now?



3. How much do you feel this way right now?



4. How much do you feel this way right now?



5. How much do you feel this way right now?



6. How much do you feel this way right now?



7. How much do you feel this way right now?



8. How much do you feel this way right now?



9. How much do you feel this way right now?



10. How much do you feel this way right now?



11. How much do you feel this way right now?



12. How much do you feel this way right now?



13. How much do you feel this way right now?



14. How much do you feel this way right now?



15. How much do you feel this way right now?



16. How much do you feel this way right now?



17. How much do you feel this way right now?



18. How much do you feel this way right now?



19. How much do you feel this way right now?



20. How much do you feel this way right now?



Appendix 2. Visual summary to represent validity of emoji for reporting current mood (based on significant correlations between PANAS and Emoji PANAS items)

Mood state		Valid indicator of current mood (indicated by ✓)*					
PANAS Item	Emoji PANAS Item	Overall	Extraversion	Agreeableness	Conscientious	Emotional stability	Openness
Enthusiastic		✓			✓		
Interested		✓	✓	✓	✓		✓
Determined		✓		✓			
Excited		✓		✓	✓		
Inspired		✓		✓			
Alert		✓		✓	✓		✓
Active		✓		✓	✓		
Strong		✓		✓			✓
Proud		✓		✓	✓		
Attentive		✓		✓	✓		✓
Scared		✓					
Afraid		✓		✓			
Upset		✓					✓
Distressed		✓	✓			✓	✓
Jittery		✓		✓			
Nervous		✓	✓				✓
Ashamed		✓		✓	✓	✓	
Guilty		✓			✓		
Irritable		✓	✓				✓
Hostile		✓					✓

*Based on a significant positive correlation between reports from the PANAS and corresponding Emoji PANAS item

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