



Applying an adaptationist framework to personality science: jealousy as a mechanistic basis of Emotionality^{*}

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ABSTRACT

Over the past half century, the field of personality psychology has developed several descriptive taxonomies, but progress toward a genuinely explanatory framework for between- and within-person variation in psychology and behavior has been elusive. We argue that this is largely due to (1) neglecting a key distinction between personality traits and the underlying psychological mechanisms that generate the behaviors captured by those trait constructs, and (2) insufficient focus on attempting to explain variation in the operation of those mechanisms. Here, we illustrate the utility of a *mechanism-centered* approach for personality psychology by empirically demonstrating that variation in the activation of the evolved psychological mechanism of jealousy is systematically linked to HEXACO Emotionality and NEO Neuroticism. People in monogamous long-term relationships ($N = 204$) read vignettes depicting varying levels of infidelity threat and wrote what they would think, feel, say, and do in response to the scenarios described. Two different groups of independent raters read the participants' written responses: one group assessed the activation of participants' jealousy by rating their expressed jealousy levels, and the other completed observer reports of the participants' HEXACO Emotionality. As predicted, (1) as infidelity threat increased across scenarios, jealousy levels increased, and (2) increased jealousy predicted higher observer-reported Emotionality. Moreover, (3) participants who exhibited higher jealousy levels reported higher levels of NEO Neuroticism, (4) these self-reports of Neuroticism covaried with the observer reports of Emotionality, and (5) a common-cause model revealed that jealousy accounted for a significant proportion of this covariance between self-reported Neuroticism and observer-reported Emotionality. These findings support the hypothesis that jealousy is a central mechanism underlying variation in Emotionality (and the overlapping Big Five/FFM dimension Neuroticism). More broadly, the present findings suggest that an understanding of specific evolved psychological mechanisms, including both their species-typical design features and individual differences in their operation, can help explain variation on major personality dimensions and offers personality science a genuine integration of universal human nature and individual differences.

Over the past half century, the discipline of personality psychology has made a wealth of empirical contributions, but progress toward *explaining* and *predicting* important within- and between-person

variation has been impeded by two fundamental conceptual problems. First, personality science has treated personality traits as if they represent the underlying psychological mechanisms that generate behavior.

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This issue, elaborated below, has resulted in the reification of *descriptors* (e.g., the Big Five personality dimensions) as *causal explanations* (see Buss & Craik, 1983). A second, derivative problem is that personality scientists—including those taking an evolutionary approach (e.g., Buss, 1991; de Vries et al., 2016; Denissen & Penke, 2008; Gurven et al., 2014; Lewis, 2015; Lukaszewski, 2013; Nettle, 2006; Penke et al., 2007)—have attempted to explain these purely descriptive traits as if they referred to underlying psychological mechanisms.

A more recent, mechanism-centered adaptationist approach (Lukaszewski et al., 2020) distinguishes between (i) personality traits and (ii) the psychological mechanisms that regulate cognition, affect, and behavior. This distinction has important implications for the advancement of personality science. First, this distinction makes it explicit that personality traits do not provide direct insight into underlying psychological mechanisms or their operation. Second, this suggests that researchers seeking to explain between-person or within-person variation should focus on underlying psychological mechanisms and their variable operation. In this paper, we (1) elaborate on the distinction between personality trait and psychological mechanism; (2) outline how researchers can study variation in personality traits using a mechanism-centered approach; and (3) empirically illustrate the utility of this approach by demonstrating that the differential activation of the jealousy mechanism generates perceived variation in the personality trait construct Emotionality.

1. Personality traits are not psychological mechanisms

To understand why personality traits do not provide direct insight into underlying psychological mechanisms, it is instructive to know how researchers constructed the major personality trait dimensions in the first place. The field's major trait constructs were produced predominantly through lexical and factor-analytic procedures: researchers began with large sets of lexical and sentence-length descriptors, asked people to rate themselves or others on those descriptors, and then used correlational and factor-analytic methods to identify clusters of descriptors that tended to covary. The resulting dimensions, such as those in the Big Five (Goldberg, 1990) and HEXACO (Lee & Ashton, 2008) models, are therefore summary labels for patterns of covariation among *folk-lexical descriptions*.

A brief analogy (adapted from Borsboom, 2013; Buss, 1996; Zietsch, 2009) illustrates why trait dimensions derived from folk-lexical descriptions do not yield clear insight into underlying mechanisms. Imagine that a researcher has a large sample of people use and rate a variety of smartphones based on a range of terms previously used to describe smartphones, and then performs a factor analysis on these ratings. These factor analyses might reveal key dimensions of interest from the perspective of smartphone users, such as the phone's 'user-friendliness,' 'touch sensitivity,' 'responsiveness,' and 'value for money.' However, none of these dimensions provides direct insight into the design and operation of the smartphone's underlying information-processing systems.

Analogously, the personality trait concepts derived from lexical approaches capture how people perceive and describe other people, not the underlying psychological mechanisms operating within the perceived people. It is therefore a conceptual error to treat personality traits—folk-lexical descriptive constructs—as indicators of underlying psychological mechanisms (see Lukaszewski et al., 2020 for further discussion).

This problem is compounded by a second error: treating trait factors derived from models of *between-person* differences as if they represent *within-person processes*. They do not (see Borsboom et al., 2003). This is not just conceptually but also empirically wrong: the factor structures that emerge from between-person models differ substantially from the factor structures that emerge from within-person models (Borkenau & Ostendorf, 1998; Cervone, 2005; Wright et al., 2015). In short, it is logically and empirically unsound to treat between-person factor

structures as a representation of the psychological mechanisms operating within individuals.

As a consequence of these and other issues (see Lukaszewski et al., 2020), personality traits do not generate clear insights about the underlying psychological mechanisms that generate the cognitions, emotions, and behaviors described by those traits. Consequently, although personality traits are useful for describing and communicating about individual differences (e.g., see Goldberg, 1990), they should not be the explanatory target of scientists seeking to understand and predict variation in psychology and behavior between and within persons. A mechanism-centered approach instead suggests that the explanatory target should be the psychological mechanisms that generate the cognitions and behaviors linguistically indexed by the major personality models. This is a key revision to evolutionary personality psychology, as earlier adaptationist approaches focused on explaining variation in lexically derived trait concepts like those that constitute the Big Five (Nettle, 2006) and Five-Factor Model (e.g., MacDonald, 1995).

2. A mechanism-centered approach to personality science

A mechanism-centered approach to personality science (Lukaszewski et al., 2020) offers a framework anchored in evolutionary theory that can be used to map the psychological mechanisms that collectively compose the human mind. This framework places a key emphasis on these mechanisms' context-sensitive design features and variable parameters that can lead to variation within and between persons.

The first step in a mechanism-centered approach is to identify the design features of these psychological mechanisms, including the inputs to which they are sensitive and the outputs that they generate. The second step is to determine whether this mechanistic understanding can generate insights about variation in personality traits, specifically by investigating whether the mechanism's outputs are captured by the person-description constructs that constitute the major personality models (e.g., HEXACO, FFM/Big Five).

Here, we present a worked example of this approach and illustrate its utility for personality science: we empirically demonstrate that the outputs of the evolved psychological mechanism of jealousy are captured in the major personality dimension of Emotionality.

3. Jealousy: an evolved psychological mechanism

Abundant evidence suggests that jealousy is a behavior-regulating mechanism that evolved to detect, appraise, and respond to threats to a valued relationship (Buss, 1988; Buss & Shackelford, 1997; Daly et al., 1982)—prototypically the threat of a romantic partner's infidelity or defection (Buss, 2000, 2018; Buss et al., 1992; Daly & Wilson, 1983; for review, see Lewis et al., 2024). Jealousy has an input-sensitive architecture—it activates in response to cues to a romantic partner's infidelity or defection (see Shackelford & Buss, 1997b)—and this context-dependent activation mobilizes tactical outputs to prevent or mitigate the costs of infidelity or defection. These outputs are diverse, ranging from vigilant monitoring (e.g., searching through a partner's belongings, calling the partner unexpectedly to see who they are with or whether they are where they said they would be) to increased investment (e.g., giving a partner gifts, enhancing one's own physical appearance) to partner-directed or interloper-directed anger (yelling, threatening, or striking) to appealing to others for intervention (e.g., having one's friends check on one's partner) to terminating the relationship (see Buss, 1988, 2000; Shackelford et al., 2002). Available evidence suggests that jealousy is a species-typical emotion that exhibits this evolved, context-sensitive design across cultures (e.g., see Scelza et al., 2020).

3.1. Within- and between-person variation in jealousy

Knowledge about a psychological mechanism's species-typical

architecture is a powerful starting point for investigating how and why the mechanism operates differently between individuals as well as variably within individuals across time and context. Here, we outline several principles for using a mechanism-centered approach to study between- and within-individual variation, and apply these principles to jealousy as an illustrative example.

One key principle is that selection pressures should have shaped psychological mechanisms to avoid the dual errors of over- and under-activation. The activation of a psychological mechanism carries costs, including cognitive and metabolic resources, time, opportunity costs, and risks. Consequently, we should expect evolved psychological mechanisms to exhibit the Goldilocks principle: they should be designed to activate under circumstances in which the probabilistic benefits of their activation recurrently outweighed the probabilistic costs, but not under circumstances in which the probabilistic costs outweighed the benefits (see Buss & Penke, 2015; Nettle, 2006; Sznycer & Lukaszewski, 2019; Tooby & Cosmides, 1990, 2008, 2015).

This means that jealousy should not activate equally across circumstances. Rather, it should activate differentially as a function of the likelihood of a partner's infidelity. When the likelihood of a partner's infidelity is high, the activation of jealousy can generate net benefits by thwarting the genuine threat. However, when the likelihood of a partner's infidelity is very low, the probabilistic benefits of jealousy's activation are outweighed by its costs, which include not just time and energy but also potential harm to the very relationship it is trying to protect (e.g., by becoming stiflingly possessive or by threatening or engaging in violence toward a faithful partner and thereby driving them off; Buss, 1988; Tomlinson et al., 2022). Consequently, we should expect jealousy to be sensitive to cues to infidelity and differentially activate as a function of these cues.

A second important principle in a mechanism-centered approach is that substantial variation in the activation of psychological mechanisms will occur at the within-person level. This is because their activation is sensitive to situational inputs (Al-Shawaf et al., 2019; Al-Shawaf & Lewis, 2017; Buss, 1995; Lewis et al., 2017, 2021; Tooby & Cosmides, 1992), and the situations to which individuals are exposed vary across both context and time. Consistent with this, experience-sampling studies suggest that a great deal of variation in emotional and behavioral states occurs *within* people as they select, encounter, and navigate different situations over time (e.g., Fleeson & Gallagher, 2009). Jealousy illustrates this well. An individual who exhibited very low levels of jealous behavior in a previous relationship with a highly committed partner may subsequently exhibit high levels of jealousy in a new relationship if their new partner engages in behaviors that cue infidelity such as showing low levels of sexual interest in them, being frequently absent, exhibiting interest in someone else, or other probabilistic cues to infidelity (Shackelford & Buss, 1997b; see also Lewis et al., 2024). In short, we should actively expect jealousy to exhibit substantial variation within individuals across situations.

4. Does the construct 'Emotionality' capture the outputs of jealousy?

The second step in a mechanism-centered approach to personality is to investigate whether variation in the mechanism's activation is captured by personality psychology's trait dimensions. Here, we investigate whether jealousy's activation and outputs are captured by HEXACO Emotionality.¹ Fig. 1 illustrates the proposed model in which

¹ A mechanism-centered approach does not posit a one-to-one correspondence between psychological mechanisms and personality dimensions. Here, the proposal is that jealousy is *one* mechanism whose activation is captured in the folk-lexical parlance of Emotionality, not that it is *the only* mechanism whose activation is captured by Emotionality. We discuss this point in further detail in the Discussion.

jealousy's activation and outputs (left) are perceived and described by observers (right) in the person-description constructs that constitute this major personality factor.

5. The current study

To test this model, we employed a multi-step procedure. First, to generate variation in the activation of jealousy, we exposed people in committed, long-term relationships to distinct scenarios differentially predictive of their partner's infidelity. These scenarios ranged from being virtually free of cues to infidelity (e.g., the participant and their partner spend the evening together and wake up next to each other the following morning) to containing unambiguous cues to infidelity (e.g., the participant finds their partner in bed with an interloper). Second, to capture the cognitive, affective, and behavioral outputs of jealousy, we prompted participants to describe what they would think, feel, say, and do in response to the scenario described. Third, we had raters read the written responses and indicate the author's (i.e., the participant's) levels of jealousy. These jealousy ratings served as both a manipulation check (i.e., to check whether jealousy increased in response to increased infidelity threat) and as a quantitative measure of jealousy's activation. Fourth, to determine whether increased jealousy is perceived by observers as higher Emotionality, we had a separate set of raters read the responses and report the author's state HEXACO Emotionality levels.

These measures enabled us to test key predictions about within-person variation. Specifically, we predicted that the activation of jealousy, operationalized as observer ratings of participants' jealousy levels, would increase across scenarios as infidelity threat increased (Prediction 1), and that these increased jealousy levels would predict higher observer-reported Emotionality (Prediction 2).

We also had participants complete the IPIP NEO PI-R Neuroticism scale (Goldberg et al., 2006), which enabled us to test predictions about between-person variation. We predicted that individual differences in the sensitivity² of the jealousy mechanism (i.e., between-person variation in jealousy's activation) would be associated with participants' self-reported Neuroticism (Prediction 3) as well as observer-ratings of Emotionality (Prediction 4), and that self-reported Neuroticism and observer-rated Emotionality would be associated through these individual differences in the sensitivity of the jealousy mechanism (i.e., jealousy as a shared, underlying cause; Prediction 5).

6. Method

6.1. Participants

As part of a larger study on personality, 204 participants (102 female; mean age = 19.79; age range: 17–33) completed the measures and procedures described below in a private computer room. Participation in the study was restricted to people in exclusive, monogamous, long-term (6 months or greater) relationships, which ensured the contextual validity of the experimental manipulation of varying a partner's infidelity likelihood (i.e., participants' responses to the infidelity scenarios were in the context of an actual, current monogamous romantic relationship).

² When we refer to individual differences in the "sensitivity" of the jealousy mechanism, we are referring to variation between participants in observed jealousy levels in response to the same contextual cues (e.g., Participant A exhibited greater jealousy than Participant B in response to Scenario X). Between-person variation in sensitivity could result from individual differences in the parameterization of several of the jealousy mechanism's features. This includes differences between individuals in (i) jealousy's activation threshold (e.g., the estimated likelihood of infidelity at which it activates), (ii) their cue-based estimates of infidelity likelihood, and (iii) biases to overestimate infidelity likelihood under conditions of uncertainty (see Andrews et al., 2008; Buss, 2000; Lewis et al., 2022; Lewis et al., 2024).

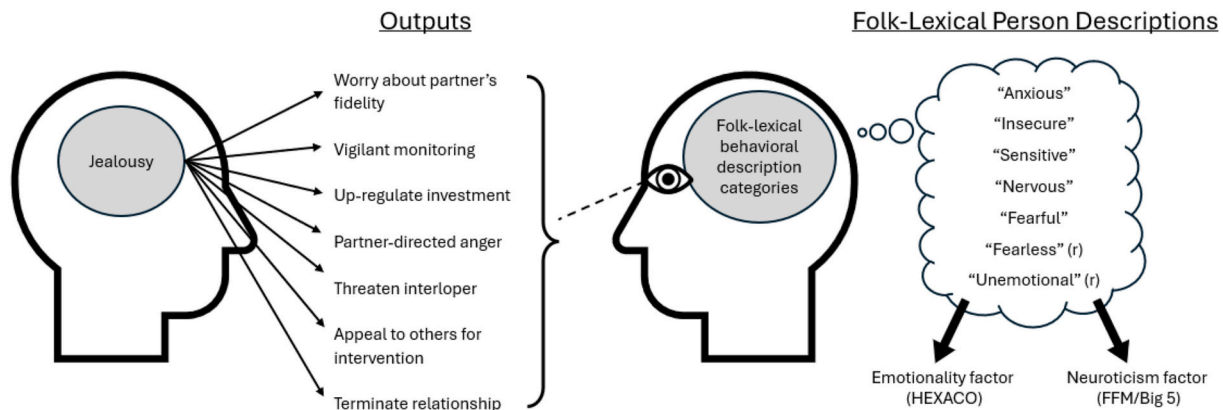


Fig. 1. The proposed model. Jealousy's activation and outputs are perceived and categorized according to folk-lexical person description constructs that constitute the Emotionality factor (and the related FFM/Big Five factor labelled Neuroticism).

Participants were recruited from the participant pool at a large, public university in the Southwestern United States, as well as by posting flyers on the university campus and advertising on social media (i.e., Facebook). Participants recruited via the participant pool received partial course credit. All participants received food and refreshments and were entered into a prize draw upon completing the study.

6.2. Materials and procedure

6.2.1. Infidelity scenarios

Five vignettes described scenarios that were designed to convey progressively increasing infidelity threat. The first vignette (Scenario 1) prompted the participant with a scenario designed to be free of cues to infidelity: "Imagine you and your partner have a romantic evening together with dinner and a date and spend the night together. The next morning, you wake up before your partner and are laying in bed." The next three scenarios included cues intended to convey increasing infidelity threat, from the participant witnessing their partner enjoying talking to a potential mate poacher while in the participant's presence (Scenario 2), to the participant's partner spending less time with the participant and being frequently absent (Scenario 3), to the participant's partner spending less time with the participant and being frequently absent *and* the participant's friends reporting that they had seen the partner alone with an interloper on multiple occasions (Scenario 4). The final scenario (Scenario 5) contained cues that conveyed virtually certain infidelity: "Imagine you go to your partner's apartment without your partner expecting you. When you walk into the bedroom, you find your partner in bed with another [man/woman]" (complete text for all scenarios available in Lewis, 2013, p. 183, and in Lukaszewski et al., 2020, Table 5).

6.2.2. Written responses

To capture the cognitive, affective, and behavioral outputs of jealousy in response to the scenarios, participants were asked, for each vignette, what they would think, feel, say, and do in response to the scenario described. Participants were then provided with a blank text field in which to write their response. After participants finished writing their response to one scenario, they were presented with the next scenario (in order of increasing infidelity likelihood).

6.2.3. Jealousy and emotionality

Twelve research assistants blind to the study hypotheses read the 1020 written responses (5 scenarios $\times$ 204 participants) and rated either the author's (i) jealousy levels or (ii) Emotionality. Jealousy and Emotionality were rated by separate research assistants to prevent raters from inferring the hypothesized association between the variables and biasing their ratings. Raters who assessed the author's jealousy levels (n

$= 9$) responded to the question, "How jealous did the person writing this response feel at the time that they wrote it?" on a five-point scale (1 = *not at all jealous*, 5 = *very jealous*). Raters who assessed the author's Emotionality ($n = 3$) were prompted with the question "How much do each of the following statements describe the person who wrote this response at the time that they wrote it?" and then completed the observer report form of the 10-item Emotionality scale from the HEXACO-60, which contains items such as "He/she worries about little things" and "He/she feels strong emotions when someone close to him/her is going away for a long time" (Ashton & Lee, 2009, full scale: https://hexaco.org/downloads/English_observer60.doc, scoring key: https://hexaco.org/downloads/ScoringKeys_60.pdf).³

To prevent any carry-over effects in the raters' ratings, we had raters read and rate all participants' written responses to Scenario 1 before reading and rating the written responses to Scenario 2, and so on. This ensured that each rater's assessment of a participant's jealousy levels or Emotionality was separated by over 200 written passages from the previous instance in which they assessed that participant's jealousy levels or Emotionality. Furthermore, raters were not informed that the study had employed a within-subjects design so were blind to the fact that they were rating the same participant multiple times.

This directly replicated the procedure employed by Lukaszewski et al. (2020), who reported that it resulted in acceptable interrater agreement for the personality trait (Agreeableness) and psychological mechanism (anger) constructs under investigation. The interrater agreement observed in the current study for Emotionality exceeded the interrater agreement observed by Lukaszewski et al. (2020) for Agreeableness, and the interrater agreement for jealousy was similarly high to the interrater agreement observed by Lukaszewski et al. (2020) for anger (both ICCs > 0.80).

Following Lukaszewski et al.'s operationalizations of anger and Agreeableness, participants' jealousy levels in response to each scenario were operationalized as the mean jealousy rating of all raters for that participant for that scenario. Emotionality was operationalized in the same manner.

6.2.4. IPIP NEO PI-R scales

In addition to reading and responding to the vignettes, participants

³ Following the protocol outlined by Lukaszewski et al. (2020), the research assistants were not given any special training to complete the ratings. This was a key feature of the study design; because the central hypothesis of a mechanism-centered approach is that the outputs of psychological mechanisms are captured in the folk-lexical person description constructs that constitute the major personality axes, lay (i.e., untrained) perceptions are the most appropriate operationalization of, for example, how high on Emotionality a participant was.

completed the 60-item Neuroticism IPIP NEO PI-R domain scale from the International Personality Item Pool (IPIP; Goldberg et al., 2006), which contains items such as [I] “worry about things” and “am not easily disturbed by events” (reverse-scored) (all items and scoring key: <https://ipip.ori.org/newNEOKey.htm#Anxiety>).

7. Results

All analyses were conducted in R (R Core Team, 2022) (study data and code for all analyses available here: https://osf.io/upqxy/?view_only=8eac0a29aeb84695b6165df212e5ad0c). We used the lme4 package (Bates et al., 2015; Kuznetsova et al., 2017) to test Predictions 1 and 2 and the brms package (Bürkner, 2017) to test Predictions 3–5.

7.1. Within-person tests: jealousy as a predictor of emotionality

To test for within-individual increases in jealousy across scenarios as infidelity threat increased (Prediction 1), we ran a linear mixed-effects model in which infidelity scenario was entered as an independent variable and participants' jealousy levels were specified as the outcome. In support of Prediction 1, participants' jealousy increased across scenarios as infidelity threat increased, $F(4, 812) = 703.48, p < .001$, partial $\eta^2 = 0.78$, 95% CI [0.76, 1.00]; participants' jealousy was lowest in response to certain fidelity and increased with increasing infidelity threat, peaking under conditions of highest infidelity likelihood (see Table S1 for all pairwise comparisons of jealousy levels across infidelity scenarios).

To test whether these within-individual increases in jealousy across infidelity scenarios were associated with higher perceived levels of Emotionality (Prediction 2), we fit a linear mixed-effects model in which participants' jealousy levels were entered as a predictor of observer-reported Emotionality. In support of Prediction 2, within-person changes in jealousy across scenarios predicted perceived changes in Emotionality, $\beta = 0.83, t(656.09) = 17.90, p < .001$, 95% CI [0.74, 0.93] (Fig. 2).

7.2. Between-person tests: jealousy as a shared predictor of neuroticism and emotionality

To test Predictions 3 through 5, we fit a Bayesian common-cause model in which jealousy was specified as a shared predictor of self-reported Neuroticism and observer-rated Emotionality.⁴ In support of Predictions 3 and 4, individual differences in the sensitivity of the jealousy mechanism (i.e., between-person variation in mean jealousy levels) were associated with self-reported Neuroticism levels, $\beta = 0.188$, 95% CrI = [0.04, 0.33], $P(\beta \leq 0) = 0.007$, as well as observer-rated Emotionality, $\beta = 0.657$, 95% CrI = [0.55, 0.76], $P(\beta \leq 0) < 0.001$. In support of Prediction 5, self-reported Neuroticism and observer-reported Emotionality were associated through these individual differences in jealousy: 26% of the covariance between self-reported Neuroticism and observer-reported Emotionality was accounted for by jealousy ($\Delta r = 0.12$, 95% CrI = [0.03, 0.23], $P(\Delta r \leq 0) = 0.007$) (see Fig. 3).

8. Discussion

The research reported here, which incorporated validated measures of individual differences (e.g., IPIP NEO PI-R Neuroticism), a within-subjects experimental design, and observer ratings (e.g., HEXACO Emotionality), supported five distinct predictions generated by a mechanism-centered approach.

⁴ Because these predictions were about between-person variation, analyses were conducted on subject-level means to capture between-person associations.

8.1. Infidelity threat activates jealousy

In line with the hypothesis that jealousy is a psychological mechanism designed to respond to the threat of a romantic partner's infidelity, participants' jealousy levels—expressed in their thoughts, feelings, and behaviors in response to the infidelity scenarios—systematically tracked infidelity threat. Within participants, jealousy levels were lowest in response to certain fidelity, rose as likelihood of infidelity increased (e.g., partner frequently absent and showing interest in a potential mate poacher), and peaked in response to the situations with the highest likelihood of infidelity.

These observations have multiple implications. First, they demonstrated that the infidelity scenarios influenced jealousy, which served as a key manipulation check. If, as hypothesized, jealousy forms part of the mechanistic basis of Emotionality, and jealousy had *not* increased across scenarios, then we would not have had a principled reason to expect changes in perceived Emotionality either. That jealousy levels systematically increased across infidelity scenarios enabled us to proceed to test the other key predictions generated by a mechanism-centered approach. Second, the within-participant increases in jealousy across infidelity scenarios add to a robust body of research suggesting that jealousy is an evolved psychological mechanism that is designed to activate in response to perceived infidelity threat (see Buss, 1988, 2000, 2018; Buss et al., 1992; Buss & Shackelford, 1997; Daly et al., 1982; Daly & Wilson, 1983; Shackelford et al., 2002; Shackelford & Buss, 1997b; for review, see Lewis et al., 2024).

Third, the current findings may reveal a previously undiscovered design feature of jealousy with respect to its deactivation. Although jealousy levels progressively increased across scenarios as infidelity threat increased, one key exception to this was that there was no mean increase in jealousy from Scenario 4, in which the participant's partner was frequently absent and had been seen by the participant's friends with a potential mate poacher on multiple occasions, to Scenario 5—the certain infidelity scenario. This observation may reflect a deactivation design feature of jealousy: under certain conditions, jealousy may be designed to *reduce* its activation in response to certain infidelity. If a key function of jealousy is to prevent infidelity, then we might expect jealousy to “turn off” when the threat of a partner's infidelity is resolved. That threat is resolved either when it is successfully thwarted or, for the subset of people who will terminate the relationship in response to their partner's infidelity, when infidelity is confirmed. For the other subset of people—those who do not terminate the relationship with the unfaithful partner—the threat of (further) infidelity remains. Consequently, we might expect a partner's infidelity to affect these two different groups of people in opposite ways. Among those who intend to remain in the relationship with the unfaithful partner, we should expect increased activation of jealousy. For those who intend to terminate the relationship, on the other hand, the mechanism's continued activation would carry costs but not generate benefits, so we might observe a decrease in their jealousy levels after confirming their partner's infidelity. These countervailing effects could account for the current finding that mean jealousy (i.e., averaged across participants) did not increase in response to certain infidelity.

This observation and this hypothesized design feature of jealousy are consistent with previous research findings. Schützwohl (2008) observed that people were more relieved to find out their partner had not cheated on them when they “merely suspected” infidelity than when they were “virtually certain” about it. This is consistent with the notion that people experience jealousy most acutely in response to the *threat* of infidelity, not confirmed infidelity. There is a clear design logic to this proposed feature of jealousy: it is a future act of infidelity, not a past infidelity, that jealousy can help prevent. Accordingly, jealousy may be designed to reduce its activation in response to confirmed infidelity when the infidelity victim intends to terminate the relationship. Future research is needed to further investigate this proposed feature of jealousy, including by assessing people's intentions to terminate or reinstate their



Fig. 2. Jealousy as a function of infidelity scenario, and Emotionality as a function of jealousy. As visualized by the data points migrating from the left to the right of the jealousy scale across infidelity scenarios, jealousy progressively increased with infidelity threat (Scenario 1: certain fidelity; Scenario 5: certain infidelity). As visualized by the positive trend lines within each scenario, observer reports of Emotionality tracked differences in jealousy.

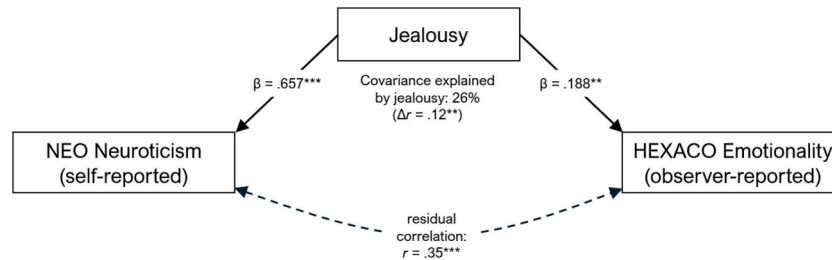


Fig. 3. Path diagram illustrating the common-cause model in which individual differences in the sensitivity of the jealousy mechanism (a) predicted self-reported Neuroticism and observer-rated Emotionality and (b) accounted for significant covariance between these self- and observer reports. ** $P(\beta \leq 0) < 0.01$, *** $P(\beta \leq 0) < 0.001$.

relationship after their partner's infidelity, and testing whether those intentions moderate the effect of confirmed infidelity on jealousy levels (see Lewis et al., 2024 for discussion; see also Shackelford et al., 2002; Shackelford & Buss, 1997a).

8.2. The activation of jealousy predicts perceptions of emotionality

Perceptions of participants' Emotionality—one of personality psychology's major axes—systematically tracked the activation of jealousy. This held true for both between-person variation and within-person variation across contexts. Within participants, as their jealousy levels increased across infidelity scenarios, so too did observer reports of their Emotionality. Between participants, those who exhibited higher jealousy levels were perceived to be higher in Emotionality. In short, the current study findings support the proposed mechanistic model: jealousy's activation and outputs (i.e., what people said they would think, feel, say, and do in response to the infidelity scenarios) were perceived and categorized by observers in the folk-lexical parlance of Emotionality.

Participants' jealousy levels accounted for substantial variation in perceived Emotionality, but considerable variation remained unexplained. This aligns with a mechanism-centered approach, which does not propose a simple one-to-one correspondence between individual psychological mechanisms and personality psychology's major axes—it does not propose that there will be a single psychological mechanism that accounts for each major personality dimension.⁵ Instead, a

mechanism-centered approach is compatible with multiple psychological mechanisms underlying each of the major personality dimensions. The approach entails identifying and mapping individual psychological mechanisms until the collection of these mechanisms provides a comprehensive account of within- and between-person variation (Lukaszewski et al., 2020). Here, we have shown that jealousy can account for meaningful variation on the folk-lexical person-description dimension Emotionality, but further work is needed to identify other psychological mechanisms whose operation may account for additional variation on this major personality axis. For example, mechanisms responsible for detecting and responding to other forms of threat, such as disease threats, the threat of social exclusion, threats to one's status or reputation, or the threat of physical aggression, may also be contributing sources of variation on this major personality axis (and the related Big Five/FFM dimension of Neuroticism) (see Byrne & Eysenck, 1995).

8.3. Jealousy as a common cause of self-reported neuroticism and observer-rated emotionality

The primary focus of the current study was to investigate whether variation in the activation of jealousy is perceived and categorized by observers in the language of Emotionality. A second goal was to investigate whether self-reported Neuroticism levels statistically tracked individual differences in the sensitivity of the jealousy mechanism—and, if so, whether self-reported Neuroticism and observer-rated Emotionality covaried as a function of jealousy as a shared, underlying cause. Indeed, a common cause model revealed that, as predicted, self-reported Neuroticism (1) tracked individual differences in jealousy sensitivity and (2) covaried with observer-reported Emotionality as a function of these individual differences in jealousy.

An approach that treats people's scores on personality inventories (i.e., their 'traits') as explanatory constructs might suggest that it was the participants' Neuroticism that *caused* (i.e., can explain) their jealousy and perceptions of their Emotionality. By contrast, a mechanism-centered lens shifts the causal emphasis: individuals whose jealousy mechanism is more sensitive (e.g., has a lower activation threshold or is otherwise more readily and frequently triggered) are those who score

⁵ Let alone a single mechanism activated in a single context; in this study, we focused specifically on jealousy in the context of mating relationships. However, jealousy is hypothesized to have evolved to respond to threats to valued social relationships more broadly, including in the context of friendships (e.g., see Krems et al., 2021) and kin relationships (e.g., siblings competing for a parent's love and affection; Hart, 2018; for a review, see Lewis et al., 2024). Future research is needed to determine whether the activation of jealousy in these and other relationship contexts can account for further variation in perceived Emotionality.

higher in Neuroticism. This mechanistic lens leads to the next key question: Why do people differ in the sensitivity of their jealousy mechanisms?

8.4. Individual differences in jealousy sensitivity

A mechanism-centered approach offers a versatile toolkit for investigating sources of variation in the sensitivity of a mechanism such as jealousy. This includes at least five distinct sources: (1) prior experiential calibration; (2) ongoing situational evocation; (3) adaptive self-assessment; (4) balancing selection, including frequency-dependent selection; and (5) mutation-selection balance (for discussions of these sources of variation, see Buss, 2009; Lewis & Buss, 2021; Lukaszewski et al., 2020; Tooby & Cosmides, 1990). A full discussion of all these sources of variation in the sensitivity of a mechanism is beyond the scope of the current manuscript, but below we briefly illustrate how the first three can produce individual differences in the sensitivity of the jealousy mechanism.

8.4.1. Prior experiential calibration

If jealousy evolved to be sensitive to local environmental cues predictive of a partner's likelihood of infidelity, we should expect it to be sensitive not just to current environmental cues but also to critical events in one's past. This could range from experiences in prior relationships to previous experiences in one's current relationship to observational learning from the relationships of others. This means that experiences such as being cheated on by a previous partner (e.g., see Buss, 2000), previously being cheated on by one's current partner, or receiving information about high infidelity prevalence in one's social environment (e.g., one's mother or father being unfaithful during childhood, one's friend experiencing infidelity in their relationship) may be key inputs that the jealousy mechanism responds to by increasing its sensitivity to cues to potential infidelity.

8.4.2. Ongoing situational evocation

In addition to individual differences in exposure to infidelity events in the past, some individuals may experience ongoing exposure to infidelity cues in their current relationships. For example, some participants in the current study may have had partners who already were engaging in behaviors that cue infidelity in their current relationship (e.g., see Fig. 6.1 in Lewis et al., 2021). Such ongoing exposure could result in heightened sensitivity of the jealousy mechanism to further infidelity cues such as those presented in the current study (see Buss, 2000, 2009; Tooby & Cosmides, 1990).

8.4.3. Adaptive self-assessment

Selection may also have shaped the jealousy mechanism to calibrate its sensitivity based on one's own characteristics recurrently predictive of a partner's likelihood of infidelity. For example, in men, certain predictors of lower mate value—such as longer alleles at the androgen receptor (AR) gene, which are associated with insufficient action of androgens and multiple markers of poor health (see Zitzmann & Nieschlag, 2007)—may have been recurrently associated with a female partner's likelihood of engaging in extra-pair copulations (Lewis, 2013). Consistent with the hypothesis that selection shaped men's jealousy mechanisms to be calibrated to such predictors of their own mate value, Lewis et al. (2018) found that men with longer alleles at the AR locus, compared to men with shorter alleles, perceived ambiguous cues as more indicative of their partner's infidelity, and reported greater distress in response to these cues. This represents just one example of how the jealousy mechanism's sensitivity may be adaptively calibrated to one's own characteristics that are predictive of a partner's likelihood of infidelity.

More broadly, the above examples illustrate how prior experiential calibration, ongoing situational evocation, and adaptive self-assessment can be sources of individual differences in the sensitivity of

psychological mechanisms such as jealousy, which in turn may explain variation in people's scores on personality 'trait' inventories.

We think this shift in causal emphasis—individual differences in the sensitivity of specific psychological mechanisms as an explanatory account for variation in scores on personality inventories—is a key step toward explanatory progress in personality science (Lukaszewski et al., 2020; see also Lukaszewski, 2021; Durkee, 2025). Rather than accepting scores on personality inventories (i.e., 'traits') as explanatory or causal constructs (see Boag, 2011, for a discussion of the inadequacy of personality traits as genuine explanations), a mechanism-centered approach directs researchers toward productive questions about variation in the sensitivity of psychological mechanisms, generates *a priori* hypotheses about sources of that variation, and equips researchers to test those hypotheses.

8.5. Summary and conclusion

The current study's findings indicate that (1) variation in jealousy's activation is perceived and categorized by observers in the language of HEXACO Emotionality, (2) individual differences in jealousy sensitivity are linked to individual differences in self-reported NEO Neuroticism, and (3) the relationship between these self-reports of Neuroticism and observer reports of Emotionality is accounted for in part by these individual differences in jealousy. These distinct forms of evidence provide convergent support for the hypothesis that jealousy underlies variation on the major personality trait dimension of Emotionality (and the related dimension of Neuroticism).

This worked example of a mechanism-centered approach suggests that an understanding of specific evolved psychological mechanisms, including both their species-typical operating characteristics and individual differences in their sensitivity, can generate key insights about underlying causal sources of variation on major personality trait dimensions. This mechanism-centered approach offers personality science a clear framework for *explaining traits* rather than treating traits as causal explanations.

More broadly, a mechanism-centered adaptationist approach offers personality psychology a promising framework for achieving the grand aim that once characterized the field: "to be the broadest, most integrative, branch of the psychological sciences" by accounting for human nature, individual differences, and the *systematic relationship between them* (Lewis & Buss, 2021, p. 3). Over the past half century, personality science had largely retreated from this grand goal; the field's empirical work was restricted to individual differences to such an extent that it became a defining feature of the field: "that branch of psychology which is concerned with providing a systematic account of the ways in which individuals differ from one another" (Wiggins, 1979, p. 395). More recently, the field has returned to the aspiration of a single theoretical framework that can unify individual differences and human nature (Baumert et al., 2017; Fleeson & Jayawickreme, 2015; Revelle & Condon, 2015; Roberts, 2018; Wood et al., 2015).

A mechanism-centered approach shows great promise for being this unifying theoretical framework. By focusing on the underlying psychological mechanisms responsible for generating between-person similarities and differences, as well as within-person stability and variation across contexts, it offers a genuine integration of species-typical human nature with individual differences. It is our hope that a mechanism-centered approach and the worked example offered here spark interest among personality scientists to increasingly direct their efforts toward mapping the psychological mechanisms that constitute human nature and generate its manifest variation.

CRedit authorship contribution statement

David M.G. Lewis: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Aaron W.**

Lukaszewski: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Patrick K. Durkee:** Writing – review & editing, Writing – original draft, Data curation. **Aaron N. Sell:** Writing – review & editing, Writing – original draft. **Daniel Sznycer:** Writing – review & editing, Writing – original draft. **David M. Buss:** Writing – review & editing, Writing – original draft. **Laith Al-Shawaf:** Writing – review & editing. **Sam P. Dale:** Writing – review & editing, Formal analysis, Data curation.

Declaration of Competing Interest

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

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.evolhumbehav.2026.106981>.

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