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The face of crime: Apparent happiness differentiates criminal and non-criminal photos

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ABSTRACT

In two studies we tested the hypothesis that observers can accurately distinguish between convicted criminals and matched controls, merely by scrutinizing facial photographs. Based on the Eudaimonic Activity Model, we further hypothesized that criminals and non-criminals differ in their apparent emotional positivity. Finally, based on honest signaling theory, we hypothesized that such emotionality differences can explain observers' ability to distinguish criminals and non-criminals. In Study 1 participants evaluated photos of people later convicted of crimes, and photos of matched controls. In Study 2 participants evaluated photos of Catholic priests later convicted of sexual offenses, and photos of the priests who replaced them at their parishes. All three hypotheses were supported. Furthermore, in Study 2, participants' own facial photos were rated by assistants. Consistent with honest signal theories, observer's facial positivity, as well as their self-rated positive affect, predicted their ability to perceive positive emotions in non-criminal faces.

According to Aristotles' Nicomachean ethics (Rackham, 1926), 'the life best lived' is lived in accordance with eudaimonic principles, as expressed by eudaimonic behaviors. Eudaimonic behaviors are 'activities in accordance with virtue,' the 'best activities of which men are capable.' In Aristotle's view eudaimonia is not a feeling or a state of mind – instead it is a way of being in the world that involves the pursuit and practice of exemplary goals, values, and attitudes. However Aristotle also viewed eudaimonic living as a primary way to attain subjective happiness, which he viewed as a chief 'good' for man. Although Aristotle's approach inextricably links eudaimonia and happiness, there is nevertheless an important distinction in that eudaimonia is manifested in motivation and action, whereas happiness is manifested in feeling and emotion. Ironically, Aristotle's ideas also suggest that happiness may not be approached directly, via mere 'hedonic' activities; it may only be achieved indirectly, by trying to live a virtuous life.

The Eudaimonic Activity Model (EAM; Martela & K. M. Sheldon, 2013, 2016, 2018; K. M. Sheldon et al., in press) formalizes these ideas by proposing that Eudaimonic activities are those that tend to bring about inherently satisfying experiences, which in turn bring about positive emotion and subjective well-being (SWB). According to the EAM, positive mood and well-being are mere outcomes of eudaimonic living, not the goal of living itself. As outcomes, however, they are reliable indicators that a person is living in a mature and virtuous way. Thus, the EAM acknowledges the unbreakable link between eudaimonia and well-being, while also establishing clear distinctions for empirical inquiry, which is imperative for scientific progress (Martela & Sheldon, 2019). The EAM views life as an experiment, in which we try out various routes to satisfaction and fulfilment. Hopefully, we are able to learn that eudaimonic activities provide the most reliable routes.

Many studies have supported the EAM, showing that some (but not all) theorized types of eudaimonic behavior (Ryan et al., 2008) promote satisfaction, and hence positive mood or SWB. These include: endorsing intrinsic values (growth, service, connection) more than extrinsic values (money, status, appearance; Niemiec et al., 2009); pursuing self-concordant goals that express one's values and passions (Sheldon & Elliot, 1999); living a time-balanced life (K. M. Sheldon et al., 2010); inhabiting an authentic 'social character' that expresses one's unguarded or deep self (K. M. Sheldon et al., 2012); behaving in other-centered and prosocial ways (Martela & Ryan, 2016); and having a long-term rather than a short-term time perspective (Huta, 2015). In contrast, pursuing hedonic

behaviors involving pleasure, materialism, and self-gain can provide benefits in the short run, but ultimately tend to work against a person's happiness and well-being because they are not as meaningful or genuinely satisfying (Kasser, 2002). These EAM findings suggest that 'trying to live in a good way' is not as painful as sometimes thought; the effort tends to pay off in currencies that count, including personal meaning, frequent positive emotions, and strong life-satisfaction (Martela & Sheldon, 2019).

Still, there are two important limitations to EAM studies thus far. First, there have been no EAM studies involving what might be construed as the essence of eudaimonic behavior: honesty and morality. Does being moral and honest help make people happy? Intuitively, these characteristics fit into the broad set of eudaimonic behaviors examined thus far, and thus might be expected to be predictive of happiness. However, the connection has been little studied. Phillips et al. (2014) provided a philosophical analysis asserting that happiness entails individuals experiencing positive psychological states *when they should*; that is to say happiness is about feeling good, but only when doing good. Research by Phillips et al. (2017) supported this, finding that observers' moral evaluations of an agent's life predict observers' evaluations of that agent's happiness. Similarly, observers' perception of the virtuousness of the organization an agent belongs to predicts ratings of the agent's well-being (Rego et al., 2011). Aghababaei et al. (2016) found that the honesty factor of the HEXACO model of traits is reliably associated with subjective well-being. Together, these findings provide good initial reasons to believe that the EAM model might be extended to include moral and honest behaviors as exemplars of eudaimonic activity.

A second limitation of EAM research is that it has relied almost exclusively on self-report, in measuring both eudaimonic activity and happiness/SWB. Thus, the positive association between eudaimonic behavior and happiness might reflect a type of response bias, or the operation of mere lay theories within participants. It would be desirable to confirm EAM propositions via other methods, for example, via observer reports regarding targets, rather than via targets' own self-reports.

The aim of the current studies was to address these two limitations of past EAM research, by examining whether there is a linkage between the observer-rated honesty (i.e. criminality) of a target's face, and observer-rated happiness of that target. We also test whether observers' judgments of criminality are accurate, by using faces of people convicted of crimes, compared to matched control faces. Finally, we examine whether perceived happiness differences in faces can explain the accurate criminality judgments regarding those faces.

Why might both honesty and happiness be visible on peoples' faces? K. M. Sheldon et al. (in press) proposed that Duchenne smiles (in which the orbicularis oculi or cheek muscle participates as well as the zygomatic major or mouth muscle; Ekman et al., 1990) evolved as 'honest signals' of chronic positive affect as well as of momentary positive emotion. Honest signaling systems (Smith & Harper, 2003) operate conjointly within both signal-producers and signal-receivers, enabling the two parties to assort and cooperate with one another (K. M. Sheldon et al., 2000). Specifically, K. M. Sheldon et al. (in press) proposed that chronic positive mood, which is derived from eudaimonic activity according to the EAM, facilitates experiences of momentary positive emotions. These emotions in turn facilitate the production of Duchenne smiles. Others recognize such smiles, especially when they are frequently produced, as indicating that the smiler is a happy person and thus likely a trustworthy and cooperative person (Harker & Keltner, 2001; Phillips et al., 2017). Thus, they are more likely to choose to interact with that person, and to establish mutually beneficial cooperative relations with them, perhaps especially if they are happy people themselves. K. M. Sheldon et al. (in press) reviewed the Duchenne smile literature to find good support for all but the last proposition, which is evaluated for the first time in the current Study 2.

Emerging research suggests that more can be read from a photograph of a person's face than whether they are smiling and experiencing positive emotions. For example, people can accurately evaluate the objective trustworthiness of a person from their facial appearance (Wilson & Rule, 2017), and can also guess, at better-than-chance rates, a person's personality traits (Tackett et al., 2016), sexual orientation (Rule & Alaei, 2016), political orientation (Rule & Ambady, 2010), antigay prejudice (Alaei & Rule, 2019) and even their lifespan (Re et al., 2015; however see Todorov et al., 2015, for a critique of such research). 'Thin slice' research also shows that people can form accurate impressions regarding many characteristics of others, based on only a few seconds of observation (Tackett et al., 2016).

Of specific relevance for the current studies is the question of whether people can accurately detect dishonesty or criminality in others' faces. Previous research has shown that when looking at photos of convicted criminals, perceivers' inferences of possible criminality were related to the perceived trustworthiness of the person in the photo (Klatt et al., 2016). Participants can also match criminal offenses to photos of convicted individuals at a greater than chance rate for certain

crimes, with drug crimes and sex crimes being matched most accurately (Krienert et al., 2018). Perceptions of the propensity for violence gleaned from a photo have been found to be associated with actual violent history (Stillman et al., 2010). While the above findings provided initial evidence that people can recognize criminals from their faces, they all lacked a non-criminal control group for comparison.

Porter et al. (2008) used a control group, showing that participants could distinguish faces of 'America's most wanted' criminals from faces of Nobel Laureates. In better controlled studies, Royer (2018) found that individuals could predict future criminality from yearbook pictures. Valla et al. (2011) found that participants could reliably distinguish between criminal and non-criminal headshots, even after removing the effects of the target's gender, race, age, attractiveness, and emotional displays. However, observers could not distinguish between violent and non-violent criminals.

In the current studies we attempted to build off of the Valla et al. (2011) study. Our first hypothesis was that participants can distinguish between criminal and non-criminal faces. In Study 1 we used criminal mugshots compared to matching controls to evaluate this ability, and in Study 2 we used faces of Catholic priests convicted of sexual offenses compared to replacement priests at the same churches.

In addition to attempting to replicate the basic effect of Valla et al. (2011), we also attempted to extend the pattern, by asking participants to evaluate the emotional positivity or happiness of the target faces. In line with the EAM, we expected that objective criminality, as well as judgments of criminality, would be negatively associated with judgments of positivity/happiness (Hypothesis 2). This would support our new EAM-based proposal that dishonest and immoral people appear to be less happy than honest and moral people. Further, we evaluated whether this lower apparent happiness would explain observers' ability to recognize the objective criminals in the mix (Hypothesis 3). Such a mediational finding would support the idea that happiness is an honest signal of virtue, a cue that helps observers to identify moral and trustworthy others.

Finally, we examined whether participants' own emotional positivity, as judged by observer ratings of participants' own faces, influence their judgment abilities. In further accordance with the conjoint signaling system idea, we suspected that happier participants would be better able to recognize the happiness of 'good' targets, compared to criminal targets (Hypothesis 4, tested only in Study 2). This mechanism would presumably help the two happier participants to assort with each other.

Study 1

Method

Stimuli

The initial set of 194 photographs came either from online criminal databases[1] or from photoset databases assembled in previous studies.[2] Target photos were gathered if they fit the following criteria: looking straight ahead, portraying a neutral facial expression, between the ages of 18 and 30, and not having any facial hair, face piercings, or visible tattoos. All targets were white females and males. Due to initial differences in photo quality and lighting within and between databases, each non-criminal photo was randomly matched with a criminal photo and then both photos were digitally manipulated using Paint Shop Pro (Jasc Software Inc., 2009) to produce a balanced level over both groups. Photos were also edited so that all had white backgrounds and all target shoulders were black.

Two pilot studies (total N = 72), one for each gender of photographs, were then conducted with two purposes in mind. Having obtained a large portion of the initial photo set from online criminal databases, as well as photo databases in which target expression was not assessed, a main purpose of the pilot was to remove photos in which the target was perceived as not displaying a neutral expression. Targets rated by more than 25% of participants as having non-neutral expressions were removed. In addition, although all photos were edited in order to resemble each other as closely as possible, factors such as photo quality and lighting could have provided participants with clues in discriminating between the criminal and non-criminal groups. We therefore had participants also rate the target photos on a measure of perceived criminality, with a 5-point likert scale of 1 = 'Definitely a student/volunteer', 3 = 'Not really sure (could be either)', 5 = 'Definitely a criminal'. Target photos were removed if the criminality rating was more than one standard deviation below or above the middle response of 'Not really sure (could be either)'. Removing these seemingly obvious criminal-looking or non-criminal-looking targets provides a more stringent test of our predictions. The final set of photographs used in the main study contained 96 photos (48 female targets and 48 male targets), 58 from convicted criminals and 38 from controls (see on-line supplement for the photos; the imbalance resulted from the photo-by-photo culling procedures employed in the pilot studies).

Participants and procedure

We collected criminality judgments and emotion judgments from independent samples, to reduce the

influence of participant lay theories concerning the connection between criminality and emotion. Both samples rated the same set of 96 photos, and both were recruited through Amazon's Mechanical Turk and paid 1.00 USD for participating. After excluding inattentive or overly hasty participants, the first sample of 85 participants (46 men and 37 women) had an average age of 36.7 ($SD = 11.8$) and was 79% Caucasian. The similarly-trimmed second sample of 86 participants (47 men and 38 women) had an average age of 36.9 ($SD = 10.5$) and was 69% Caucasian. Each participant evaluated a subset of 16 photos randomly selected from the overall set. Each of the 96 photos were evaluated by between 11 and 17 participants across both samples.

First-sample participants were told: 'On the following screens you will be shown a collection of photos that randomly consists of: 1) photos taken of students or volunteers and 2) criminal mug shots.' Below each subsequent photo they read: 'Does this photo look like it is of a student/volunteer or a criminal?' Participants were provided a 5-point scale ranging from 1 = 'Definitely a student/volunteer' to 3 = 'Not really sure (could be either)' to 5 = 'Definitely a criminal.' Second-sample participants were told: 'On the following screens you will be shown a collection of photos of people from a particular area and asked to evaluate them on several different measures.' Below each subsequent photo they read: 'What kind of emotion do you think this person is feeling?' Participants were provided a 7-point scale ranging from 1 = 'Very negative' to 4 = 'Neutral' to 7 = 'Very positive.' The criminality and emotionality rating variables were combined into a single dataset (N = 96 photos), along with the objective criminality information. Both samples made further ratings irrelevant to the current study which were not included in the Study 1 dataset.

Results

The average criminality rating for the 96 photos was 2.84 ($SD = 0.50$), close to the neutral value of 3.00 ('not sure, could be either'). The average emotional positivity for the 96 photos was 3.84 ($SD = 0.59$), close to the neutral value of 4.00. The criminality and positivity ratings correlated −.42 ($p < .001$), despite having come from different samples. This is consistent with Hypothesis 2's prediction that criminals would be judged less happy. Our primary hypotheses, however, concerned the *accuracy* of criminality judgments, to which we now turn.

Supporting Hypothesis 1, a matched-group t-test found that participants were more likely to identify the convicted criminals as criminals, compared to the volunteers ($M = 2.93$, $SD = .47$ versus $M = 2.71$, $SD = .47$; t

(94) = −2.30, $p = .023$, $d = 0.48$, 95% CI [−0.42. −0.03]). Supporting Hypothesis 2, participants perceived the criminal group as experiencing less emotional positivity than controls ($M = 3.74$, $SD = .60$ versus $M = 4.00$, $SD = .56$; $t(94) = 2.11$, $p = .038$, $d = 0.44$, 95% CI [0.02. 0.50]). Stated differently, participants rated the convicted criminals as feeling slightly negative emotions compared to the more neutral-looking volunteers.

To test Hypothesis 3, that ratings of emotion felt would explain the link between objective and subjective criminality, we conducted a bootstrapped mediation analysis with 5,000 samples (Preacher & Hayes, 2004) testing the emotion rating as a mediator of the relationship between criminal status and criminality ratings. The analysis first established that objective criminal status was a significant predictor of subjective criminality, b = .23, t(94) = 2.30, p = .02, 95% CI [0.03, 0.42]. The analysis then revealed a direct effect of objective criminal status on the proposed mediator (DE = −.26, SE = .12, p = .038, LL = −.50, UL = −.01). Also within the mediation model, the direct effect of objective criminal status on criminality ratings was no longer significant (DE = .14, SE = .09, p = .122, LL = −.04, UL = .32). Most pertinent to Hypothesis 3, the indirect effect of objective criminality on rated criminality via rated felt emotions of the target was significant (IE = .08, SE = .04, LL = .01, UL = .18). In sum, perceptions of felt emotion mediated the relationship between objective criminality and rated criminality.

As a supplementary analysis we ran separate regressions for the convicted criminals group (N = 58) and for the volunteers group (N = 38) predicting criminality ratings from emotionality ratings. In the convicted criminals group, emotion ratings explained 25.9% of the variance in criminality ratings (F(1, 56) = 19.55, p < .001) and significantly predicted criminality ratings ($\beta = −.40$, p < .001, 95% CI [−0.58, −0.22]). For the control group, emotion ratings explained only 4.0% of the variance in criminality ratings (F(1, 36) = 1.52, p = .23) and was not a significant predictor of criminality ratings ($\beta = −.17$, p = .23, 95% CI [−0.45, 0.11]). In sum, participants apparently used emotion differences in the criminal faces when judging them as criminals (hits), but emotion differences did not affect criminal judgments of control faces (false positives).

Study 2

Although Study 1 provided good initial evidence for our hypotheses, one weakness of the study is that the criminal photos were taken during the person's arrest. Thus our findings may represent a context effect rather than a personality effect, although being a less moral person

and being arrested are doubtless highly correlated. In Study 2 we rectified this issue by using photographs taken *before* the person's arrest: specifically, we used parish photos of Catholic priests wearing their robes, taken before some of those priests were convicted of sex offenses. Our assumption was that priests-to-be-convicted had likely already fallen into negative life-styles, which might be revealed on their faces despite the fact they had not yet been accused and convicted.

We gathered our source images from a database of publically accused priests. Thus, Study 2 afforded us a chance to test our ideas in an important ecological context. Might the images available in public archives be used to judge a person's criminality, at a better than chance rate? If so, consumers might seek out such archives prior to making choices, amongst churches, therapists, coaches, and the like. The disadvantage of using a public archive is the researcher's loss of control over the stimuli set. What if the curators who assembled the archive were biased to select unattractive images of the priests, knowing that they are all accused of crimes? Below, we describe our procedures to minimize this possibility and other possible confounds.

Method

Stimuli

In preparation for Study 2 we collected images from a database of U.S. Catholic clergy publicly accused of sexually abusing children and/or possessing child pornography (http://www.bishop-accountability.org/member/index.jsp). The database contains more than 6500 entries of publicly accused priests. However, only about 10% of these entries are listed as convicted/sentenced (most are simply listed as 'accused'). For our own data-set, we only considered this subset of 'convicted' photos, to maximize the chances the individual really is a criminal.

To equate the background context and setting of all images (including the matched control images, described below), we further decided to include only images that show the man in priestly garb. The criterion ensured that the photographs were all taken in a similar neutral setting, as the priest posed for an 'official' church photograph. This selection criterion greatly narrowed the image-set, excluding casual shots and mug-shots, for example. We also eliminated a large number of the photos based on image quality, because many of the photos in the database were reproductions of reproductions, often of low-resolution newspaper images.

In the end, we arrived at a set of 60 good quality images with which to proceed. To address the possibility of bias being introduced by the curators selecting the

photos, we emailed the database curators about their selection criteria. We were informed that there are often multiple photos of one individual, but that their rule-of-thumb is to post in the database the photo that is early-career. This rule would seem to reduce the potential for curator bias, while also conveniently selecting for images of the priests as younger men, commensurate with the likely younger age of their replacements.

With these 60 images in-hand we attempted to assemble a matched control group by finding images of the successor/current priest at the convicted priest's former church, by visiting the church's current website. As with the convicted priests, images were included only if they depicted the man in priestly garb. We were able to find matching images for 32 of the 60 convicted priest images, in which there was an adequate-quality picture of a replacement (garbed) priest. Thus, our final dataset consisted of 64 images, 32 convicted priests and 32 replacement priests. All images were cropped to a standard size that showed the person's head and part of their shoulders. Color images were converted to black and white, and all images had a plain, light-colored background.

Participants and procedure

Participants were 158 freshmen psychology students at the University of Missouri, 54 men and 108 women, who participated to satisfy a course requirement. They first read: 'One question we are studying is the relationship of peoples' physical appearance to their survey responses. Therefore, we would like you to upload a picture of your own head and shoulders right now! You can either browse for such an image that you already have, or you can take a new picture now and upload it.' These uploaded images were later edited in the same way as the priest images described above. Next, participants completed two measures of well-being: a nine-item adjective-based measure of positive and negative mood (Emmons, 1991; Sheldon, 2020) and a two-item measure of life-satisfaction (Brunstein, 1993). Positive affect, negative affect, and life-satisfaction scores were computed from these ratings, and an aggregate SWB score was computed by subtracting negative affect from the sum of the other two scores (Diener, 1994; Sheldon & Elliot, 1999).

Next, participants read 'Now we are going to show you a series of faces. For each individual, you are going to rate how generally happy they are, based on the photo.' The 64 priest images were presented in rando-mized order, each with the question 'How happy is the person above?' with a response scale ranging from 1 (extremely unhappy) to 7 (extremely happy). Then parti-cipants read: 'About half of the individuals that you just

rated have actually been convicted of a sex crime. Your job is to try and identify which ones were convicted of a sex crime.' The 64 images were then presented again in a different randomized order, each with the question 'Do you think the person above has been convicted of a sex crime?' with 'yes' or 'no' response options provided.

We told participants that about half the priests were convicted because it was the truth, and because this set up the signal detection analyses reported below (true versus false positives and negatives). Another reason to tell them was that otherwise, participants might vary widely in their baseline expectations regarding the dataset. Some participants might think 'in reality a very small fraction of priests get convicted, thus there are probably very few convicts in this set of pictures', whereas others participants might think 'there must be a lot of convicted priests in this set of pictures, since they are studying convicted priests.'

Research assistant ratings

Later, three trained undergraduate research assistants (RAs) were asked to make ratings concerning both the priest images and the participant images. Regarding the priest images, we asked RAs to evaluate the apparent quality of the photograph ($\alpha = .90$), since the photos still varied considerably in quality. We also asked them to evaluate the apparent age of the person in the photograph ($\alpha = .85$), to control for any remaining apparent age differences. Image quality and priest age were to be employed as control variables. Regarding the participant images, we asked the RAs to rate the happiness displayed in the participant images (with a 7 point scale; $\alpha = .85$). Because almost all of the uploaded images were smiling, we also educated RAs on the Duchenne concept and pattern and asked them to rate the 'genuineness of the smile' ($\alpha = .80$) and 'smiling in the eyes' ($\alpha = .84$). Since these correlated .94 we combined them into a single 'Duchenne smile' variable ($\alpha = .96$).

Datasets used for hypothesis tests

Finally, we combined the participant and research assistant data, in two different ways. First, we constructed a dataset of 64 priests[3] which contained the priests' objective status (convicted vs matched control), the averaged participant ratings (based on 158 ratings), and the averaged research assistant ratings (based on 3 ratings). This dataset allowed us to test hypotheses 1, 2, and 3. Second, we constructed a dataset of 158 participants which contained each participants' ratings of the happiness and criminality of each priest, each participant's ratings of their own well-being, and the three research assistants' averaged ratings of the participant's happiness, Duchenne smiling, and criminality. This dataset allowed us to test Hypothesis 4.

Results

Table 1 provides descriptive statistics and correlations for the four study variables in the priests dataset (N = 64). As can be seen, participants identified 47% of the priests as criminals, in line with the given information that about half of the priests had been convicted of a crime. The average rated happiness of priests (4.80) was well over the midpoint of 3.5, consistent with the typical positivity offset bias (Diener et al., 2015). Research assistants estimated the average age of the priests to be 50, and adjudged the average picture quality to be just over the midpoint. The most interesting correlational result was that the participant-rated happiness of the priests was correlated −.53 with participant-judged criminality of the priests, consistent with Hypothesis 2's prediction that criminal priests would appear less happy. Again, however, our primary hypotheses concerned the *accuracy* of criminality judgments, not just the linkage between perceived criminality and perceived happiness.

To test Hypothesis 1 we conducted paired t-tests of priests matched by parish. We found a significant difference in perceived criminality by priest status (convicted/control Ms = .52 and .43, t(31) = 2.49, p = .018). Signal detection analyses supported this conclusion, as the proportions of hits (.52) and correct negatives (.57) both exceeded the proportions of false alarms (.43) and misses (.48; d′ = .26).

Supporting Hypothesis 2, participants also perceived later-convicted priests as being less happy than matched replacement priests (convicted/control *M*s = 4.60 and 5.00; *t*(31) = 2.33, *p* = .027). For the readers' information, convicted and non-convicted priest groups did not differ in RA-rated priest age or picture quality (all *p*s > .35).

To test Hypothesis 3, that perceptions of priest happiness would explain the link between objective and subjective criminality, we conducted a bootstrapped mediation analysis with 5,000 samples (Preacher & Hayes, 2004) testing the happiness ratings as a mediator of the relationship between dummy coded priest criminal status (0 = criminal and 1 = non-criminal) and criminality ratings (scores closer to zero equate to more criminality). The analysis first revealed a direct effect of objective criminal status on the proposed

Table 1. *Study 2*: Descriptive statistics and correlations for the variables in the priest dataset (N = 64).

	M	SD	1	2	3
1. P-rated Happiness	4.80	0.94			
2. P-rated Criminality	0.47	0.14	−.51**		
3. RA-rated Priest age	50.1	12.67	−.06	−.16	
4. RA-rated Picture Quality	3.92	1.11	.08	−.31*	.08

Note. Correlations involving the Criminality variable are point-biserial correlations; *p <.05, **p <.001

mediator of happiness (DE = .40, SE = .20, p = .050, LL = −.80, UL = .00). Also, within this model, the direct effect of priest criminal status on mean criminality ratings was significant (DE = .07, SE = .03, *p* = .049, LL = .00, UL = .13). More pertinent to Hypothesis 3, the indirect effect of objective criminality on rated criminality via rated happiness of the target was significant (IE = .03, SE = .02, LL = .00, UL = .07). In sum, perceptions of felt emotion significantly mediated the relationship between objective criminality and rated criminality.

In a similar exploratory analysis as in Study 1, we ran two separate regressions for convicted priests (N = 32) and control priests (N = 32) with the perceived happiness of the priest entered to predict hit rate in the sample of 32 (i.e. correctly identifying a criminal) and true negatives in the sample of 32 (i.e. correctly identifying a non-criminal), respectively. For convicted priests, happiness ratings explained 30.2% of the variance in hit rate (*F*(1,30) = 12.98, *p* = .001), and significantly predicted hit rate (β = −.08, *p* = .001). For non-convicted priests, happiness ratings explained 16.9% of the variance in true negatives (*F*(1,30) = 6.11, *p* = .019) and significantly predicted true negatives (β = .09, *p* = .019). In sum, participants apparently used perceptions of facial (un)happiness to recognize criminal priests, and perceptions of facial happiness to recognize non-criminal priests.

To test H4, that participants' own apparent (and self-reported) emotional positivity would be associated with their perceptions of priest criminality and happiness, we turned to the second dataset (N = 158). Table 2 presents descriptive statistics and correlations for the major study variables. As can be seen, none of the P's happiness variables (either RA-rated or self-rated) predicted accuracy in identifying the priests' status. However, all four of the P's happiness variables (RA-rated P happiness, RA-rated P's Duchenne smiling, P-rated positive affect, and P-rated SWB) were significantly correlated with perceiving happiness in the non-convicted priests, and none of the four P's happiness variables were significantly correlated with perceiving happiness in the convicted priests. We evaluated whether the differences in these four pairs of correlations were significant using Lee and Preacher

(2013) two-tailed test of the difference between dependent correlations. In all four cases P's happiness was differentially associated with their happiness ratings of convicted and non-convicted priests (RA-rated P's happiness, z = 2.40, p = .016; RA-rated Duchenne smiling, z = 2.19, p = .028; P-rated positive affect, z = 2.40, p = .016; P-rated SWB, z = 2.84, p = .005).

Finally, we conducted a regression analysis predicting P-rated happiness of non-convicted priests from both RA-rated P's happiness and P-rated positive affect, to test for additive effects. In this analysis both predictors were significant (βs = .191 and .198, respectively, ps = .015 and .011). This indicates that both the apparent happiness of P's faces *and* their self-rated positive affect account for independent variance in the judgment of happiness in 'good' priest faces. There was no interaction between the two variables.

Discussion

These two studies tested the novel hypothesis that people can distinguish between moral and less moral people (i.e. convicted criminals vs controls) on the basis of the positivity displayed in a single facial photograph. Our studies were also the first to test the EAM using observer-report data (regarding images of targets) rather than using self-report data (obtained from targets themselves). Both studies found support for H1, conceptually replicating the findings of Valla et al. (2011). Specifically, participants could tell, with better than chance accuracy, which young adult faces belonged to later-convicted criminals and which ones did not (Study 1), and which priest faces belonged to later-convicted pedophiles and which ones did not (Study 2).

H2 proposed that faces of criminals would evidence less emotional positivity than faces of controls, based on the EAM propositions that eudaimonic (i.e. virtuous) behavior promotes satisfaction and well-being and that honesty and morality are examples of eudaimonic behavior. In leading a life that led to a criminal conviction these targets were failing to achieve fulfillment and well-being, a fact we thought would be apparent on their faces. In both studies, participant ratings of the

Table 2. *Study 2*: Descriptive statistics and correlations for major study variables in the participant dataset (N = 158).

	M	SD	1	2	3	4	5	6	7
1. RA-rated P's Happiness	4.42	1.37							
2. RA-rated P's Duchenne Smiling	4.01	1.57	.95**						
3. P-rated positive affect	4.96	1.13	.08	.12					
4. P-rated subjective well-being	2.01	4.44	.00	.04	.79**				
5. P's Hits	0.53	0.18	.03	.05	−.01	−.11			
6. P's True negatives	0.58	0.19	−.06	−.11	−.02	.07	−.77**		
7. P-rated happiness of non-convicted priests	4.98	0.43	.21*	.19*	.21*	.28**	−.22*	.20*	
8. P-rated happiness of convicted priests	4.58	0.43	.09	.08	.09	.14	−.11	.11	.80**

Note. Correlations involving the hits/true negative variables are point-biserial correlations; *p <.05, **p <.001

criminality of faces were strongly negatively associated with participant ratings of the emotional positivity of faces. This shows that criminality and emotional positivity are at least linked by lay theories within observers' minds. More importantly, participants perceived the faces within the convicted criminal group as expressing less positivity, within both studies. This indicates that more than a lay theory is at work; criminals really do appear less positive.

H3 proposed, based on honest signaling theory (Sheldon et al., in press; Smith & Harper, 2003), that facial positivity is an important cue to the objective honesty or morality of the person being judged. In this view, eudaimonic behavior evokes chronic positive mood within people, which is evident on their faces. Observers use this evidence to make inferences about the trustworthiness and integrity of targets, presumably as a basis for deciding whether to assort with the target. If correct, this reasoning implies that facial positivity will mediate peoples' accurate judgments of criminality. H3 was supported in both studies, consistent with this reasoning. However, one limitation is that we did not actually measure eudaimonic behavior in these studies, and another limitation is that we cannot be sure that all of the non-criminals really aren't criminals.

H4 proposed, also based on honest signaling theory, that observers who are themselves high in positive emotionality are better able to recognize positivity in others, and thus better able to judge trustworthiness and morality. Honest signals are conjoint systems that require both parties to participate (Smith & Harper, 2003). In the case of helping happy people to associate with each other, it would make sense that both observers and targets would need to be experiencing positive emotion for the system to work, i.e., for targets to reciprocate the perceivers' interest. H4 was tested only in Study 2, and received only partial support. Both participants' RA-rated facial positivity and Duchenne smiling, and their self-reported PA and SWB, predicted their perceptions of facial positivity in the control priest faces, and not within the convicted priest faces. Thus, participants' own well-being helped them to perceive well-being in moral others. However, participants' well-being and facial positivity were unrelated to their accuracy in distinguishing between convicted and non-convicted priests. It is possible that if the stakes had been boosted, perhaps by asking participants which priests they would want to actually meet or get to know, then the expected difference would have emerged. However this speculation awaits testing.

In sum, these studies provide promising initial data for the interesting and potentially important idea that people can 'judge the quality of a book by its cover' – that they can tell which strangers are trustworthy and reliable and which ones are not, just by the positivity of their faces. They also provide a new kind of evidence for the EAM assumption that eudaimonic or virtuous behavior is rewarded by subjective happiness (Sheldon, 2018). Obviously, further replication is required to fully confirm the pattern, and to test other mediators besides facial positivity. In Study 1, target faces had mostly neutral facial expressions. What conveyed positivity in this study, if not smiles? One possibility is that the expressions of criminals are more heterogeneous than non-criminals, as suggested by recent machine learning findings (Wu & Zhang, 2016). Or, in line with the human self-domestication hypothesis, perhaps criminal faces exhibit less subtle friendliness or openness despite the predominantly neutral expressions (Zanella et al., 2019).

Also, additional studies are required to test whether other participant variables besides well-being and facial positivity might moderate the ability to make accurate judgments. Such variables might include participants' own scores on honesty or morality measures, their standing on Dark Triad variables such as Machiavellianism, Narcissism, and Psychopathy, or their intrinsic (prosocial) versus extrinsic (self-serving) values (Sheldon & McGregor, 2000). Future studies might also take the next step by asking participants to actually choose group-mates with whom to play in dyadic or N-person prisoner's dilemmas (K. M. Sheldon et al., 2000). This might confirm the honest signaling proposal that happy people are able to assort and cooperate with each other, to their mutual advantage (Smith & Harper, 2003).

Notes

1. The criminal photographs came from the Arkansas, Florida, Georgia, Illinois, New Jersey, and Oklahoma online criminal offender databases (Arkansas: http://adc.arkansas.gov/inmate_info/index.php; http://www.dc.state.fl.us/AppCommon/; Georgia: http://www.dcor.state.ga.us/GDC/OffenderQuery/jsp/OffQryForm.jsp?Institution=; Illinois: http://www2.illinois.gov/idoc/Offender/Pages/InmateSearch.aspx; New Jersey: https://www6.state.nj.us/DOC_Inmate/inmatesearch; Oklahoma: http://docapp065p.doc.state.ok.us/servlet/page?_pageid=395&_dad=portal30&_schema=PORTAL30).
2. The non-criminal photos were of students or volunteers gathered from several previously used databases, including the Karolinska database (Lundqvist, Flykt, & Ohman 1998), Georgia Tech face database (http://www.anefian.com/research/face_reco.htm), Radbound Faces Database (Langner, Dotsch, Bijlstra et al. 2010), and two sources (Aberdeen and Ultrecht) obtained through the University of Stirling (http://pics.psych.stir.ac.uk/).
3. Participants actually rated 82 images, because we had some unmatched priests of both types within the dataset. Results were the same whether we used this large

set of ratings, or the subset of 64 fully matched ratings. We chose to report only the fully matched data because of the cleaner design and tighter control

Disclosure statement

Funding

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