The impact of mixed emotions on judgements: A naturalistic study during the FIFA World Cup

Thomas J. Hostler[1] and Raul Berrios[2]

[1]Department of Psychology
Manchester Metropolitan University
ORCID: 0000-0002-4658-692X
@tomhostler

[2]Department of Management
Universidad de Santiago de Chile
ORCID: 0000-0003-1826-7822

Abstract

Experiencing mixed emotions, a combination of two oppositely-valenced emotions, has been shown to reduce bias in decision making and improve the accuracy of judgements made. However, most previous research has been limited to laboratory-based experiments. In this pre-registered study, we looked at mixed emotions and judgements in the naturalistic context of watching sport during the FIFA world cup. *N*=80 participants reported on mixed emotions before and after each England game during the World Cup, and made score predictions for each game, collecting a total of k = 480 observations. We used a lagged-effect design and multilevel modelling to analyse the data. We found that participants who felt more mixed emotions at the end of a match made significantly more likely score predictions in the following match, indicating that experiencing stronger mixed emotions subsequently predicted more reasonable judgements. This result was supported even after controlling for a number of affective, attitudinal, and socio-demographic variables. This provides evidence that naturally occurring mixed emotions are related to improved real-world judgements. The evidence is discussed through the lens of fantasy realization theory, and the importance of feeling mixed during decisions involving puzzling or uncertain outcomes is emphasized.

Key words: mixed emotions, judgements, predictions, naturalistic, sport consumption

People often rely on heuristics when making judgements in everyday life, but risks of cognitive biases are a common side effect (Barnes, 1984; Tversky & Kahneman, 1974). Understanding how to reduce bias and gain greater accuracy when making judgements is important for a range of different societal issues, ranging from prejudice to decision making. Although emotions have usually been thought to reflect the operation of "System 1" - the fast, heuristic-based and biased thinking mode (Morewedge & Kanheman, 2010), research studying the role of emotions on individuals' judgement provides a more nuanced understanding (Lerner et al., 2015; Zhong, 2011). In the present research we focused on the experience of mixed emotions - the co-occurrence of two oppositely-valenced emotions - as a driver for making more accurate and reasonable judgements.

Mixed emotions are characterized as the co-activation of two oppositely-valenced emotions (Larsen & McGraw, 2011; Schimmack, 2001), such as feeling happy and sad, amused and disgusted, or fearful and hopeful. Although the idea of co-activation in mixed emotions has been debated and questioned (Larsen, 2017; Russell, 2017), accrued evidence demonstrates the feasibility of experiencing mixed emotions (Berrios et al., 2015a). Mixed emotions are commonly triggered during situations involving goal conflict or personal dilemmas (Berrios et al., 2015b, 2018a; Hadley, 2014; Schniter et al., 2015). Furthermore, recent research shows that mixed emotions are associated with greater effort to resist temptations, suggesting a relationship between mixed emotions and self-control (Berrios et al., 2018b). A growing literature suggests that mixed emotions may also improve the accuracy of individuals' judgements (e.g., Rees et al., 2013). Together, this evidence indicates that mixed emotions may be particularly relevant when people deliberate about uncertain or puzzling future outcomes (Berrios, 2019).

However, much of this research has been laboratory-based, and studies investigating naturally occurring mixed emotions in relation to people's judgements are notably scarce. Current studies investigating mixed emotions in real-life do not investigate judgement accuracy (e.g., Berrios et al., 2018b) or describe the instances instigating mixed emotions (e.g., Podoynitsyna et al., 2012). Thus, our aim in the present study is to determine whether mixed emotions influence people's judgements during a massive sport event, the FIFA World Cup 2018. In addition, we aim to examine this association considering a scenario where temporal precedence exists between mixed emotions (the independent variable) and judgements (the dependent variable). Examining this association including temporal precedence between independent and dependent variables permits to control for portions of random covariation existing in data surveyed at the same time. Surveying fans during the FIFA World Cup 2018 provides a unique opportunity to observe how the emotional experiences after watching a football match linger on individuals, and permeate their judgements made in the following match, creating a natural lagged-effect design. To appropriately model this effect, we develop an analytical strategy based on a series of multilevel models, controlling for the effects of time, and adding a number of covariates to depurate the findings.

Mixed emotions and making judgements

A number of studies have investigated how the experience of mixed emotions may influence the judgements an individual makes. Considering a decision from different perspectives reduces bias and improves subsequent judgement accuracy (Galinsky & Moskowitz, 2000; Wang et al., 2014), and there is evidence showing the experience of mixed emotions encourages people to consider alternative perspectives, which in turn improves the accuracy of their judgements. Rees, Rothman, Lahavy and Simon-Burks (2013) showed that participants

induced into feeling mixed emotions gave more accurate judgements on future weather forecasts and general knowledge estimations, compared to participants induced to feel only happy or sad. The participants who felt mixed also responded more favourably to considering alternative information and used this to modify and improve their own judgements.

Mixed emotions may also enhance judgement fairness by making individuals less susceptible to cognitive biases. Guarana and Hernandez (2016) found that participants who felt mixed emotions about a decision to fund a disease-prevention program were less affected by explicit framings of the program in terms of 'losses or gains' that were designed to bias their judgements. Mixed emotions also helped to improve the objectivity of judgements by protecting participants against bias from the availability heuristic (the belief that events that are mentioned regularly are more likely) and the conjunction bias (that specific conditions that appear to fit a situation are more likely than more general statements).

More broadly, mixed emotions have been associated with the beneficial cognitive processes involved in "wise reasoning" (Grossmann et al., 2019), which include an appreciation of context, acknowledgement of the likelihood of multiple outcomes, and less biased judgements. Complementing the experimental studies described above, Grossman et al. (2019) present observational evidence indicating that individuals perceived as "wise" by their peers reported more mixed emotions than age- and gender- matched controls in descriptions of personal situations involving conflict and decision-making. A second study also showed that participants who reported greater emotional diversity also showed more evidence of wise reasoning when making judgements about a political conflict.

The relationship between mixed emotions and judgement-making has also been considered within the literature of future thinking and goal-directed behaviour, in the form of "mental

contrasting". This describes the mental process of explicitly contrasting a desired future outcome with one's current present reality (Oettingen, 2012). Typically, such contrasts will induce a mix of emotions, produced when a desired positive future state is subsequently contrasted with a current (negative) reality. The process of mental contrasting primes self-regulatory processes including utilisation of feedback and facilitation of decision-making (Oettingen & Cachia, 2016).

Mixed emotions and making judgements in real world settings

Overall, the literature supports the suggestion that experiencing mixed emotions has beneficial effects on accurate and reasoned judgement making. However, there is a lack of evidence on whether this relationship is found in naturalistic, real world environments. The studies reviewed above on mixed emotions and judgements can all be said to neglect one or more aspects of ecological validity (Kvavilashvili & Ellis, 2004). For example, the task of judging to fund a disease prevention program (Guarana & Hernandez, 2016) is not particularly representative of an everyday judgement (unless one works for a government health department), and participants had no genuine interest in the topic of their decision. Similarly, the results of recall-based emotional induction procedures as used in Rees et al. (2013) and Grossman et al. (2019) may not be generalizable to the experience of emotions elicited by genuine real-life events. Whilst methods to induce emotion based on the autobiographical recall of memories are likely to generate mixed emotions (Mills & D'Mello, 2014), they are also likely to underestimate the intensity of emotions experienced in real life (Konečni et al., 2008).

The present study

The present research addresses calls for naturalistic studies to compliment laboratory findings (Parrott & Hertel, 2005) and more research on "real world" emotional phenomena (Kuppens, 2019). We do this by investigating the experience of mixed emotions in the context of watching sports, namely the FIFA Football World Cup 2018. Sports are emotional events and Kim, Magnusen & Lee (2017) have observed that they elicit mixed emotions, in particular when a team's performance and result are incongruent. Watching football - in particular the national team - is a popular pastime in England and is a good example of what "truly matters" to people, meaning the emotions associated with the game result represent more "genuine" emotional data that theories of emotion also need to explain (Picard, 2010). Thus, the present study adds to the literature by attempting to reproduce previous findings on mixed emotions and judgements in a new ecologically valid setting, to examine their robustness and applicability in real life environments.

In the context of making judgements about the outcome of sporting events, we hypothesized that feeling mixed emotions (in contrast to single emotions) would likely enable an individual to make a less biased and more careful judgement of the outcome by considering multiple perspectives. For example, an individual feeling particularly excited and positive about her teams' upcoming game may make an unrealistically positive judgement about the team's chances. Similarly, an individual feeling particularly anxious or worried might make an unrealistically negative judgement about the outcome. An individual feeling both excited and anxious about a game would be more likely to consider the team's chances from multiple perspectives (e.g., a negative outcome influenced by their anxiety over the team's recent form, contrasted with a positive outcome influenced by their excitement of the return of their star player from injury) to come up with a less biased and more reasonable prediction.

The study presented in this paper is taken from a larger data set collected during the FIFA 2018 World Cup. We measured fans' mixed emotions before and after each match, as well as their pre-match predictions of the score. The likelihood of these predictions was quantified using bookmaker's pre-match odds on each outcome, which can be taken as a proxy for the "reasonableness" of the outcome. This measure was chosen as the dependent variable instead of a comparison with the actual game outcome because odds are calculated via unbiased algorithms that take into account a huge number of variables, including team strength, form, and history. Thus, they reflect the best available estimate of an 'objective' or reasonable prediction. For example, if two teams both with strong defensive players but weak attacking players face one another, a reasonable prediction based on this information would be that it will be a low-scoring game. This prediction would be associated with low odds and a high probability of occurring. Prospective odds represent a more accurate measure of our construct of interest - judgement reasonability - compared to the accuracy of predictions with respect to the actual score, which may be influenced by freak and unpredictable circumstances, such as a player injury. Whilst an unreasonable prediction may in any individual game turn out to be correct; in the long run, more reasonable predictions with lower odds are more likely to be accurate (this is how bookmakers stay in business). Based on previous laboratory work in this area, we expected mixed emotions to be associated with more reasonable judgements.

Method

Design

The study used a non-experimental longitudinal correlational design with 14 time points (initial questionnaire, before + after each England football team match, and post-tournament). The measures discussed below are those that are relevant to the present research questions, but

data was also collected on perceived emotional synchrony, emotional contagion, and participant's beliefs about the team's performance. These are reported in the study pre-registration but were not relevant to the present analyses, and so are not discussed further.

Participants

A total of $n = 97$ participants completed at least the initial questionnaire. Data from $N = 17$ participants who completed the initial questionnaire were excluded as they did not provide a unique ID code, which prevented this questionnaire being linked to any subsequent responses from pre- or post-match questionnaires. Any data from pre- and post-match questionnaires that could not be linked was also discarded. A full breakdown of this is provided in the data processing diary on the study Open Science Framework page. Excluded participants did not significantly differ from the included sample on age, supporter identification, or nationalism (p's >.05). A final sample of $N = 80$ participants who were included in the analysis ($M_{age} = 34.30$, $SD = 10.32$). The sample included 61 males, 18 females and 1 Prefer-not-to-say. Participants were recruited through twitter and social media pages of football and local interest groups (Manchester, UK) and compensated for participation with entry into a prize draw. There was no set sample size, but as much data as possible was collected for the duration of the study (during the 2018 World Cup from 12th June 2018 - 15th July 2018).

Measures

Initial questionnaire. The initial questionnaire collected demographic information and included two measures relevant for this study.

***Supporter identification*.** An adapted version of the Sports Spectator Identification Scale (SSIS; Wann & Branscombe, 1993), comprised 5-items measuring support of and identification

with the England Football Team on a scale of 1-8. This is a widely used and validated scale of fan identification with sports teams. Two items were left out from the original scale "how much do you dislike [team]'s rivals?" and "how strongly do your FRIENDS see you as a fan?", as there is no single obvious rival to the England national team, and as the team do not play regularly it was considered less likely that friends would be aware of an individual's support of the team.

Nationalism. The Nationalism Motive Scale (Bogdanov, 2005), a 7-item questionnaire, measured the extent to which people express their national pride through watching sports teams. An example item is "Watching the England Football Team brings a sense of belonging to my nation". The measure used a 1-7 Likert scale from Strongly Disagree to Strongly Agree. The measure was chosen as to our knowledge there are no other validated scales that measure this construct.

Pre-match questionnaire. Questionnaires completed pre-match primarily focused on the participant's predictions for the upcoming game.

Predictions likelihood. Participants were asked to predict the score at the end of the game. The website [www.oddsportal.com] was consulted in order to get the average of a range of bookmaker's odds for each predicted outcome. Higher odds indicate that the bookmakers consider the predicted score unlikely and will thus pay out more money. Odds are typically calculated by unbiased algorithms taking into account a huge number of variables, including team strength, form, and history, and can thus be considered a reasonable proxy for the likelihood of the score occurring. The odds were converted into a percentage probability providing an index of prediction feasibility – i.e., the likelihood of the prediction judgement occurring.

Emotion. Finally, pre-match measures of emotion (happiness, sadness, anxiety, and excitement) were included. As per the instructions of Schimmack (Schimmack, 2003), these differentiated by the presence and absence of emotion using a 0-6 scale, with 0 being "No I do not feel this emotion", 1 being "Yes, very mildly" and 6 being "Yes, maximum intensity". In addition, participants were instructed to treat each scale independently and first consider whether they felt each individual emotion before responding. A measurement check was included to ensure that participants were supporting England in the match.

Post-match questionnaire. Questionnaires completed post-match focused on participant's reactions to the game, as well as assessing information about where and when they had watched the match.

Reaction. First, a measurement check was made that participants had watched the match ("Thank you for your continued participation in this study. Firstly - just to check - did you watch the England vs. [opposition] match?"). Only k=6 responses failed this check across all matches for all participants, and these data were excluded. Participants were asked whether the outcome was a fair result (with either "fair result" or "England/Opposition were lucky" as the 3 responses). Participants also separately assessed whether the result/performance (from England's point of view) was good or bad on a 5-point scale.

Emotions. Emotions were assessed in the same way as in the pre-match questionnaire, but included measures of happiness, sadness, anxiety, excitement, anger, embarrassment, relief, shock, boredom, pride, and amazement. These additional emotions were included to investigate other kinds of reactions to football matches but were not analysed as part of this study on mixed emotions.

Viewing. We asked participants where they had watched the match, with response options including "at home", "at someone else's house", "in a pub/bar/club", "in a cinema", "outside on a big screen" or "other". We then asked people to estimate how many other people were in the venue with them on an ordinal scale, and the percentage of those people supporting England.

Post-tournament questionnaire. As part of the data collection, a post-tournament questionnaire was distributed which was identical to the initial questionnaire. This data was not used in the present analyses.

Procedure

Recruitment began 6 days before the first England game of the 2018 FIFA World Cup and continued for the first 3 weeks of the tournament. Participants were recruited via social media to participate in a study investigating "emotional responses to watching England matches". The study was advertised towards people who were planning on watching and supporting England during the tournament, and they needed to have a smartphone with messaging app WhatsApp. The participant information sheet informed participants that they would have to fill out a short questionnaire before and after each England match at the tournament. As compensation, participants were entered into a prize draw to win a shopping voucher. Upon enrolment in the study, participants completed the initial questionnaire and provided their mobile phone number. A link to each pre-match questionnaires was sent out via mobile messaging service WhatsApp to all participants, 60 minutes before the kick-off of each England game, with instructions to complete it before kick-off. Post-match questionnaires were

sent out immediately after each game had finished in the same way. After the final England game, a post-tournament questionnaire was sent out that covered the same questions as the initial questionnaire. For a full timeline of the study, see the supplementary materials.

Data preparation. Participant's responses were linked up using unique ID codes provided at each time point. If the data could not be linked reliably, it was excluded. The timestamp of each questionnaire was inspected and pre-match questionnaires that were completed more than 5 minutes after the kick-off of the match were excluded. Details of all exclusions are in the data processing diary. There was no specific cut off point for post-match questionnaires, as it was expected that participants may not be able to complete these immediately if they were watching the game with others. However, the vast majority completed these within 2 hours of matches finishing, and all participants completed them within 48 hours.

Transparency statement

Following Open Science best practices (Munafò et al., 2017), the full anonymised dataset, study materials, recruitment media, pre-registration, and data processing diary can be found on the study OSF page: https://osf.io/954c8/

Data analysis strategy

In order to evaluate the influence of mixed emotions on making judgements, we prepared the data beforehand. From the emotion data, we created variables for affect, mood, and mixed emotions. When referring to affect, we mean a broad sense of either positively or negatively valanced feeling, i.e. positive affect (PA; happiness + excitement) or negative affect (NA; anxiety + sadness). By mood we mean a more diffuse feeling, i.e. PA and NA spanning multiple timepoints across the study for each participant. Finally, by mixed emotion we mean simultaneous activation of opposing affects. We computed mixed emotions as the minimum value (Schimmack, 2001) between positive affect and negative affect. Positive emotions (i.e., excitement and happiness) and negative emotions (i.e., sadness and anxiety) included in this study were averaged and the minimum value between these scores was taken as an index of mixed emotions. This procedure was repeated for each mixed emotion variable computed before and after each match.

We also created a series of one time-point delayed mixed emotion variables (i.e., lag-effects) to be used as independent variables for testing the main hypothesis that mixed emotions would impact future judgement accuracy. Thus, the mixed emotions reported after a match could be used to predict judgements in the subsequent match. Although this does not allow us to infer causation, it gives stronger evidence of a possibly causal relationship than correlations at the same time point.

Next, following Curran and Bauer's recommendations (2011), a set of between-person centred variables were created by averaging the raw scores for each relevant variable. This created variables that had the same score over time but a different value across individuals. Then, a set of within-person variables were created by subtracting the individual's average score for

each variable from the raw scores. This created variables with a unique value for each time point, orthogonal to the corresponding between-person centred variables. This procedure was repeated for all the independent variables used in the subsequent analysis unless otherwise specified. Separating between-subject and within-subject variables reduces conflation effects observed because of shared variance lying at different levels of analysis (level-2 and level-1, respectively). Additionally, testing between-subject and within-subject variables allows the testing of different effects. The within-subject variables allow the evaluation of the effects of mixed emotions "in the moment"; whereas between-subject variables test effects akin to individual differences.

Our analysis strategy had two stages. First, we explored whether participants experienced mixed emotions, and how these were affected by individual differences and changed during the tournament. Second, we ran a series of multilevel models to investigate our main hypothesis that mixed emotions were related to judgement reasonability. In these models, the prediction likelihood made by each participant was the dependent variable. In all the models tested, we controlled for the linear effects of time by including a variable for time (coded as 0-5) in the model and using an autoregressive matrix; the estimator was maximum likelihood. We also accounted for the nonindependence of the data by including random intercepts for participants, and for some models, random slopes for the mixed emotion variables or time were also included (these are explicitly stated in the model descriptions).

Results

As indicated in the procedures section, several missing values exist in the data, which is common when conducting intensive longitudinal studies (Hektner et al., 2007). Thus, in order to statistically examine whether the data were missing completely at random (MCAR), we performed the Little's MCAR test (Little, 1988) considering the main variables studied (i.e.,

mixed emotions, judgements). Results allow the acceptance of the null hypothesis that the data are missing entirely at random, $\chi^2(8) = 12.12$, $p = .154$. Further inspection of the data revealed that there were two outliers for the mixed emotions variables (before and after the match); these are retained in subsequent analyses. The inclusion of these two data points did not alter any of the analyses conducted and reported below. *Table 1* reports the descriptive statistics and zero-order correlations between the variables studied.

[TABLE 1 HERE]

The results are divided into two sections. First, we briefly examine the prevalence of mixed emotions within the sample and changes of mixed emotions across the matches. This is a necessary step before testing the main hypothesis. Second, we present the findings for the influence of mixed emotions on making judgements, including models with several relevant covariates.

Feeling mixed emotions during the World Cup

These preliminary analyses were conducted to examine the influence of time and individual differences in the experience of mixed emotions. Examination of the time trends was performed using Growth Curve Modelling. This allow us to determine whether natural fluctuations of mixed emotions over time may better explain the relationships between the variables studied. We set a model including mixed emotions measured at the end of each match as the dependent variable. Random intercepts and slopes for the time variable were also considered, whereas a maximum likelihood estimator and an unrestricted matrix were used. The variance of mixed emotions' trajectory (slope parameter) was not statistically significant, $\sigma_{ME\text{-}post}$= 0.027, p = .169, meaning that people did not increase feelings of mixed emotions after each match over time.

We repeated the same analysis, but this time with the experience of mixed emotions before the match as the dependent variable. Results revealed a positive, mixed emotions trajectory, $\sigma_{ME\text{-}pre}$= 0.058, p < .001, meaning that people tended to slightly increase the levels of mixed emotions reported at the beginning of each match over time.

[FIGURE 1 HERE]

Additionally, we examined whether significant individual differences in mixed emotions are present in the data, in order to control for this effect in subsequent analyses. Visual inspection of *Figure 1* suggests that some people tended to experience higher levels of mixed emotions (average scores above 3), whereas others seldom experience mixed emotions (average score of 1). This observation suggests that it is possible that individual differences in the experience of mixed emotions exist in the data, and as such, it is important to control for this effect. To test this observation, we conducted a multi-level model similar to the previously described model, but without independent variables and using a variance components matrix to compute the intra-class correlation. We found that there was a significant amount of variance between individuals for mixed emotions before the match, $\rho = 0.28$, $p < .001$, revealing that some individuals tended to experience more mixed emotions before the match compared to others. However, this effect did not replicate for the mixed emotions reported after each match.

Do mixed feelings matter emotionally for the next match?

One preliminary question is whether mixed emotions may have a lingering effect on the emotional experience people reported in the following match, over and above individual differences in mixed emotions. To evaluate this question, we performed three separate models using lagged mixed emotions variables (within and between-person centred) and time (centred) as independent variables. The models include PA, NA, and mixed emotions before the match as dependent variables.

The first model revealed that lagged mixed emotions centred at the within-person level positively significantly predicted higher PA, $\beta = 0.13$, $t(145.17) = 2.28$, $p = .024$, *95% CI* [0.02, 0.24]. Time was also positively related to PA, $\beta = 0.19$, $t(57.05) = 4.51$, $p < .001$, *95% CI* [0.10, 0.27]. The effect size of this model at level-1 was medium in magnitude, $R^2 = 0.24$.

For the second model tested, lagged mixed emotions centred at the within-person level also positively predicted higher NA, $\beta = 0.11$, $t(134.92) = 2.43$, $p = .016$ *95% CI* [0.02, 0.20]. Time was also positively related to NA, $\beta = 0.23$, $t(77.31) = 7.48$, $p < .001$, *95% CI* [0.17, 0.29]. The effect size of this model at level-1 was large in magnitude, $R^2 = 0.48$.

Finally, in the third model, lagged mixed emotions centred at the within –person level positively predicted higher mixed emotions before the next match, $\beta = 0.11$, $t(146.83) = 2.74$, $p = .007$, *95% CI* [0.03, 0.20]. Time was also positively related to mixed feelings before the next match, $\beta = 0.24$, $t(77.03) = 8.19$, $p < .001$, *95% CI* [0.18, 0.29]. The effect size of this model at level-1 was large in magnitude, $R^2 = 0.57$. Lagged mixed emotions centred at the between-person level did not predict changes in the dependent variable in any of these models. Overall, people who felt more mixed emotions at the end of a previous match, tended to experience greater PA, NA, and mixed emotions before the next match, over and above linear trends of time and individual differences in mixed emotions. In none of the models previously described did we find that individual differences in mixed emotions (mixed emotions centred at the between-person level) at the end of a previous match had an effect on PA, NA, or mixed emotions before the next match.

The influence of mixed emotions on making judgements

In this sub-section we report testing the main hypothesis regarding the influence of mixed emotions on prediction judgments, including a series of model to control for relevant social and emotional-related variables. Results showed that when people experienced higher levels of mixed emotions at the end of a match, they made a more likely score prediction judgement at the beginning of the next match, $\beta = 0.87$, $t(145.8) = 2.42$, $p = .017$, *95% CI* [0.16, 1.59].

In contrast, time was negatively related to making judgements, β = -0.54, t(92.78) = -2.45, p = .016, *95% CI* [-0.97, -0.10], which implies that prediction likelihood tended to decay from match to match. Mixed emotions before the match and between-subject variables did not predict future scores. The effect size at level-1 for this model was small in magnitude, R^2 = 0.07. Estimates and standard errors of all the variables included in this model are in *Table 2 (Model 1)*.

[TABLE 2 HERE]

The model previously tested was repeated but with random intercepts and random slopes for the lagged mixed emotions variable at the within-person level. Results still supported the finding of a significant effect of mixed emotions predicting better judgements in the next match, β = 0.89, t(38.48) = 2.43, p = .020, *95% CI* [0.15, 1.63]. Whereas time was negatively related to better judgements, β = -0.53, t(106.32) = -2.42, p =.017, *95% CI* [-0.97, -0.10].

To test the robustness of the main hypothesis test, we implemented a new model including several emotion-related variables. The model included anxiety and sadness before each match at the within-person level; excitement and happiness before each match at the within-person level; an interaction term for excitement before the match and anxiety before the match centred at the within-person level; and no lagged mixed emotions variable measured before and after each match centred at the between and within-person levels.

Evidence for an effect of mixed emotions forecasting better judgements remained positively statistically significant, β = 0.84, t(138.01) = 2.26, p = .026, *95% CI* [0.10, 1.58]. Time was no longer significantly related to prediction likelihood, β = -0.48, t(129.15) = -1.71, p = .090, although the pattern was in the same direction. Finally, happiness before the match was negatively related to more likely score predictions in the same match, β = -1.52, t(125.16) = -

3.01, $p < .001$, *95% CI* [-2.49, -0.55]. No other variable was statistically related to score predictions, as shown in *Table 2 (Model 2)*.

One final model tested (*Table 2, Model 3*), includes several variables at level-2: The *Sports Identification Scale* (SSIS), the Nationalism Motive Scale (NAT-Q), age, and gender. At level-1 we also included the degree of confidence reported at the beginning of each match, the number of people present in each match, and the venue where participants watched each match. This model incorporates a lagged mixed emotions variable reported at the end of each match centred at the within-person level.

[TABLE 3 HERE]

Results indicate that the main effect of mixed emotions predicting more likely score predictions in the following match remained, $\beta = 0.86$, $t(156.52) = 2.98$, $p = .003$, *95% CI* [0.29, 1.43]. In keeping the results previously reported, time was negatively associated with score predictions, $\beta = -0.51$, $t(140.28) = -2.38$, $p = .019$, *95% CI* [-0.94, -0.09]. The remaining variables included in the model were not associated with score prediction likelihood.

We complemented the previously explained models by testing two new models (see *Model 4 and Model 5* in *Table 3*). One model used a within-person centred variable of lagged mixed emotions reported at the end of the match alongside two lagged between-person centred variables for PA and NA reported at the end of the match (the two componential variables used to compute mixed emotions), the interaction between these two, and time. We included a group-mean centred version of these variables, instead of within-person centred variables, because of the multicollinearity between the within-person centred variables, in the case of mixed-emotions and PA ($r = 0.44$, $p < .001$) and mixed-emotions and NA ($r = 0.78$, $p < .001$).

Results for this model supported the observed effect of mixed emotions making better judgements in the next match, β = 1.58, t(130.02) = 2.76, p = .007, *95% CI* [0.45, 2.71]. Time was negatively related to making more likely judgements, β = -0.58, t(114.33) = -2.66, p = .009 *95% CI* [-1.00, -0.15]. Lagged PA and NA did not predict better judgements, the interaction between these two variables were not associated with better judgements, β = -0.26, t(192.58) = -1.673, p = .085. The observed effect size for this model was small in magnitude, R^2 = 0.14.

The second model used a within-person centred variable of lagged mixed emotions reported at the end of the match, two within-person centred variables for PA and NA reported at the beginning of the match (no lagged, measured in the same moment when predictions were made), the interaction between these two, and time. Again, results supported better judgements made in the following match based on higher levels of mixed emotions at the end of the previous match, β = 1.03, t(172.91) = 3.61, p < .001, *95% CI* [0.46, 1.59]; whereas PA was negatively associated with making more likely judgements, β = -1.28, t(151.06) = -2.66, p = .005, *95% CI* [-2.23, -0.33], and no effect was observed for NA. As with the previous model, time was negatively related to better judgements, β = -0.51, t(146.11) = -2.28, p = .025, *95% CI* [-0.96, -0.07].

Discussion

We began from the premise that mixed emotions can be beneficial when navigating scenarios with uncertain outcomes, helping people to make more reasonable prospective judgements. Specifically, we sought to investigate this association in an ecologically valid setting, using naturally occurring mixed emotions. Thus, we carried out a lagged-effect study during the FIFA World Cup 2018, in which participants were surveyed in their emotions (at the beginning and the end of each match) and judgements about the match outcomes (at the

beginning of each match) were taken during the tournament. Overall, the results showed that participants made better judgements of a likely score in a match when experiencing higher levels of mixed emotions at the end of the previous match. In contrast, general positive affect was associated with less likely judgements, and there was no effect of negative affect.

The models tested in this investigation divided the portion of the variance over time explained by averaging idiosyncratic reports made by participants across all units of time (between-variables) from the portion of variance explained by natural fluctuation from time to time for each individual (within-time). As judgement likelihood naturally varied from game to game, we tested our hypothesis using the main independent variable of the within-person version of mixed emotions, although we also controlled for the potential effects of between-person effects. Additionally, our models controlled for linear time trends by adding time to the model, and also accounting for common autoregressive effects observed in intensive longitudinal measurement. Finally, we added random intercepts and, for some models, random slopes to examine the robustness of the effects.

We tested whether individuals who experienced higher mixed emotions at the end of each match would make more likely judgements at the start of the next match, as a result of the mixed emotions. Our pattern of results illustrated this effect: mixed emotions experienced at the end of the match predicted more likely judgements at the beginning of the next match. These results were resilient to the inclusion of several covariates. For ease of comprehension we discuss the findings below as “the effect” of mixed emotions although we stress that as the study is non-experimental, we cannot infer a causal relationship.

One may speculate that this result is better explained by the time trends in the experience of mixed emotions. The effect of mixed emotions on judgement could be better explained by a

linear association between increments or decrements of mixed emotions and judgements made, or merely because of average levels of mixed emotions reported across time are a stronger predictor. However, this trend was not observed, and the effect of mixed emotions on judgements remained after including mixed emotions reported in the same match, and also after controlling for individual differences in mixed emotions (Rafaeli et al., 2007).

Alternative hypotheses may suggest that the influence of mixed emotions on judgements are better explained by the compositional positive emotions or negative emotions involved in the mixed emotions index. In other words, the single emotions surveyed before each match may be stronger influences on judgements than the mixed emotion index. However, this was not the case. Only happiness reported before the match was negatively related to making more likely judgements, and none of the single emotions (including interactions between single emotional adjectives) changed the main effect of mixed emotions on judgements.

Another possibility could be that the general affective tone of people during the match (i.e., core positive or negative affect; Russell & Barrett, 1999) may be a better explanation for our finding. Again, the inclusion of positive affect and negative affect (before or after the match) or the interaction between these two, and even lagged-effect versions for these variables were not related to judgements before the match. Similarly, moods estimated as the between-person centred variables for Positive Affect and Negative Affect (i.e., average levels of PA and NA for each individual across all units of time) were not related to making more reasonable judgements or disconfirmed the main effect of mixed emotions on judgements.

We also explored whether attitudinal variables or situational variables may better explain our findings, but this was also not the case. Adding variables such as nationalism, the degree of identification with the team, and prediction confidence to the model did not prove to be

statistically significant, and the main effect of lagged mixed emotions remained intact. Similarly, the number of people with whom each participant watched the match or the place where the participant watched the match was not related to more feasible judgements about the outcome, and the effect of mixed emotions remained.

Finally, we estimated whether mixed emotions had an impact on the emotional experience people reported before the next match. In accordance with previous literature, we found that mixed emotions measured after the previous match positively predicted positive affect, negative affect, and mixed emotions the next match, controlling for individual differences in mixed emotions. This finding shows the relevance of the measure of mixed emotions after the match for both PA and NA.

Overall, it is plausible to affirm that mixed emotions can help people to make more probable judgements during scenarios involving puzzling or uncertain outcomes, over and above the effect of other emotionally-related constructs (e.g., happiness), individual differences (e.g., PA, NA), attitudinal variables (e.g., nationalism, identification) and demographic characteristics. The study adds to the literature on mixed emotions and judgement making by measuring real-world emotions and judgements that are meaningful to participants. Examining mixed emotions in a naturally occurring situation enables researchers to understand the consequences of mixed emotions in everyday life.

The measures and materials in the present study are high on representativeness (Kvavilashvili & Ellis, 2004), reflecting more accurately how participants experience emotions and make judgements in everyday life compared to laboratory studies. In addition, it fulfils a call for more “reality” in emotion research and to take research outside of the laboratory (Kuppens,

2019). This can help to fuel "full-cycle" research in which experimental and ecological research are used together to help fuel theory generation (Mortensen & Cialdini, 2010).

Can mixed emotions help make people's beliefs more realistic?

Forecasting future outcomes when one cannot act upon them may be a naïve enterprise, but this is a common strategy when making decisions in real life (Makridakis & Taleb, 2009). According to Oettingen and Mayer (2002), anticipating the future can emerge in the mind as beliefs or judgements about the likelihood of certain events, or may take the form of free thoughts or fantasies. In the present research we asked participants to predict the future outcome of each England football match during the FIFA World Cup, and then we compared these predictions to the bookmakers' odds for each potential scoreline. The odds therefore reflect the participants' judgement likelihood. We investigated how mixed emotions contributed to making these beliefs more realistic. Can emotions help to move our beliefs closer to reality?

Previous research has shown that positive emotions, such as happiness, increase overconfidence (Ifcher & Zarghamee, 2014. Study 1), which can lead to poor forecasting (e.g., Hillary & Menzly, 2006). The effect of positive emotions on overconfidence appears consistent even when comparing its effect against other emotional experiences, such as anger, fear, or sadness (Ifcher & Zarghamee, 2014. Study 2). Aligned with this evidence we found that the degree of happiness reported at the end of the match negatively predicted more reasonable judgements about the results in the next match, suggesting overconfidence in future outcomes. This finding is consistent with the indulging strategy in the fantasy realization theory (Oettingen, 2000, 2012). Indulging occurs when people focus on the future positive outcome exclusively, misperceiving the present obstacles. Consistently, we found that an overreliance on the positive

aspects of reality may result in wishful thinking and, consequently a less likely prediction of future outcomes.

In contrast, we also found that mixed emotions predicted more reasonable judgements, making people's beliefs closer to reality, even after controlling for a number of affective, attitudinal, and contextual variables. At this point, the process through which this relationship is possible is unknown. However, we speculate that mixed emotions simultaneously signal the rewarding features of future outcomes and the obstacles perceived in the present, in line with the propositions of fantasy realisation theory and mental contrasting (Oettingen, Park, & Schnetter, 2001). Both future rewards and present obstacles would be accessible and integrated when feeling mixed emotions, offering substantial benefits compared to feeling positive or negative emotions alone. Our reasoning is also consistent with Livet (2010). He asserts that making judgements are the product of simultaneous comparisons between anticipatory emotions elicited from the observation of the present situation and the desired future outcome.

The availability of mental representations of future fantasies and present obstacles caused by mixed emotions can be understood in the context of the strategy of 'mental contrasting' in fantasy realization theory (Oettingen, 2000, 2012). When mental contrasting, people first envision the positive realization of a desired future goal and then contrast this with the obstacles of the present reality. The process of contrasting activates more accurate expectations of success, leading to a wiser goal selection (Oettingen, 2012). Research examining the emotional antecedents of spontaneous mental contrasting points towards the beneficial role of sad moods to encourage this process. Across six studies, Kappes et al. (2011) found that a sad mood induction produced greater self-initiated mental contrasting compared to neutral mood and happy moods, after participants had listed their desired future goals and present obstacles. The authors suggest

that a sad mood encouraged a deliberative processing style and signalled to participants that they should pay attention to the problematic obstacles in their present reality and how to overcome them to achieve their future goals. Mixed emotions are generally thought of as signalling both the rewarding features of future expectations and the obstacles perceived in the present (Berrios, 2019): both necessary ingredients for mental contrasting. We suggest that mixed emotions can therefore be an additional mechanism that instigate self-initiated mental contrasting. Mixed emotions might encourage people not only to spontaneously generate the representations of both desired goals and current obstacles, but also to contrast these in an effective manner. Positive fantasizes about how far the team can make it in the FIFA World-Cup led to more reasonable judgments only when people felt more mixed emotions, i.e. when they also contrasted these with the present obstacles, such as the strength of the upcoming opposition, or poor aspects of a recent performance. Further research is needed to examine whether mixed emotions are an effective mechanism that instigates spontaneous mental contrasting, but we consider that it is reasonable to advance such hypothesis.

Our evidence about the relationship between mixed emotions and making reasonable judgements may also help to expand the literature examining the relationship between emotion and decision-making. Research indicates that emotions such as fear and anxiety make people more sensitive to risk, which in turn produce more accurate risk estimations (Lerner & Keltner; 2001; Ragunathan & Pham, 1999); whereas anger and sadness make people more prone to risk leading to less accurate risk assessment (Lerner & Keltner; 2001; Ragunathan & Pham, 1999). These findings correspond with the direct impact of immediate emotions on decision making (Lowenstein & Lerner, 2003). However, the influence of mixed emotions on making judgements may reflect the operation of two anticipated emotions acting in parallel on making judgements.

An optimal deliberation process that combines a comparison between the elating relief resulting from future desires, and prudential pride emerging from cautious observation of reality (Livet, 2010). The idea that anticipated mixed emotions can have a direct impact on judgement and decision making awaits to be tested.

Limitations and Future research

One limitation to the study is the relatively small sample size (N =80), which was necessarily limited by the time frame of the study, conducted over the course of the World Cup. As such, further data could not be collected. However, the small sample size is mitigated somewhat by the 14 time points represented in the longitudinal design (Bolger et al., 2012). In addition, as the study was conducted remotely, there was no way to ensure that participants completed the post-match questionnaire immediately after watching the game. Completion time was highly skewed (towards fast responses), and retrospective reports of emotion are often as accurate as momentary responses (Barrett, 1997). However, ensuring that participants all complete post-match questionnaires at the same time immediately after the game would allow a greater measure of control over memory differences. Incentivising timely completions of questionnaires may be one way to overcome this issue in future studies.

A limit to the broader generalisability of the findings is that the study only considered the emotions of England fans, and predictions on England games. Sports fans make more optimistic predictions about their own team's results than other teams (Massey et al., 2011), meaning our participants' predictions may have been generally more biased than if they had been predicting the score of a game not involving England. It is likely that mixed emotions provide smaller benefit in improving judgement likelihood in situations where people are initially less biased. Future continental and global football competitions may give opportunity to test these

predictions using a cross cultural design, where fans of two teams predict the results of each other's games, as well as their own.

Another future direction for research in this area is to expand on the findings relating to the judgements people made. In the present research, we asked about participant's predictions of the scores of the games, but there were no measures of behavioural counterparts to these decisions. As we used bookmaker odds to estimate the likelihood of these predictions, an obvious prospect would be to investigate how mixed emotions affect actual gambling decisions, i.e. how much money a person would be willing to bet on their predicted score occurring. However, decision making in gambling behaviours is complex: although decisions are influenced by emotions (e.g., de Vries et al., 2008) they are also independently related to personality correlates such as sensation-seeking behaviour and impulsivity (Buelow & Suhr, 2013; Suhr & Tsanadis, 2007). This makes investigation of the relationship between mixed emotions and gambling decisions in an ecologically valid context such as watching sport tricky as these factors are difficult to control. An alternative would be to add a competitive element to the predictions, such as a prediction league, in which participants receive points for correct predictions, and compete against each other to be the most accurate predictor. This would help add stronger behavioural motivations to the predictions, but without including the potential loss-making elements of a gambling task.

Conclusion

A growing body of research has illustrated how mixed emotions can improve the accuracy of judgements in controlled laboratory tasks using induced emotions. We sought to take this research into the ecologically valid context of making judgements on football scores and mixed emotions felt during the FIFA World cup. The data showed that participants who felt

greater mixed emotions at the end of a match made more likely score judgements of the next match, providing evidence that mixed emotions are linked to judgement likelihood in naturalistic settings as well as in the lab. Future research should seek to replicate these findings in a cross-cultural study.

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Table 1. Descriptive and correlations between the variables studied ($N = 80$).

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. TimeR	2.500	1.710	.																						
2. Age	34.300	10.332	0.000	.																					
3. Gender	~	~	0.000	.126**	.																				
4. SSISQ_Pre	5.027	1.473	0.000	0.081	-.149**	.																			
5. NATQ_Pre	4.292	1.202	0.000	-.115*	0.028	.620**	.																		
6. PA_pre	3.298	1.281	.220**	-.267**	-.144*	.249**	.332**	.																	
7. NA_pre	1.139	0.924	.387**	-0.073	0.093	.163**	.228**	.224**	.																
8. PA_post	3.380	1.954	-0.087	-.124*	-0.010	.185**	.227**	.287**	.173**	.															
9. NA_post	1.571	1.498	.482**	0.030	0.075	0.048	0.064	0.124	.512**	0.099	.														
10. Mix_Pre	1.075	0.898	.422**	-0.118	0.065	.200**	.252**	.372**	.949**	.186**	.513**	.													
11. Mix_Post	1.215	1.258	.273**	0.046	0.044	0.067	0.105	0.098	.407**	.461**	.803**	.392**	.												
12. Pre_Happy	3.048	1.408	0.115	-.188**	-0.086	.180**	.252**	.910**	0.031	.232**	-0.025	.164**	-0.025	.											
13. Pre_Excited	3.548	1.408	.284**	-.298**	-.176**	.273**	.352**	.910**	.377**	.292**	.252**	.513**	.204**	.657**	.										
14. Pre_Sad	0.218	0.726	-.126*	-0.002	0.009	-0.116	-0.073	-.209**	.398**	-0.129	-0.012	.229**	-0.027	-.216**	-.165**	.									
15. Pre_Anxious	2.060	1.696	.476**	-0.079	0.097	.228**	.280**	.334**	.920**	.243**	.561**	.937**	.454**	.126*	.481**	0.006	.								
16. Post_Happy	3.468	2.088	-.183**	-.122*	0.013	.153**	.197**	.221**	0.098	.951**	-0.037	0.101	.361**	.190**	.213**	-0.095	.147*	.							
17. Post_Excited	3.291	2.029	0.020	-.113*	-0.033	.199**	.234**	.327**	.234**	.948**	.230**	.257**	.517**	.253**	.344**	-.151*	.318**	.803**	.						
18. Post_Sad	0.962	1.684	.517**	-0.013	0.067	0.027	-0.004	0.069	.440**	-.330**	.729**	.424**	.334**	-0.020	.146*	.134*	.421**	-.443**	-.181**	.					
19. Post_Anxious	2.180	2.110	.272**	0.052	0.052	0.046	0.094	0.122	.380**	.405**	.838**	.394**	.873**	-0.021	.244**	-0.125	.466**	.301**	.470**	.237**	.				
20. Judgements	11.730	4.643	-.257**	0.030	-0.030	-.168**	-.179**	-.199**	-.174**	-0.076	-.235**	-.193**	-.186**	-.156*	-.206**	-0.014	-.184**	-0.036	-0.111	-.173**	-.198**	.			
21. Confidence	65.790	16.051	-.388**	-0.009	-0.001	.247**	0.059	0.107	-.225**	.253**	-.346**	-.199**	-.252**	.164**	0.030	-0.039	-.229**	.294**	.183**	-.284**	-.267**	0.082	.		
22. No. of People	1.965	1.786	.176**	-.261**	-0.106	.198**	.140*	.282**	.182**	.143*	0.085	.229**	0.075	.200**	.315**	-0.102	.241**	0.094	.179**	0.040	0.088	-.134*	-0.025	.	
23. Venue	~	~	-0.003	0.055	0.110	0.016	-0.024	-0.006	-0.014	0.011	0.021	-0.013	0.001	-0.019	0.008	-0.002	-0.014	0.006	0.015	0.024	0.010	0.033	0.083	-.167**	.

Table 2. Model of the effect of mixed emotions on making judgements, including emotion-related variables and social-related variables.

Model parameters	Model 1		Model 2		Model 3	
	Estimate	*SE*	*Estimate*	*SE*	*Estimate*	*SE*
Level-1						
Intercept	12.65	0.66	12.42	0.84	14.97	2.90
Lag-ME-Pre_w	0.50	0.58	0.29	0.57		
Lag-ME-$Post_w$	0.87	0.38	0.84	0.37	0.86	0.29
Time	-0.53	0.22	-0.48	0.28	-0.51	0.22
Anxiety-Pre_w			-1.02	1.10		
Excitement-Pre_w			0.44	0.58		
Sad-Pre_w			-1.45	1.05		
Happy-Pre_w			-1.52	0.49		
ME-Pre_w			2.62	2.31		
ME-$Post_w$			-0.61	0.37		
Anxiety-Pre_w* Excitement-Pre_w			-0.36	0.34		
$Confidence_w$					0.01	0.03
Number of People					-0.48	0.41
Viewing					1.07-3.03	≈2.5
Level-2						
Lag-ME-Pre_b	0.58	0.60	0.20	1.32		
Lag-ME-$Post_b$	-0.16	0.68	1.41	1.55		
ME-pre_b			-0.73	1.31		
ME-$post_b$			-1.69	1.64		
SSIS					-0.53	0.32
NAT-Q					-0.18	0.36
Age					-0.01	0.04
Gender (*0 = male*)					0.57	0.83
Deviance -2ΔLL(Δdf)	581.6(5)		619.6(14)		407.2(13)	
R^2 *(aprox.)* at Level-1	0.07		0.17		0.22	
R^2 *(S&B)* total	0.14		0.20		0.20	

Note: N = 80, k = 480. ME: Mixed emotions. *SSIS*: Sport Spectator Identification Scale. NAT-Q: Nationalism Questionnaire.

Table 3. Model of the effect of mixed emotions on score prediction likelihood including PA and NA.

Model parameters		Model 4		Model 5	
		Estimate	*SE*	*Estimate*	*SE*
Level-1					
	Intercept	13.08	0.63	12.76	0.65
	Lag-ME-Post$_w$	1.58	0.57	1.03	0.28
	Time	-0.58	0.22	-0.51	0.22
	Lag-PA-Post$_c$	-0.27	0.21		
	Lag-NA-Post$_c$	-0.37	0.39		
	Lag-PA-Post$_c$ * Lag-NA-Post$_c$	-0.26	0.15		
	PA-pre$_w$			-1.24	0.43
	NA-pre$_w$			-0.14	0.53
	PA-pre$_w$* NA-pre$_w$			0.47	0.58
Deviance -2ΔLL(Δdf)		317.2(5)		322.8(5)	
R^2 *(aprox.)* at Level-1		0.14		0.19	
R^2 *(S&B)* total		0.13		0.14	

Note: N = 80, k = 480. ME: Mixed emotions. *NA*: negative affect. *PA*: positive affect.

Figure 1. *Fluctuations of the experience of mixed emotions at the beginning (A) and the end (B) of each match. Raw data and fitted regression lines for each participant over time. The number above each square represents the number assigned to each participant (n = 80), while the X-axis represents time.*