AMERICAN PSYCHOLOGICAL ASSOCIATION

Journal of Personality and Social Psychology:
Personality Processes and Individual Differences

© 2021 American Psychological Association
ISSN: 0022-3514

https://doi.org/10.1037/pspp0000387

A Sociocultural Norm Perspective on Big Five Prediction

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The Big Five predict numerous preferences, decisions, and behaviors—but why? To help answer this key question, the present research develops the sociocultural norm perspective (SNP) on Big Five prediction—a critical revision and extension of the sociocultural motives perspective. The SNP states: Agreeableness, Extraversion, and Conscientiousness predict outcomes positively if those outcomes are socioculturally normative. Openness, by contrast, predicts outcomes negatively if they are socioculturally normative. Moreover, the SNP specifies unique mechanisms that underlie those predictions. Two mechanisms are social (social trust for Agreeableness, social attention for Extraversion) and two are cognitive (rational thought for Conscientiousness, independent thought for Openness). The present research develops the SNP by means of three large-scale experiments (N_{total} = 7,404), which used a new, tailor-made experimental paradigm—the minimal norm paradigm. Overall, the SNP provides norm-based, culture-focused, and mechanism-attentive explanations for why the Big Five predict their outcomes. The SNP also has broader relevance: It helps explain why Big Five effects vary across cultures and, thus, dispels the view that such variation threatens the validity of the Big Five. It suggests that the psychology of norms would benefit from attention to the Big Five. Finally, it helps bridge personality, social, and cross-cultural psychology by integrating their key concepts—the Big Five, conformity, and sociocultural norms.

Keywords: Big Five, conformity, sociocultural norms, minimal norm paradigm

Supplemental materials: https://doi.org/10.1037/pspp0000387.supp

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The discovery of the Big Five has been a game changer for personality psychology (John et al., 2008; McCrae & Costa, 2008). Those basic personality domains enjoy enormous popularity within psychology (e.g., clinical: Gore & Widiger, 2013; cognitive: Robison & Unsworth, 2016; developmental: Lamb et al., 2002; educational: Kim et al., 2018; organizational: Judge et al., 2002; social: Higgins et al., 2003) and outside of it (e.g., economics: Becker et al., 2012; political science: Gerber et al., 2011; sociology: Shanahan et al., 2014). The main reason for this popularity is the Big Five's ability to predict preferences, decisions, and behaviors (Ozer & Benet-Martínez, 2006; Roberts et al., 2007).[1] Why, however, do the Big Five possess that predictive ability? Answering this why-question may well be the most important challenge for personality psychology to date (Asendorpf, 2016; Benet-Martínez et al., 2015; Fleeson, 2007; Hampson, 2012). To help address the challenge, the present research develops the sociocultural norm perspective (SNP) on Big Five prediction. The SNP is a critical revision and extension of the sociocultural motives perspective (SMP; Gebauer et al., 2014).[2,3] Hence, we introduce the SMP next.

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We acknowledge support from the German Research Foundation (Grants GE 2515/3-1 and GE 2515/6-1).

Deidentified data, data-analysis scripts, and research materials for all three experiments are publicly available on the University of Mannheim's Research Data Repository (https://madata.bib.uni-mannheim.de/364/).

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[1] There is more than one definition of preferences, decisions, and behaviors. In this article, we rely on the definition provided by the APA Dictionary of Psychology (American Psychological Association, n.d.). Accordingly, we refer to *preferences* as "the act of choosing one alternative over others" and we refer to *decisions* more generally as the act of "choosing between two or more alternatives." Thus, preferences can be seen as decisions that are explicitly based on a comparative rating of alternatives. Further, we refer to *behaviors* as "an organism's activities in response to external or internal stimuli." Therefore, behaviors are often the result of preferences and decisions.

[2] We would have liked to retain the name of the original perspective. However, the present research shows that the term *motives* in SMP is inappropriate. Therefore—and with the goal in mind to change established terminology as little as possible—we named the revised and extended perspective the sociocultural *norm* perspective.

[3] The SMP is not the only answer in the literature to the why-question of Big Five prediction. Early on in personality psychology, Allport (1937) assumed that people strive for consistency between their personality and their behavior. One reason for why they do so is that such consistency is affectively rewarding (e.g., extraverts gain pleasure from partying, introverts from reading in solitude; Emmons et al., 1986; Ickes et al., 1997). In his classic example, Allport (1950) suggested that personality traits akin to Agreeableness should predict religiosity panculturally because a religious way of life facilitates agreeableness-consistent behavior in all cultures (see also Saroglou, 2010). Importantly, though, recent research has found major cross-cultural differences in the Big Five's ability to predict religiosity (see next section). Those cross-cultural differences illustrate that Allport's answer is insufficient and that an additional answer is needed.

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SMP

The SMP assumes that agreeable and conscientious people possess a motive to "swim with the sociocultural tide," and, thus, conform to sociocultural norms. Consequently, Agreeableness and Conscientiousness should predict preferences, decisions, and behaviors if the latter are socioculturally normative. The SMP further assumes that open people possess a motive to "swim against the sociocultural tide," and, thus, oppose sociocultural norms. Consequently, Openness should predict preferences, decisions, and behaviors if they are socioculturally antinormative (Gebauer et al., 2014).

Three articles report findings relevant for the SMP (Big Five as predictors: Entringer et al., 2020; Gebauer et al., 2014; HEXACO as predictors: Ashton & Lee, 2019). All three articles rely on large-scale, correlational studies across many cultures and focus on religiosity as the sole outcome. In line with the SMP, those studies show that Agreeableness and Conscientiousness predict higher religiosity most strongly in religious cultures and least strongly (if at all) in secular cultures. Further in line with the SMP, those studies show that Openness predicts higher religiosity most strongly in secular cultures and least strongly (or even negatively) in religious cultures.

The SMP provides a promising answer to the why-question of Big Five prediction. Yet, the SMP is not sufficiently developed theoretically, nor is it thoroughly tested empirically. Five open issues require particular attention. We address all of them in the present research, thereby developing the SNP.

Five Open Issues

First, past evidence for the SMP has been limited to religiosity as the sole outcome (Ashton & Lee, 2019; Entringer et al., 2020; Gebauer et al., 2014). Therefore, that evidence may well be due to religiosity-specific alternative explanations (Saroglou, 2010; 2017). Thus, tests with other outcomes are paramount. It would be ideal if the nature of those outcomes rendered them robust against alternative explanations. To come closest to this ideal, the present research adopts a tried-and-true procedure from cognitive psychology—namely, to go minimal. We describe our minimalist paradigm later in this Introduction. For now, it suffices to say that the paradigm uses different minimalist outcomes, such as preferences for one Chinese character over another.

Second, sociocultural norms are at the heart of the SMP. Yet, relevant past research has been entirely correlational, rendering the causal role of sociocultural norms pure speculation. The correlational nature of past research is particularly limiting because that research has been conducted in the realm of religiosity and sociocultural religiosity norms are particularly prone to confounds (Gebauer et al., 2017; Joshanloo & Gebauer, 2020). Therefore, experiments that manipulate sociocultural norms are essential. Our minimalist paradigm experimentally manipulates sociocultural norms (e.g., some participants learn that it is ostensibly normative in their culture to prefer the Chinese character "舟" over the Chinese character "至," whereas other participants learn that it is ostensibly normative in their culture to prefer the Chinese character "至" over the Chinese character "舟"). In fact, that norm manipulation is so central to the new paradigm that we termed it the minimal norm paradigm.

Third, the Big Five contain four domains that primarily provide descriptive content unrelated to affect (Neuroticism primarily provides affective content; Furr & Funder, 1998; Judge et al., 1998). Yet, the SMP is mute about one of these descriptive Big Five domains: Extraversion. The scope of the SNP would be considerably broader than the scope of the SMP if it pertained to all four descriptive domains. Notably, past research on the SMP does not preclude the possibility that Extraversion can be included into the SNP. Specifically, Gebauer et al. (2014) found some evidence that Extraversion predicted higher religiosity most strongly in religious cultures and least strongly in secular cultures (see also Entringer et al., 2020). However, those authors considered that finding religiosity-specific and, thus, they did not include Extraversion into the SMP. Therefore, it is important to test whether that finding was indeed religiosity-specific and, if not, to include Extraversion into the SNP. The present research performs such a test. To foreshadow the results, we found that Extraversion should be included. Hence, the SNP is relevant to all four descriptive Big Five domains.

Fourth, the SMP characterizes open people as "sociocultural contrarians," who seek to oppose sociocultural norms (Gebauer et al., 2014). Alternatively, however, open people may be better characterized as "sociocultural mavericks," who seek independence from sociocultural norms (cf. Efferson et al., 2008). More precisely, they may do whatever they personally consider appropriate no matter what the sociocultural norm is. At a psychological level, those two alternatives (contrarians vs. mavericks) differ fundamentally. The present research helps tell them apart (past research has been unable to). To foreshadow the results, they favored the mavericks view, thereby instigating a critical revision of the SMP.

Finally, what are the psychological mechanisms that explain why the Big Five interact with sociocultural norms in predicting their outcomes? The SMP assumes two motives—namely, to swim with the sociocultural tide and to swim against it (Gebauer et al., 2014). Yet, two things are conceptually problematic about those motives: (a) Recent research has revealed that the two sociocultural motives are located at the endpoints of a single dimension and, thus, that there actually is one single sociocultural motive only (i.e., to swim with the sociocultural tide vs. against it; Gebauer, 2015). (b) That single sociocultural motive is considered the mechanism driving all Big Five effects within the SMP—a highly unspecific, if not elusive, mechanism. Consequently, it seems important to identify much more specific mechanisms, which are unique to each Big Five domain. The present research seeks to identify such unique mechanisms in two complementary ways: (a) The mainstream view of the Big Five considers the Big Five a hierarchy with the Big Five domains on top and the more specific Big Five facets below (e.g., Goldberg, 1999; McCrae & Costa, 2008). According to the reflective view of trait structure (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000), such a Big Five hierarchy implies that the Big Five domains manifest in (i.e., partly cause) the more specific Big Five facets, which ultimately cause behavior. We therefore test the Big Five facets as process variables potentially driving their domain's effect (cf. Asendorpf, 2016; McCrae, 2016). (b) It is possible that a Big Five domain predicts its outcomes through mechanisms which do not involve any of the measured Big Five facets (e.g., Caprara et al., 2012; Graziano et al., 1997). Hence, we also test possible process variables outside the Big Five hierarchy. To foreshadow

the results, they revealed four highly specific and distinct mechanisms—one for each descriptive Big Five domain. Those results led to another critical revision and extension of the SMP.

Minimal Norm Paradigm

To address the five open issues described in the previous section, we used the minimal norm paradigm. This paradigm is an innovation of the present research and tailor-made to test the SNP. We created the paradigm with two goals in mind. The first goal was to test whether sociocultural norms play a causal role in the SNP. The second goal was to test whether the SNP is applicable to diverse outcomes. To meet these goals, we fitted the paradigm with two key conceptual features. We briefly describe these features next and provide more methodological details in Experiment 1's Method section.

To test whether sociocultural norms play a causal role in the SNP, the minimal norm paradigm experimentally manipulates sociocultural norms as follows: At the outset of the paradigm, participants read that their task is to learn and recall sociocultural norms—a cover story.[4] In an initial "learning phase," participants see pairs of Chinese characters (e.g., "舟" vs. "至") and pairs of social values (e.g., "honest" vs. "responsible"), one pair at a time. For each pair, participants also see the ostensible sociocultural norm—that is, which character/value the majority of people in participants' sociocultural context ostensibly prefer (e.g., 68% prefer "honest," 32% prefer "responsible"). Importantly, for each participant, the computer randomly determines the sociocultural norm for a given pair (e.g., some participants learn that it is ostensibly normative to prefer "honest" over "responsible," whereas other participants learn that it is ostensibly normative to prefer "responsible" over "honest"). Thus, the sociocultural norms are bogus, yet credible (extensive pretests checked their credibility; see Online Supplement S1). Participants are instructed to memorize the sociocultural norms. After that learning phase, participants complete a "recall phase." The recall phase serves as a manipulation check, ensuring that participants correctly recall the presented sociocultural norms. Finally, participants complete a "personal preference phase," in which they see the same pairs of characters/values as in the prior two phases (without information on which preference is normative). For each pair, participants report which character/value they prefer personally—the outcome.

To test whether the SNP is applicable to diverse outcomes, the minimal norm paradigm uses different minimalist outcomes. Specifically, each participant provides preferences regarding 36 different stimulus pairs: 18 pairs of Chinese characters and 18 pairs of social values (stimulus pairs are, thus, nested in participants—a multilevel data structure). The minimal norm paradigm uses Chinese characters and social values because they differ from each other in many ways, including their meaningfulness for people: Chinese characters are completely meaningless for people who do not speak Chinese (Payne et al., 2005), whereas social values are particularly meaningful for people (Verplanken & Holland, 2002). Additionally, the use of Chinese characters and social values comes with another advantage: It allows for creating outcomes that are in and of themselves independent of the Big Five.[5] That independence helps ensure that the evidence for the SNP is not attributable to confounding variables.

Present Research

We report three experiments on the Big Five and the minimal norm paradigm. These three experiments include a total of 7,404 participants. In the process of developing the minimal norm paradigm (i.e., prior to Experiment 1), 1,926 additional participants completed the Big Five and some trial version of the paradigm. We report the results including those additional participants in Online Supplement S2. By doing so, we report all data ever collected on the Big Five and the minimal norm paradigm.

Experiment 1 (N = 2,306) used the Big Five Inventory (BFI; John et al., 1991), the most frequently used nonproprietary measure of the Big Five. That experiment had three goals: (a) to test the general applicability of the SNP (relevant past findings have been restricted to religiosity—a highly specific and confound-prone outcome); (b) to experimentally manipulate sociocultural norms for the first time within this line of research (relevant past research has been entirely correlational); and (c) to examine whether the SNP applies to all four descriptive Big Five domains (the SMP considers only three domains theoretically relevant).

Experiment 2 (N = 2,556) also had three goals: (a) to test the (conceptual) replicability of Experiment 1's results with a recent extension of the BFI, the BFI-2 (Soto & John, 2017); (b) to examine Big Five facets as process variables to identify mechanisms that underlie the SNP (the BFI-2 was designed to assess both Big Five domains and their facets); and (c) to gain initial insight into whether open people are best characterized as sociocultural contrarians (as the SMP assumes) or as sociocultural mavericks.

Experiment 3 (N = 2,542) once more had three goals: (a) to test the direct replicability of Experiment 2's results (both experiments used the BFI-2); (b) to identify external mechanisms that underlie the SNP (i.e., mechanisms that do not involve any of the measured BFI-2 facets); and (c) to gain deeper insight into whether open people are best characterized as sociocultural mavericks.

Experiment 1

This experiment constitutes our foray into research with the minimal norm paradigm. We test the general applicability of the SNP, experimentally manipulate a central concept of the SNP (i.e., sociocultural norms), and examine whether the SNP applies to all four descriptive Big Five domains.

Method

We conducted Experiments 1–3 in full accordance with the Ethical Standards of the American Psychological Association. The

[4] We use a cover story to minimize demand characteristics. If participants knew that we are actually interested in conformity to sociocultural norms, they might conform to those norms in an effort to be "good" participants. The cover story seems to be effective as 74.8% of our participants were oblivious to the influence of sociocultural norms on their personal preferences (see description in the General Discussion and Online Supplement S13).

[5] Preferences for Chinese characters are independent of the Big Five when people do not speak Chinese. Preferences for social values are independent of the Big Five when the two social values of a pair are matched according to their semantic similarity (e.g., "honest" and "responsible," rather than "honest" and "successful"; see Gebauer et al., 2013).

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experiments were part of a larger research project and that project was approved by the ethics committee of the Humboldt-University of Berlin (project title: A Social Motives Perspective on Personality, protocol number: 2013-06).

Participants

We analyzed data from 2,306 participants across two samples[6] (Sample 1a: N = 1,304; 58% female, 41% male, 1% missing; M_{age} = 34.71, SD = 11.33; Sample 1b: N = 1,002; 60% female, 38% male, 2% missing; M_{age} = 34.11, SD = 11.47; ethnical background of Samples 1a–b: 75% Caucasian, 8% African American, 6% Asian, 6% Hispanic, 3% Other, 2% missing; participation duration: Mdn = 31 min; payment for full completion: USD $3.30).[7] The two samples differed only in one way: In addition to the BFI (administered in both samples), we administered some other self-report measures and those measures differed across samples (see the material file at https://madata.bib.uni-mannheim.de/364/). Importantly, however, the minimal norm paradigm preceded all self-report measures. Therefore, the differences between samples are inconsequential for the present purposes. We aggregated the two samples to obtain more precise estimates in our analyses.

We collected our data online via Amazon's Mechanical Turk (MTurk). MTurk is an ideal participant pool for this experiment because (a) it allows to sample many participants and, thus, to estimate effects with high precision (Schönbrodt & Perugini, 2013); (b) it is easily accessible to researchers worldwide and, thus, facilitates direct replications (Zwaan et al., 2018); (c) it is demographically diverse and, thus, allows rather general conclusions (Buhrmester et al., 2011); (d) its data quality is comparatively high (Hauser & Schwarz, 2016); and (e) it is the most popular participant pool in personality and social psychology to date (Anderson et al., 2019).

MTurkers qualified for the experiment if they had self-identified as U.S. residents (the United States served as the sociocultural context in this experiment) and if more than 95% of their past work was satisfactory to the requesters (i.e., approval ratings $>$ 95%). Those two criteria ensure high data quality and may even render other steps for quality assurance unnecessary (e.g., attention check questions; Peer et al., 2014). We also prohibted double participation within the same experiment and across our three experiments. Consequently, all participants were naïve to the minimal norm paradigm.

Procedure and Measures

Participants entered their MTurk ID (to prevent double participation), provided informed consent, completed the minimal norm paradigm, responded to the Big Five measure, reported demographic information, and were debriefed (in this order).[8]

Minimal Norm Paradigm. As a cover story, participants read that the study examines how difficult it is for people to learn societal preferences (we use the term "societal preferences" rather than "sociocultural norms" because the former appears more accessible to participants). Participants then receive a short description of the societal preferences they are going to learn and are told that their memory for those societal preferences will be tested (for exact instructions, see the material file at https://madata.bib.uni-mannheim.de/364/). The paradigm consists of three phases: learning, recall, and personal preference (in this order).

In the learning phase (i.e., the manipulation of sociocultural norms), participants see pairs of Chinese characters and pairs of social values. We created those pairs using pictures of Chinese characters from Payne et al. (2005) and social values from Schwartz (1992). The pairs come with bar graphs and percentages that inform participants about the ostensible sociocultural norms (i.e., which characters/values the majority of U.S. adults ostensibly prefer; Figure 1a). The sociocultural norms are experimentally manipulated (i.e., the computer determines randomly for each participant whether the majority ostensibly prefers the left or the right character/value of a pair). Participants are instructed to memorize the sociocultural norm for each pair without having to memorize the precise percentages (the percentages vary between "61% vs. 39%" and "88% vs. 12%"). Participants are also instructed that the pairs will be presented in a different order in the recall phase. Thus, participants know that learning the presentation order (instead of the sociocultural norms) does not help them to complete the task successfully. Finally, participants are instructed that a "next" button (to proceed to the next pair) will emerge after 10 seconds, ensuring a minimum learning time of 10 seconds for each sociocultural norm.

In the recall phase (i.e., the manipulation check), participants see the pairs of Chinese characters and social values from the learning phase again (in random order). For each pair, participants report which character/value the majority prefers (options: *the left picture [value], the right picture [value], I don't remember*; Figure 1b). That information is important to exclude pairs with incorrectly recalled sociocultural norms from the statistical analyses (i.e., exclusion of those pairs per participant that failed the manipulation check). The recall rate was sufficiently high in Experiment 1 (87%), Experiment 2 (85%), and Experiment 3 (86%).

[6] Experiments 1-3 were each completed by two samples of participants. To determine the minimum size of the single samples, we used the preliminary data of the 1,926 additional participants who had completed some trial version of the minimal norm paradigm (Online Supplement S2). Specifically, we (a) repeatedly drew 10,000 bootstrap samples from those additional participants to obtain datasets for different sample sizes, (b) conducted the model described in Experiment 1's Statistical Modeling section in each bootstrap sample, and (c) checked how frequently our postulated effects emerged across bootstrap samples of the same size. On the basis of this analysis, we opted for at least 1,000 participants per sample. In our preliminary data, this sample size achieved about 99% power to detect the postulated Agreeableness effect and about 80% power to detect the postulated Openness effect. The achieved power to detect the postulated Conscientiousness or Extraversion effect was lower than 80%, but we expected larger effect sizes with the final version of the minimal norm paradigm and we recruited two samples per experiment.

[7] We excluded a priori 74 additional participants (3%) because they (a) did not complete all main-text measures; (b) started to complete the minimal norm paradigm multiple times (and, thus, probably noticed that the ostensible sociocultural norms had changed); (c) misunderstood the instructions of the minimal norm paradigm (checked by one item); (d) did not comply with those instructions (e.g., wrote down the sociocultural norms rather than memorized them); (e) did not recall correctly at least one sociocultural norm within the minimal norm paradigm (the results were conceptually identical when we demanded higher recall rates; see Online Supplement S3); (f) did not participate seriously (checked by one item); and/or (g) reported a sensible reason for why their data should be excluded (e.g., participant chose Chinese characters at random instead of indicating own preferences).

[8] Adjacent to the Big Five measure, participants completed additional self-report measures. The material file at https://madata.bib.uni-mannheim.de/364/ lists all those measures. Together with the demographic items, participants also responded to a few control items (e.g., "Are there any reasons why we should not enter your data into our analyses? If YES, please enter the reason[s]").

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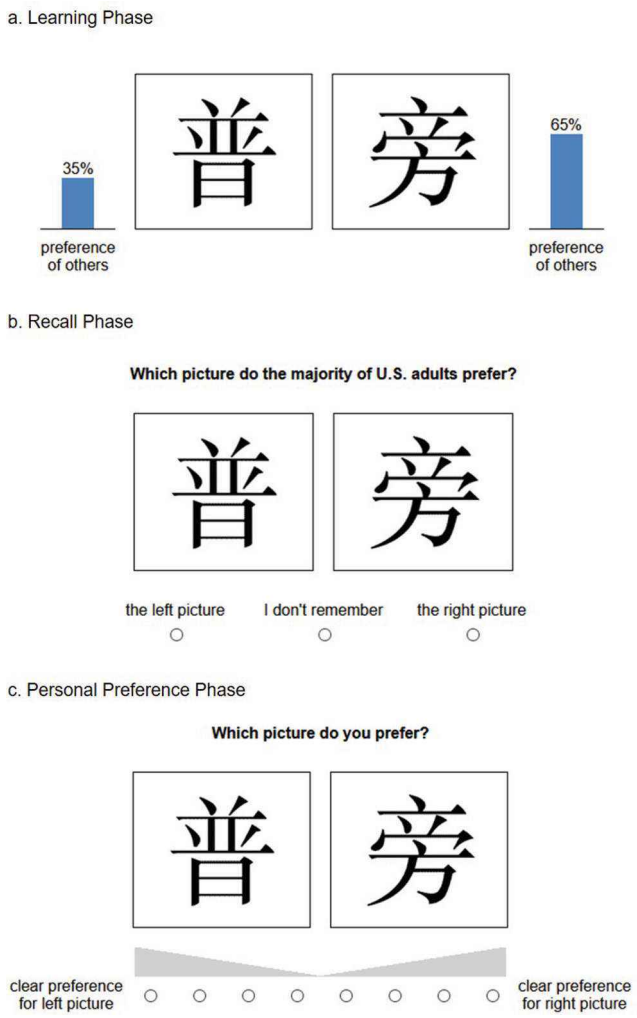
Figure 1
Example of the Three Phases of the Minimal Norm Paradigm



Note. See the online article for the color version of this figure.

In the personal preference phase (i.e., the assessment of the outcomes), participants see the pairs of Chinese characters and social values from the previous two phases one last time (in the same order as in the recall phase). For each pair, participants indicate which character/value they prefer personally (1 = *clear preference for left picture [value]* to 8 = *clear preference for right picture [value]*; Figure 1c).

Each participant sees 18 pairs of Chinese characters and 18 pairs of social values—that is, a total of 36 experimental manipulations and corresponding outcomes per participant. This large number is a major strength of the minimal norm paradigm, but it also exceeds people's short-term memory capacity (Cowan, 2016). Therefore, the minimal norm paradigm consists of six blocks. Each block uses six pairs of Chinese characters or social values and contains its own learning, recall, and personal preference phases. As a result, participants have to learn and recall sociocultural norms for six pairs of Chinese characters or social values at a time, not all 36 pairs. For each participant, the computer randomizes (a) the order of the pairs within each block and (b) the order of the blocks (with the first three blocks using Chinese characters and the second three blocks using social values or vice versa). After completing the last block of Chinese characters, participants indicate whether they knew the meaning of any Chinese character they just saw. Only very few of our participants knew the meaning of at least one Chinese character (Experiment 1: 3%; Experiment 2: 4%; Experiment 3: 4%). For those participants, we excluded all 18 pairs of Chinese characters from the statistical analyses because we wanted the Chinese characters to be meaningless for our participants (the results conceptually replicated when we retained those pairs; see Online Supplement S4).

Big Five. The 44-item Big Five Inventory (BFI; John et al., 1991) measures each Big Five domain with 8–10 items. Each item begins with the phrase "I see myself as someone who . . . ." Example items are "... is generally trusting" (Agreeableness), "... is a reliable worker" (Conscientiousness), "... is curious about many different things" (Openness), "... is outgoing, sociable" (Extraversion), and "... worries a lot" (Neuroticism). Participants responded on 5-point rating scales, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). All five BFI domains had adequate internal consistencies ($.82 \leq \alpha s \leq .88$).

Statistical Modeling

In the minimal norm paradigm, pairs of Chinese characters and social values are nested within participants. We therefore conducted a random-intercept random-slope model (Barr et al., 2013) with the *MixedModels* package (version v2.3.0; Bates et al., 2020) in the statistical software environment *Julia* (version v1.4.2; Bezanson et al., 2017). Personal preferences regarding pairs of Chinese characters and social values served as (Level-1) outcomes.[9] The Big Five domains served as simultaneous Level-2 predictors.[10] The experimentally manipulated sociocultural norms (effect-coded: −0.5 = majority prefers left character/value, 0.5 = majority prefers right character/value) served as Level-1 moderators.[11] The focal effects

[9] We excluded the following stimulus pairs from the statistical analyses: (a) Pairs of Chinese characters and social values for which participants did not recall correctly the sociocultural norm (i.e., pairs with a failed manipulation check). (b) All pairs of Chinese characters for participants who knew the meaning of at least one of the characters (see Experiment 1's Minimal Norm Paradigm section).

[10] We included all Big Five domains in a single model because this single-model approach controls for shared variance between the Big Five domains (Entringer et al., 2020; Gebauer et al., 2014). It is often argued that such shared variance should be controlled for because it is largely due to evaluative biases in self-report (McCrae et al., 2008; Paulhus & John, 1998). Yet, for completeness reasons, we also conducted separate models for each Big Five domain. We report the results in Online Supplement S5. These results conceptually replicated our main-text results with one exception: The Neuroticism × Sociocultural Norms interaction in Experiments 1–3 became significant when the shared variance between the Big Five domains was not controlled for.

[11] We modeled sociocultural norms as a dichotomous moderator (majority prefers left vs. right character/value). This modeling decision corresponds with the instructions of the minimal norm paradigm. Those instructions are to memorize whether the majority prefers the left or the right character/value *without* memorizing the precise percentages of those preferences (see Experiment 1's Minimal Norm Paradigm section). Also, we report Bayes factors for our results (Jeffreys, 1961; Kass & Raftery, 1995) and those can be adequately computed for our model (see Equations 1–3) but not (yet) for an analog model with a continuous moderator. Such an analog model can, of course, be computed with *Julia*'s *MixedModel* package (and, thus, without obtaining Bayes factors). For completeness reasons, we conducted that model for all experiments and report the results in Online Supplement S6. All Big Five Domain × Sociocultural Norms interactions from the main text replicated in that supplementary model.

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are the five cross-level interactions between the Big Five domains and the experimentally manipulated sociocultural norms. To obtain interpretable results, we grand-mean centered the Big Five domains and entered (effect-coded) sociocultural norms uncentered (Nezlek, 2012). Equations (1) to (3) show the full model.

The Level-1 part of the model is

$$\text{personal preferences} = \psi_0 + \psi_1 \times \text{Sociocultural Norms} + e \quad (1)$$

where personal preferences are modeled as a combination of one person-specific intercept, ψ_0, one person-specific linear slope, ψ_1, and a residual, e. Person-specific intercepts and slopes are modeled as Level-2 outcomes.

The Level-2 part of the model (bold: grand-mean centering) is

$$\psi_0 = \gamma_{00} + \gamma_{01} \times \mathbf{A} + \gamma_{02} \times \mathbf{C} + \gamma_{03} \times \mathbf{O} + \gamma_{04} \times \mathbf{E} + \gamma_{05} \times \mathbf{N} + u_0 \quad (2)$$

$$\psi_1 = \gamma_{10} + \gamma_{11} \times \mathbf{A} + \gamma_{12} \times \mathbf{C} + \gamma_{13} \times \mathbf{O} + \gamma_{14} \times \mathbf{E} + \gamma_{15} \times \mathbf{N} + u_1 \quad (3)$$

where γ_{00} and γ_{10} are sample means, $\gamma_{01} - \gamma_{15}$ are sample-specific slopes of person-level Big Five (A = Agreeableness, C = Conscientiousness, O = Openness, E = Extraversion, N = Neuroticism), and $u_0 - u_1$ are Level-2 residuals indicating person-level deviations from sample means.

How strong is the empirical evidence for our hypotheses? To find out, we relied on Bayes factors (Jeffreys, 1961; Kass & Raftery, 1995) and computed them with the *R* package *BayesFactor* (Version 0.9.12–4.2; Morey & Rouder, 2018).[12] Bayes factors inform about the empirical support for a focal hypothesis compared to an alternative hypothesis (typically the null hypothesis). For example, $BF_{10} = 100$ means that, given the data, the focal hypothesis is 100 times more likely than the null hypothesis.[13] To facilitate interpretation, one can categorize Bayes factors and label the categories. We use the following categories/labels based on Jeffreys (1961) as they are probably most popular: BF_{10}s ranging from 1 to 3.2 indicate inconclusive support for the focal hypothesis, 3.2 to 10 indicate substantial support, 10 to 32 strong support, 32 to 100 very strong support, and greater than 100 decisive support. BF_{10}s ranging from 0.32 to 1 indicate inconclusive support for the null hypothesis, 0.10 to 0.32 indicate substantial support, 0.032 to 0.10 strong support, 0.01 to 0.032 very strong support, and smaller than 0.01 decisive support.

Results and Discussion

Our modeling strategy allowed us to compute our results simultaneously within one comprehensive model (see previous section). This single-step approach is an analytic strength. Yet, for clarity reasons, we structured this section in four consecutive parts: (a) Effects of the Big Five domains on personal preferences independent of those preferences' sociocultural norms (i.e., main effects); (b) effects of Agreeableness, Conscientiousness, and Openness on personal preferences as a function of those preferences' sociocultural norms (i.e., focal cross-level interactions according to the SMP); (c) effects of Extraversion on personal preferences as a function of those preferences' sociocultural norms (i.e., a cross-level interaction that is not predicted by the SMP but has emerged in relevant past research); and (d) effects of Neuroticism on personal preferences as a function of those preferences' sociocultural norms (i.e., a cross-level interaction that is not predicted by the SMP, nor has it emerged in relevant past research).

As described in the Method section, the minimal norm paradigm experimentally manipulated whether it was socioculturally normative to prefer the left or the right character/value of a pair. In other words, the computer determined randomly for each participant whether the presented majority of U.S. adults preferred the left or the right character/value of a pair. According to the SNP, Agreeableness, Conscientiousness, and Extraversion should predict personal preferences for the right (left) character/value more strongly if the majority preferred the right (left) character/value. By contrast, Openness should predict personal preferences for the right (left) character/value more strongly if the majority preferred the left (right) character/value.

Main Effects

Table 1's first data-column includes the results of our comprehensive model. Lines 2–6 include the main effects of the Big Five domains. Conceptually, these main effects show the effects of the Big Five domains on participants' preferences independent of those preferences' sociocultural norms. In creating the minimal norm paradigm, we constructed an array of outcomes that is in and of itself independent of the Big Five (see Minimal Norm Paradigm section in the Introduction). We therefore did not expect to find main effects of the Big Five domains. That expectation was met: The main effects of the Big Five domains were not significant with the exception of Conscientiousness (a main effect that did not replicate in Experiments 2–3) and the Bayesian analyses revealed evidence for the null hypothesis (i.e., the absence of a main effect) for all Big Five domains (including Conscientiousness).

Cross-Level Interactions Involving Agreeableness, Conscientiousness, and Openness

The SMP makes predictions regarding Agreeableness, Conscientiousness, and Openness only (Gebauer et al., 2014). We therefore focus first on whether these Big Five domains predicted personal preferences as a function of those preferences' sociocultural norms. Lines 8–10 (Table 1, first data-column) include the relevant cross-level interactions.

The cross-level interaction involving Agreeableness was significant and the Bayesian support for it was decisive (line 8). More precisely, Agreeableness predicted personal preferences for the right (left) character/value more strongly if the majority preferred the right (left) character/value (Figure 2.1a). Conceptually, then,

[12] We used the following default priors of the *BayesFactor* package: a medium prior scale for standardized, reduced fixed effects (rscaleFixed = 0.5), a nuisance prior scale for standardized random effects (rscaleRandom = 1), and a medium prior scale for standardized slopes (rscaleCont = sqrt[2]/4).

[13] To obtain the Bayes factor for a particular cross-level interaction, we compared the full model described in this section with a model which omitted that particular cross-level interaction. Likewise, to obtain the Bayes factor for a particular main effect, we compared a model which included all main effects with a model which omitted that particular main effect.

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Table 1
Effects of the Big Five Domains on Personal Preferences Moderated by Sociocultural Norms

	Experiment 1			Experiment 2			Experiment 3			Experiments 1–3[a]	
Predictor	Estimate	95% CI	BF_{10}	Estimate	95% CI	BF_{10}	Estimate	95% CI	BF_{10}	Estimate	95% CI
(1) (Intercept)	4.57	[4.55, 4.59]		4.57	[4.55, 4.59]		4.57	[4.55, 4.59]		4.57	[4.56, 4.58]
(2) Agr	6e-04	[−0.03, 0.03]	0.03	−0.05	[−0.09, −0.02]	2.94	−0.01	[−0.05, 0.02]	0.04	−0.02	[−0.04, −4e-03]
(3) Cns	−0.03	[−0.06, −1e-04]	0.13	-4e-03	[−0.03, 0.03]	0.03	−0.02	[−0.05, 0.01]	0.04	−0.02	[−0.03, 1e-03]
(4) Opn	0.01	[−0.01, 0.04]	0.04	0.02	[−0.01, 0.04]	0.04	−0.01	[−0.04, 0.02]	0.03	0.01	[−0.01, 0.02]
(5) Ext	−0.02	[−0.05, 3e-03]	0.08	−0.04	[−0.07, −0.01]	0.46	−0.03	[−0.06, −1e-04]	0.12	−0.03	[−0.04, −0.01]
(6) Neu	−0.02	[−0.04, 0.01]	0.06	−0.05	[−0.07, −0.02]	8.37	−0.03	[−0.05, −2e-03]	0.15	−0.03	[−0.05, −0.02]
(7) Norms	0.99	[0.93, 1.05]	2e+845	1.06	[1.00, 1.12]	2e+1,103	1.12	[1.06, 1.18]	4e+1,173	1.06	[1.02, 1.09]
(8) Agr × Norms	0.33	[0.23, 0.43]	1e+08	0.28	[0.18, 0.39]	4e+04	0.23	[0.12, 0.34]	198.75	0.27	[0.21, 0.33]
(9) Cns × Norms	0.12	[0.03, 0.22]	1.18	0.11	[0.02, 0.21]	0.85	0.13	[0.03, 0.23]	1.39	0.12	[0.06, 0.17]
(10) Opn × Norms	−0.18	[−0.27, −0.09]	114.52	−0.32	[−0.41, −0.23]	9e+08	−0.26	[−0.36, −0.17]	2e+05	−0.24	[−0.30, −0.19]
(11) Ext × Norms	0.11	[0.04, 0.18]	3.70	0.14	[0.05, 0.23]	5.33	0.24	[0.14, 0.33]	1e+04	0.16	[0.11, 0.21]
(12) Neu × Norms	0.04	[−0.04, 0.11]	0.08	0.01	[−0.07, 0.09]	0.05	−0.01	[−0.10, 0.07]	0.06	3e-03	[−0.04, 0.05]

Note. CI = confidence interval; BF_{10} = Bayes factor which compares the focal hypothesis (i.e., the presence of an effect) to the null hypothesis (i.e., the absence of an effect) such that $BF_{10} > 1$ means Bayes factor favors the focal hypothesis over the null hypothesis and $BF_{10} < 1$ means Bayes factor favors the null hypothesis over the focal hypothesis; Agr = Agreeableness; Cns = Conscientiousness; Opn = Openness; Ext = Extraversion; Neu = Neuroticism; Norms = sociocultural norms.
[a] The total sample size was too large to compute Bayes factors with the *BayesFactor* package (Morey & Rouder, 2018).

Agreeableness predicted personal preferences more strongly if those preferences were socioculturally normative.

The cross-level interaction involving Conscientiousness was significant, too, but the Bayesian support for it was inconclusive (line 9). More precisely, Conscientiousness appeared to predict personal preferences for the right (left) character/value more strongly if the majority preferred the right (left) character/value (Figure 2.1b). Or, in conceptual terms, Conscientiousness appeared to predict personal preferences more strongly if those preferences were socioculturally normative. Yet, more data is needed to draw sufficiently clear conclusions.

The cross-level interaction involving Openness was also significant and the Bayesian support for it was decisive (line 10). More precisely, Openness predicted personal preferences for the right (left) character/value more strongly if the majority preferred the left (right) character/value (Figure 2.1c). In more conceptual terms, Openness predicted personal preferences more strongly if those preferences were not socioculturally normative.

Together, the results of this subsection constitute first-ever evidence that sociocultural norms are crucial for Big Five prediction in general (relevant past findings have been restricted to religiosity as the outcome). At the same time, these results constitute first-ever experimental evidence for the role of sociocultural norms in Big Five prediction (relevant past research has been entirely correlational). Finally, these results also provide much reason to believe that relevant past results in the realm of religiosity have not been due to something religiosity-specific (Ashton & Lee, 2019; Entringer et al., 2020; Gebauer et al., 2014). In fact, the high correspondence between past and present results is striking because past results have been survey-based across 100+ countries and restricted to one very specific outcome, whereas the present results are experiment-based and our minimalist set-up ensures wide applicability and generality of the results.

Cross-Level Interaction Involving Extraversion

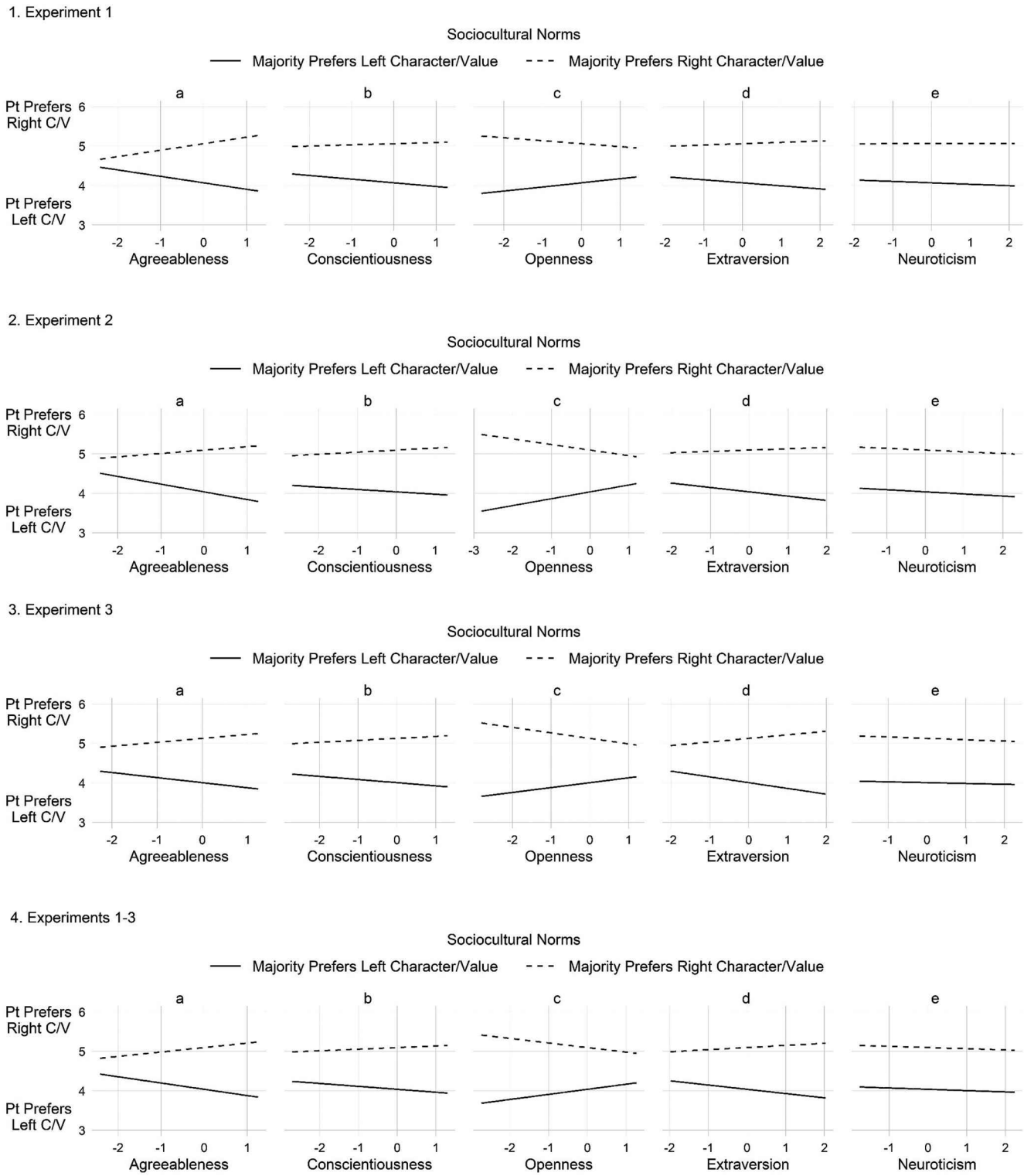
Some past research has found that Extraversion predicts higher religiosity most strongly in religious cultures and least strongly in secular cultures (Gebauer et al., 2014; see also Entringer et al., 2020). Nonetheless, Gebauer et al. (2014) did not consider Extraversion relevant for the SMP because they considered those Extraversion results specific to religiosity. The present data allowed us to test whether past Extraversion results replicate within the minimal norm paradigm and, thus, cannot be specific to religiosity. Line 11 (Table 1, first data-column) includes the relevant cross-level interaction, which was significant and the Bayesian support for it was substantial. More precisely, Extraversion predicted personal preferences for the right (left) character/value more strongly if the majority preferred the right (left) character/value (Figure 2.1d). Conceptually, then, Extraversion predicted personal preferences more strongly if those preferences were socioculturally normative. Therefore, the SNP also applies to Extraversion and, hence, to all four descriptive Big Five domains.

Cross-Level Interaction Involving Neuroticism

Evidence for a theory is typically sought by testing for the presence of theoretically predicted effects (akin to convergent validity in scale construction). By contrast, evidence for a theory is rarely sought by testing for the absence of theoretically unpredicted

Figure 2

Effects of the Big Five Domains on Personal Preferences as a Function of Sociocultural Norms



Note. Pt = participant; C/V = character/value. Participants' personal preferences ranged from 1 (*clear preference for left picture [value]*) to 8 (*clear preference for right picture [value]*). Thus, a positive regression slope indicates a relatively strong preference for the right character/value and a negative regression slope indicates a relatively strong preference for the left character/value with higher levels on the Big Five domain. The Big Five domains are grand-mean centered.

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effects. Yet, the latter also helps evaluate a theory (akin to discriminant validity in scale construction). We did not predict an effect of Neuroticism on personal preferences as a function of sociocultural norms. Line 12 (Table 1, first data-column) includes the relevant cross-level interaction, which was not significant (Figure 2.1e). More tellingly, we found strong Bayesian support for the null hypothesis (i.e., the absence of an effect).

Experiment 2

Experiment 1 buttressed the SNP on three counts. It successfully examined the general applicability of the SNP, experimentally manipulated a key concept of the SNP (sociocultural norms), and provided some initial evidence that the SNP applies to all four descriptive Big Five domains. Because all those things were "firsts," replication was a must. Consequently, Experiment 2's first goal was replication.

The second goal was to shed first light on the mechanisms that underlie the SNP. A small, yet crucial, alteration between Experiments 1 and 2 helped achieve this goal. Namely, we changed from the BFI to the BFI-2. The latter contains three facets per domain. Those facets constitute possible process variables that may help explain why a Big Five domain interacts with sociocultural norms in predicting its outcomes (cf. Asendorpf, 2016; McCrae, 2016). We therefore conducted indirect-effects analyses (Hayes, 2018; MacKinnon et al., 2007) which treated Big Five facets as mediators between their Big Five domain and socioculturally (not) normative preferences. We had several (partly competing) hypotheses. However, we decided to portray the present goal as entirely exploratory. Such a portrayal is much more concise than lengthy descriptions of (partly competing) hypotheses for three facets per Big Five domain. Importantly, three things render an exploratory portrayal particularly viable: our data analytic procedure (focus on Bayes factors; Jeffreys, 1961), our large sample size (2,556 participants in Experiment 2; Schönbrodt & Perugini, 2013), and our replicability test (Experiment 3 includes a direct replication of Experiment 2).

The third goal was to provide an initial test of whether open people are better characterized as sociocultural contrarians or mavericks. To this end, an indirect-effects analysis is useful that treats the facets of Openness as mediators (see previous paragraph). Specifically, the Openness facet *O-Creative Imagination* (e.g., "is original, comes up with new ideas") is characterized by creativity and the likely essence of creativity is opposition (Sheldon, 2011; Sternberg, 2018). Thus, this Openness facet suggests *opposing thought* as a mechanism. An indirect effect through O-Creative Imagination would therefore favor the contrarians explanation. By contrast, the Openness facet *O-Intellectual Curiosity* (e.g., "is complex, a deep thinker") is characterized by cognitive endeavors and people engaging in cognitive endeavors make up their own minds rather than rely on heuristics (Cacioppo et al., 1996; Petty et al., 2009), including the "conformity heuristic" (i.e., the heuristic to follow majority opinions). Thus, this Openness facet suggests *independent thought* as a mechanism. An indirect effect through O-Intellectual Curiosity would therefore favor the mavericks explanation.

Method

Participants

We analyzed data from 2,556 participants across two MTurk samples (Sample 2a: N = 1,288; 52.6% female, 47.0% male, 0.4% missing; M_{age} = 35.56, SD = 11.56; Sample 2b: N = 1,268; 54.3% female, 44.4% male, 1.3% missing; M_{age} = 34.46, SD = 11.67; ethnical background of Samples 2a-b: 74% Caucasian, 9% African American, 7% Asian, 6% Hispanic, 3% Other, 1% missing; participation duration: Mdn = 31 min; payment for full completion: USD $3.30 in Sample 2a, USD $3.50 in Sample 2b).[14] As in Experiment 1, the two samples differed only regarding their additional self-report measures (see the material file at https://madata.bib.uni-mannheim.de/364/), which all came after the minimal norm paradigm. Therefore, the differences between samples are inconsequential for the present purposes. We aggregated the two samples to obtain more precise estimates in our analyses. Participation requirements were identical to those in Experiment 1 and so were the data-exclusion criteria (see Footnote 7). Because of those criteria, we excluded a priori 97 additional participants (4%).

Procedure and Measures

The procedure was identical to Experiment 1's procedure, except for the Big Five measure. We used the 60-item BFI-2 (Soto & John, 2017), which measures each Big Five domain with three facets. Each facet contains four items. As in Experiment 1, each item began with the phrase "I see myself as someone who . . . ." Example items are ". . . is helpful and unselfish with others" (A-Compassion), ". . . is polite, courteous to others" (A-Respectfulness), ". . . assumes the best about people" (A-Trust), ". . . is systematic, likes to keep things in order" (C-Organization), ". . . is efficient, gets things done" (C-Productiveness), ". . . is dependable, steady" (C-Responsibility), ". . . is fascinated by art, music, or literature" (O-Aesthetic Sensitivity), ". . . is original, comes up with new ideas" (O-Creative Imagination), ". . . is complex, a deep thinker" (O-Intellectual Curiosity), ". . . is dominant, acts as a leader" (E-Assertiveness), ". . . is full of energy" (E-Energy Level), ". . . is outgoing, sociable" (E-Sociability), ". . . worries a lot" (N-Anxiety), ". . . tends to feel depressed, blue" (N-Depression), and ". . . is moody, has up and down mood swings" (N-Emotional Volatility). Participants responded on 5-point rating scales, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). All five domain scales had adequate internal consistencies ($.85 \leq \alpha s \leq .93$) and so had all 15 facet scales ($.68 \leq \alpha s \leq .86$).

Statistical Modeling

To replicate Experiment 1, we specified the same random-intercept random-slope model as in Experiment 1 (hereafter: domains-as-predictors model; see Equations 1–3). To identify mechanisms, we proceeded as follows: First, we specified a second random-intercept random-slope model, which differed from the first model

[14] Experiments 2–3's data on the BFI-2 facets and on an additionally assessed religiosity item ("I see myself as someone who is very religious") were also used for a supplementary analysis in Entringer et al. (2020; Footnote 16). That supplementary analysis investigated how much religiosity variance the BFI-2 facets explained in a U.S. sample. Data from the minimal norm paradigm were not used.

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in one respect only: We replaced the five Big Five domains with the 15 Big Five facets (hereafter: facets-as-predictors model). The Big Five facets that interacted significantly with sociocultural norms qualified as possible process variables that may drive their domain's effect (cf. Asendorpf, 2016; McCrae, 2016). Second, we conducted an indirect-effects analysis and treated as mediators those Big Five facets that qualified as possible process variables in the first step (the other Big Five facets were not examined any further). This indirect-effects analysis took the form of a third random-intercept random-slope model (hereafter: facets-as-mediators model).

To fully appreciate our facets-as-mediators model, it is necessary to foreshadow the results of the facets-as-predictors model. The latter model revealed one—and only one—possible process variable for Agreeableness, Conscientiousness, and Openness (for Extraversion, no possible process variable emerged). Consequently, the facets-as-mediators model was identical to the domains-as-predictors model with three critical extensions: (a) Additional predictors were those three facets that qualified as possible process variables in the facets-as-predictors model. (b) Cross-level interactions between those three facets and sociocultural norms were specified. (c) Indirect effects through those three facets were specified (e.g., path a of indirect effect: Agreeableness → Agreeableness Facet; path b of indirect effect: Agreeableness Facet × Sociocultural Norms → Personal Preferences; model 15 in Hayes, 2018; p. 592).[15] Importantly, we ensured independence between the three included facets and their domains by removing the items of those three facets from the domains' scores. Conceptually, that removal is unproblematic from the predominant view of trait structure (i.e., the reflective view; Bollen & Lennox, 1991; Edwards & Bagozzi, 2000). Empirically, that removal barely affected participants' rank order, as indicated by very strong Spearman's rank correlations between the full and reduced domain scores for Agreeableness, Conscientiousness, and Openness (Experiment 2: $.94 \leq rs \leq .97$; Experiment 3: $.93 \leq rs \leq .97$). We tested the facets-as-mediators model with *Mplus 8.4* (Muthén & Muthén, 1998–2017) as *Julia's MixedModels* package is not (yet) able to model indirect effects.

Results and Discussion

We start with the replication of Experiment 1, followed by the analysis of the possible process variables and the indirect-effects analysis.

Domains-as-Predictors Model (Replication of Experiment 1)

Table 1's second data-column includes the results of the domains-as-predictors model. Lines 2–6 show the effects of the Big Five domains on participants' preferences independent of those preferences' sociocultural norms (i.e., the main effects of the Big Five domains). We did not expect to find such main effects and that expectation was largely met: The main effects of Conscientiousness and Openness were not significant and the Bayesian analyses revealed evidence for the null hypothesis (i.e., the absence of a main effect). The main effects of the other three domains reached significance, but the Bayesian support for them was inconclusive (Agreeableness and Extraversion) or substantial at best (Neuroticism).

Much more important are the cross-level interactions between each Big Five domain and sociocultural norms (lines 8–12). These cross-level interactions fully replicated those of Experiment 1: The cross-level interaction involving Agreeableness was significant and the Bayesian support for it was decisive. More precisely, Agreeableness predicted personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figure 2.2a). The cross-level interaction involving Conscientiousness was significant, too, but the Bayesian support for it was inconclusive. More precisely, Conscientiousness appeared to predict personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figure 2.2b). The cross-level interaction involving Openness was also significant and the Bayesian support for it was decisive. More precisely, Openness predicted personal preferences for a particular character/value more strongly if those preferences were not socioculturally normative (Figure 2.2c). Moreover, Experiment 1's conceptually novel finding regarding Extraversion replicated. Specifically, the cross-level interaction involving Extraversion was significant and the Bayesian support for it was substantial. More precisely, Extraversion predicted personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figures 2.2d). Finally, Neuroticism was again the only Big Five domain that did not significantly interact with sociocultural norms in predicting personal preferences (Figure 2.2e). More tellingly, we again found strong Bayesian support for the null hypothesis (i.e., the absence of an effect). Overall, the results buttress the SNP and, for the first time, they do so with the latest Big Five measure—the BFI-2.

Facets-as-Predictors Model (Possible Process Variables)

Table 2's first data-column includes the results of the facets-as-predictors model. Lines 2–16 show the effects of the Big Five facets on participants' preferences independent of those preferences' sociocultural norms (i.e., the facets' main effects). We did not expect to find such main effects and that expectation was met in 13 out of 15 cases (in the two significant cases, Bayesian analyses revealed inconclusive evidence for those main effects and neither of those main effects replicated in Experiment 3).

Much more important are the cross-level interactions between each Big Five facet and sociocultural norms (lines 18–32). These cross-level interactions revealed three possible process variables—one each, and only one each, for Agreeableness, Conscientiousness, and Openness. Specifically, the cross-level interaction involving A-Trust was significant and the Bayesian support for it was very strong. At the same time, the cross-level interactions involving the other two facets of Agreeableness were not significant and the Bayesian analyses strongly supported the null hypotheses (i.e., the absence of cross-level interactions). The cross-level interaction involving C-Responsibility was also significant, but the

[15] The reflective view of trait structure (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000) suggests to treat the Big Five domains as latent variables in an indirect-effects analysis. We therefore computed the latent scores for all Big Five domains and repeated the facets-as-mediators model with those latent scores. We report the results in Online Supplement S7. These results were conceptually identical to the main-text results, which are based on manifest scores for the Big Five domains.

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Table 2
Effects of the Big Five Facets on Personal Preferences Moderated by Sociocultural Norms

	Experiment 2			Experiment 3			Experiments 2–3[a]	
Predictor	Estimate	95% CI	BF_{10}	Estimate	95% CI	BF_{10}	Estimate	95% CI
(1) (Intercept)	4.57	[4.55, 4.59]		4.57	[4.55, 4.59]		4.57	[4.56, 4.58]
(2) A-Compassion	−0.04	[−0.07, −0.01]	0.59	−0.02	[−0.05, 0.01]	0.08	−0.03	[−0.06, −0.01]
(3) A-Respectfulness	0.02	[−0.02, 0.06]	0.06	0.02	[−0.02, 0.06]	0.06	0.02	[−0.01, 0.05]
(4) A-Trust	−0.01	[−0.04, 0.02]	0.06	4e-03	[−0.03, 0.03]	0.05	-2e-03	[−0.02, 0.02]
(5) C-Organization	4e-03	[−0.02, 0.03]	0.05	0.02	[−0.01, 0.04]	0.09	0.01	[−0.01, 0.03]
(6) C-Productiveness	4e-03	[−0.03, 0.04]	0.05	1e-03	[−0.04, 0.04]	0.05	3e-03	[−0.02, 0.03]
(7) C-Responsibility	−0.02	[−0.06, 0.02]	0.07	−0.04	[−0.08, −4e-03]	0.27	−0.03	[−0.06, −3e-03]
(8) O-Aesthetic Sensitivity	0.01	[−0.02, 0.03]	0.05	−0.01	[−0.04, 0.01]	0.06	-2e-03	[−0.02, 0.02]
(9) O-Creative Imagination	−0.02	[−0.05, 0.01]	0.09	−0.04	[−0.08, −0.01]	0.63	−0.03	[−0.06, −0.01]
(10) O-Intellectual Curiosity	0.03	[-3e-03, 0.06]	0.15	0.06	[0.02, 0.09]	3.49	0.04	[0.02, 0.07]
(11) E-Assertiveness	0.01	[−0.02, 0.04]	0.05	2e-03	[−0.03, 0.03]	0.05	5e-03	[−0.02, 0.03]
(12) E-Energy Level	−0.01	[−0.04, 0.02]	0.05	−0.04	[−0.08, −0.01]	0.48	−0.03	[−0.05, −3e-03]
(13) E-Sociability	−0.02	[−0.04, 0.01]	0.09	-4e-03	[−0.03, 0.02]	0.05	−0.01	[−0.03, 0.01]
(14) N-Anxiety	−0.04	[−0.07, −0.01]	0.63	−0.01	[−0.04, 0.02]	0.05	−0.02	[−0.05, −2e-03]
(15) N-Depression	0.01	[−0.02, 0.05]	0.06	−0.04	[−0.07, −4e-03]	0.30	−0.01	[−0.03, 0.01]
(16) N-Emotional Volatility	−0.01	[−0.05, 0.02]	0.06	0.01	[−0.02, 0.05]	0.06	1e-03	[−0.02, 0.02]
(17) Norms	1.06	[1.00, 1.12]	3e+1,104	1.12	[1.07, 1.18]	7e+1,173	1.09	[1.05, 1.13]
(18) A-Compassion × Norms	0.03	[−0.08, 0.13]	0.10	0.05	[−0.06, 0.16]	0.14	0.04	[−0.03, 0.12]
(19) A-Respectfulness × Norms	0.02	[−0.10, 0.14]	0.09	−0.01	[−0.14, 0.11]	0.09	1e-04	[−0.09, 0.09]
(20) A-Trust × Norms	0.18	[0.08, 0.28]	49.10	0.15	[0.06, 0.25]	9.84	0.17	[0.10, 0.24]
(21) C-Organization × Norms	-5e-03	[−0.09, 0.08]	0.09	0.09	[-4e-03, 0.17]	0.48	0.04	[−0.03, 0.10]
(22) C-Productiveness × Norms	0.01	[−0.11, 0.13]	0.09	0.10	[−0.03, 0.22]	0.27	0.05	[−0.03, 0.14]
(23) C-Responsibility × Norms	0.16	[0.04, 0.28]	2.28	−0.05	[−0.17, 0.08]	0.11	0.06	[−0.03, 0.14]
(24) O-Aesthetic Sensitivity × Norms	−0.05	[−0.13, 0.03]	0.17	0.02	[−0.07, 0.10]	0.10	−0.02	[−0.07, 0.04]
(25) O-Creative Imagination × Norms	0.02	[−0.08, 0.13]	0.10	−0.02	[−0.13, 0.09]	0.10	2e-03	[−0.07, 0.08]
(26) O-Intellectual Curiosity × Norms	−0.29	[−0.39, −0.18]	2e+05	−0.29	[−0.39, −0.18]	9e+04	−0.29	[−0.36, −0.21]
(27) E-Assertiveness × Norms	0.01	[−0.08, 0.10]	0.09	0.04	[−0.05, 0.13]	0.13	0.03	[−0.04, 0.09]
(28) E-Energy Level × Norms	0.06	[−0.05, 0.16]	0.16	0.15	[0.04, 0.25]	2.26	0.10	[0.02, 0.17]
(29) E-Sociability × Norms	0.02	[−0.06, 0.09]	0.10	0.05	[−0.03, 0.13]	0.21	0.04	[−0.02, 0.09]
(30) N-Anxiety × Norms	0.05	[−0.05, 0.15]	0.14	−0.02	[−0.12, 0.07]	0.10	0.01	[−0.06, 0.08]
(31) N-Depression × Norms	−0.12	[−0.23, −0.02]	1.17	0.02	[−0.09, 0.12]	0.10	−0.05	[−0.13, 0.02]
(32) N-Emotional Volatility × Norms	0.09	[−0.01, 0.20]	0.38	−0.02	[−0.13, 0.09]	0.10	0.04	[−0.04, 0.11]

Note. CI = confidence interval; BF_{10} = Bayes factor which compares the focal hypothesis (i.e., the presence of an effect) to the null hypothesis (i.e., the absence of an effect) such that $BF_{10} > 1$ means Bayes factor favors the focal hypothesis over the null hypothesis and $BF_{10} < 1$ means Bayes factor favors the null hypothesis over the focal hypothesis; A = Agreeableness; C = Conscientiousness; O = Openness; E = Extraversion; N = Neuroticism; Norms = sociocultural norms.
[a] The total sample size was too large to compute Bayes factors with the *BayesFactor* package (Morey & Rouder, 2018).

Bayesian support for it was inconclusive. Notably, the cross-level interactions involving the other two facets of Conscientiousness were not significant and the Bayesian analyses strongly supported the null hypotheses. Finally, the cross-level interaction involving O-Intellectual Curiosity was significant and the Bayesian support for it was decisive. At the same time, the cross-level interactions involving the other two facets of Openness were not significant and the Bayesian analyses provided substantial support for the null hypotheses.[16,17] Next, we treated those three possible process variables as mediators in the facets-as-mediators model.

Facets-as-Mediators Model (Indirect Effects)

Table 3 (lines 1–5) includes the results of the facets-as-mediators model. First, we found an indirect effect of higher Agreeableness on more normative preferences through A-Trust (line 1). This suggests that Agreeableness predicts socioculturally normative preferences positively because agreeable people trust more the members of their sociocultural context and, thus, behave in the same way as those members.

[16] Table 2 also shows a significant N-Depression × Sociocultural Norms interaction. We do not elaborate on this cross-level interaction for two reasons: (a) This cross-level interaction did not replicate in Experiment 3. (b) We examined the Big Five facets to elucidate why the Big Five domains interact with sociocultural norms in predicting their outcomes. As hypothesized, Neuroticism did not interact with sociocultural norms in predicting its outcomes.

[17] For completeness reasons, we also conducted separate models for each Big Five facet. We report the results in Online Supplement S5. In brief, these results showed that almost all Big Five Facet × Sociocultural Norms interactions in Experiments 2-3 became significant. Importantly, though, the interactions were not significantly larger than in the facets-as-predictors model (except for the two interactions involving N-Anxiety and N-Emotional Volatility in Experiment 2 and the two interactions involving N-Depression and C-Responsibility in Experiment 3). Accordingly, each Big Five facet that showed a unique interaction with sociocultural norms in the facets-as-predictors model (Table 2) was exactly that facet of a Big Five domain which also stood out as the most influential facet in the separate models (Supplemental Table S5.2). As we tested the Big Five facets to identify mechanisms that underlie the effects of the Big Five domains, it was crucial to reveal Big Five Facet × Sociocultural Norms interactions that were unique (i.e., not attributable to shared variance between facets). Thus, the results relevant for the present research are the results of the facets-as-predictors model.

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Table 3
Results of Indirect-Effects Analyses

Predictor	Mediator	Direct effect		Path a of indirect effect		Path b of indirect effect		Indirect effect		Proportion mediated (%)
		Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	
					Experiment 2					
(1) Agreeableness	A-Trust	0.06	[−0.07, 0.18]	0.70	[0.65, 0.74]	0.18	[0.09, 0.27]	0.13	[0.06, 0.19]	68
(2) Conscientiousness	C-Responsibility	0.02	[−0.10, 0.13]	0.56	[0.52, 0.59]	0.15	[0.04, 0.28]	0.09	[0.02, 0.15]	82
(3) Openness	O-Intellectual curiosity	−0.03	[−0.13, 0.06]	0.62	[0.58, 0.65]	−0.29	[−0.39, −0.19]	−0.18	[−0.24, −0.12]	86
(4) Extraversion		0.13	[0.04, 0.22]							
(5) Neuroticism		0.03	[−0.05, 0.11]							
					Experiment 3					
(6) Agreeableness	A-Trust	−0.02	[−0.14, 0.11]	0.69	[0.65, 0.74]	0.20	[0.10, 0.30]	0.14	[0.07, 0.21]	100[a]
(7) Conscientiousness	Rational thought	0.14	[0.02, 0.25]	0.64	[0.57, 0.72]	0.14	[0.07, 0.21]	0.09	[0.04, 0.14]	39
(8) Openness	Need for cognition	−0.10	[−0.21, 0.01]	0.88	[0.83, 0.94]	−0.18	[−0.24, −0.11]	−0.16	[−0.22, −0.10]	62
(9) Extraversion	Social attention	0.11	[−0.05, 0.26]	1.52	[1.47, 1.57]	0.12	[0.04, 0.20]	0.18	[0.06, 0.30]	62
(10) Neuroticism		−0.03	[−0.12, 0.06]							

Note. Direct effect = Predictor × Sociocultural Norms interaction on personal preferences in the facets-as-mediators model (Experiment 2) or full-sociocultural-norm model (Experiment 3); path a of indirect effect = effect of predictor on mediator, controlled for the other predictors and mediators in the model; path b of indirect effect = Mediator × Sociocultural Norms interaction on personal preferences in the facets-as-mediators model (Experiment 2) or full-sociocultural-norm model (Experiment 3); indirect effect = product of path a and path b of indirect effect; proportion mediated = indirect effect divided by the sum of indirect and direct effect (MacKinnon et al., 1995), multiplied by 100; CI = confidence interval; A = Agreeableness; C = Conscientiousness; O = Openness. To ensure independence between the Big Five domains and the facets included in the model, we removed the items of those facets from the domains' scores (see Experiment 2's Statistical Modeling section).
[a] Because of the negative direct effect, the calculated proportion mediated actually was greater than 100%. A-Trust, however, can account for maximal 100% of the positive effect of Agreeableness on more normative preferences.

Second, we found an indirect effect of higher Conscientiousness on more normative preferences through C-Responsibility (line 2). Yet, it was not immediately clear to us why C-Responsibility may drive the effect of higher Conscientiousness on more normative preferences. Compared to the other two facets of Conscientiousness, C-Responsibility may reflect a stronger notion of rule adherence. Thus, Conscientiousness may predict socioculturally normative preferences positively because sociocultural norms can be conceived of as unwritten rules and conscientious people adhere to rules particularly strongly. Experiment 3 further clarifies the mechanisms driving the Conscientiousness effect.

Finally, we found an indirect effect of higher Openness on less normative preferences through O-Intellectual Curiosity (line 3). This suggests that Openness predicts socioculturally normative preferences negatively because open people engage more in cognitive endeavors and this fosters independent thought (i.e., to make up one's own mind) rather than reliance on the conformity heuristic (as closed-minded people do a lot). Notably, this result also provides initial evidence that open people are better characterized as sociocultural mavericks rather than contrarians. That is, open people do not seem to seek opposition to sociocultural norms (as predicted by the SMP). If open people did, O-Creative Imagination should have qualified as process variable, but it did not (see Table 2). Experiment 3 further compares the contrarians and mavericks views against each other.

In sum, A-Trust, C-Responsibility, and O-Intellectual Curiosity were all distinctive process variables. That is, they emerged as unique predictors of socioculturally (not) normative preferences, whereas the other facets of Agreeableness, Conscientiousness, and Openness emerged as nonpredictors (see Table 2). Moreover, all three facets were sizable mediators in the facets-as-mediators model (proportions mediated $\geq$ 68%). Thus, to examine the Big Five facets as process variables helped provide initial evidence for three possible mechanisms that may underlie the SNP.

Experiment 3

Experiment 2 supported the SNP in several ways. To begin with, it successfully replicated Experiment 1's results with a different Big Five measure. As such, Experiment 2 buttressed the SNP's general applicability, reinforced the SNP's proposal that sociocultural norms play a causal role, and strengthened the evidence that the SNP is relevant for all four descriptive Big Five domains. Moreover, Experiment 2 provided two conceptually novel contributions: First, it examined the Big Five facets as process variables that may drive their domain's effect. Second, it challenged the SMP in its view of Openness. More precisely, it appears inappropriate to characterize open people as sociocultural contrarians (as the SMP does). Instead, it appears more appropriate to characterize open people as sociocultural mavericks (i.e., people who do whatever they like to do no matter what the sociocultural norm is). Both novel contributions are important and, thus, deserve more empirical support. Consequently, Experiment 3's first goal was to replicate those novel contributions.

The second goal was to illuminate further the mechanisms that underlie the SNP. Experiment 2's facet-level results are wanting on two counts: First, it was not immediately clear to us why

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C-Responsibility may drive the Conscientiousness effect (see Experiment 2's Results and Discussion section). Classic social psychology suggests a mechanism that does not involve any of the measured BFI-2 facets. Specifically, the behavior of conscientious people is typically guided by *rational thought* (i.e., careful thinking before acting; Costa & McCrae, 1992; John et al., 2008) and it is generally considered rational to behave in accord with social norms (Cialdini & Trost, 1998; Jetten & Hornsey, 2012). Penner and Davis (1969; p. 299), for example, noted that "group majorities may frequently be regarded as 'tools' or problem solving aids, whose general value has been established through past experience." Thus, as part of the second goal, we tested for an indirect effect of higher Conscientiousness on more normative preferences through rational thought. Second, none of the three Extraversion facets qualified as process variables in Experiment 2 (see Table 2). Possibly, then, some central feature of Extraversion may drive the effect of higher Extraversion on more normative preferences (cf. McCrae, 2016; Mõttus, 2016). According to Ashton et al. (2002), seeking social attention is the central feature of Extraversion (see also Denissen & Penke, 2008). Seeking social attention is also a plausible mechanism according to classic social psychology. This is the case because people who behave normatively typically receive positive attention from their social environment (Gilbert, 1997; Schachter, 1951). Thus, as part of the second goal, we tested for an indirect effect of higher Extraversion on more normative preferences through social attention.

The third goal was to substantiate that open people are better characterized as sociocultural mavericks than contrarians. In support of the mavericks explanation, Experiment 2 found an indirect effect of higher Openness on less normative preferences through O-Intellectual Curiosity. A complementary and more direct test would be to replace O-Intellectual Curiosity with *need for cognition* (Cacioppo & Petty, 1982). Conceptually, need for cognition is a close relative of O-Intellectual Curiosity (for empirical support, see Footnote 20). The advantage of the former is that decades of research is available and some of it has explicitly shown that people high in need for cognition rely little on heuristics (Cacioppo et al., 1996; Petty et al., 2009), including the conformity heuristic (i.e., the heuristic to follow majority opinions, because the majority tends to be correct; cf. Moscovici, 1980; Sachdev & Bourhis, 1984). In other words, that research has directly shown that people high in need for cognition engage in independent thought, rather than opposing thought.

Method

Participants

We analyzed data from 2,542 participants across two MTurk samples (Sample 3a: N = 1,268; 56.6% female, 42.4% male, 1.0% missing; M_{age} = 35.63, SD = 11.25; Sample 3b: N = 1,274; 57.6% female, 42.0% male, 0.4% missing; M_{age} = 35.43, SD = 11.80; ethnical background of Samples 3a-b: 74% Caucasian, 9% African American, 6% Asian, 7% Hispanic, 3% Other, 1% missing; participation duration: Mdn = 31 min; payment for full completion: USD $3.50). As in Experiments 1–2, the two samples differed only regarding their additional self-report measures (see the material file at https://madata.bib.uni-mannheim.de/364/), which all came after the minimal norm paradigm. We again aggregated the two samples for analyses to obtain more precise estimates. Participation requirements were identical to those in Experiments 1–2 and so were the data-exclusion criteria (see Footnote 7). Because of those criteria, we excluded a priori 97 additional participants (4%).

Procedure and Measures

The procedure was identical to Experiment 2's procedure, except that we administered three additional measures to assess possible process variables (see below). Participants responded to all three measures on 7-point rating scales, ranging from 1 (*does not describe me at all*) to 7 (*describes me extremely well*). All domain scales of the BFI-2 evinced adequate internal consistencies ($.84 \leq \alpha s \leq .91$) and so did all facet scales of the BFI-2 ($.64 \leq \alpha s \leq .86$).

Rational Thought. The 11-item Premeditation Scale (Whiteside & Lynam, 2001) measures "the tendency to think and reflect on the consequences of an act before engaging in that act" (Whiteside & Lynam, 2001; p. 685). Example items are "I tend to value and follow a rational, 'sensible' approach to things." and "My thinking is usually careful and purposeful." The internal consistency was adequate (α = .91).

Need for Cognition. The 18-item Need for Cognition Scale (Cacioppo et al., 1984) measures "an individual's tendency to engage in and enjoy effortful cognitive endeavors" (Cacioppo et al., 1984; p. 306). Example items are "I usually end up deliberating about issues even when they do not affect me personally." and "The notion of thinking abstractly is appealing to me." The internal consistency was adequate (α = .93).

Social Attention. The 13-item Social Attention Scale (Ashton et al., 2002) measures "the tendency to behave in ways that attract social attention and to enjoy being the object of such attention" (Ashton et al., 2002; p. 247). Example items are "You are often 'the life of the party'" and "You do not like to stay in the background." The internal consistency was adequate (α = .94).

Statistical Modeling

To replicate Experiments 1–2, we specified the same random-intercept random-slope models as in those experiments. To examine the possible process variables external to the BFI-2 (i.e., rational thought, need for cognition, and social attention), we used the same procedure as for the Big Five facets (see Experiment 2). We first tested whether the external process variables predicted personal preferences as a function of sociocultural norms. To this end, we specified a random-intercept random-slope model parallel to the facets-as-predictors model (see Experiment 2). The only difference was that we replaced the 15 Big Five facets with the three external process variables. To foreshadow the results of that model (hereafter: externals-as-predictors model), all three external process variables interacted with sociocultural norms in predicting personal preferences. Thus, we treated all three external process variables as mediators in an indirect-effects analysis. This analysis took the form of a final random-intercept random-slope model (hereafter: full-sociocultural-norm model). The full-sociocultural-norm model was identical to the facets-as-mediators model of Experiment 2 with one crucial exception. Instead of the three BFI-2 facets, it included the following four process variables—one process variable per descriptive Big Five domain: A-Trust (for Agreeableness), rational thought (for Conscientiousness),

need for cognition (for Openness), and social attention (for Extraversion).[18]

Results and Discussion

We start with the replication of the domains-as-predictors model of Experiments 1–2, followed by the replication of the facets-as-predictors model of Experiment 2. The novel results follow thereafter (externals-as-predictors and full-sociocultural-norm models).

Domains-as-Predictors Model (Replication of Experiments 1–2)

Table 1's third data-column includes the results of the domains-as-predictors model. Lines 2–6 show the effects of the Big Five domains on participants' preferences independent of those preferences' sociocultural norms (i.e., the main effects of the Big Five domains). We did not expect to find such main effects and that expectation was met: The main effects of the Big Five domains were not significant with the exception of Extraversion and Neuroticism (main effects that did not consistently emerge in Experiments 1–2) and the Bayesian analyses revealed evidence for the null hypothesis (i.e., the absence of a main effect) for all Big Five domains (including Extraversion and Neuroticism).

Much more important are the cross-level interactions between each Big Five domain and sociocultural norms (lines 8–12). These cross-level interactions fully replicated those of Experiments 1–2: The cross-level interaction involving Agreeableness was significant and the Bayesian support for it was decisive. More precisely, Agreeableness predicted personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figure 2.3a). The cross-level interaction involving Conscientiousness was significant, too, but the Bayesian support for it was inconclusive. More precisely, Conscientiousness appeared to predict personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figure 2.3b). The cross-level interaction involving Openness was also significant and the Bayesian support for it was decisive. More precisely, Openness predicted personal preferences for a particular character/value more strongly if those preferences were not socioculturally normative (Figure 2.3c). Moreover, Experiment 1's conceptually novel finding regarding Extraversion replicated once again. Specifically, the cross-level interaction involving Extraversion was significant and the Bayesian support for it was decisive. More precisely, Extraversion predicted personal preferences for a particular character/value more strongly if those preferences were socioculturally normative (Figures 2.3d). Finally, Neuroticism was once more the only Big Five domain that did not significantly interact with sociocultural norms in predicting personal preferences (Figure 2.3e). More tellingly, we again found strong Bayesian support for the null hypothesis (i.e., the absence of an effect).

Facets-as-Predictors Model (Replication of Experiment 2)

Table 2's second data-column includes the results of the facets-as-predictors model. Lines 2–16 show the effects of the Big Five facets on participants' preferences independent of those preferences' sociocultural norms (i.e., the facets' main effects). We did not expect to find such main effects and that expectation was met in 10 out of 15 cases (in four of the five significant cases, Bayesian analyses revealed inconclusive evidence for those main effects or even substantial evidence against those main effects).

Much more important are the cross-level interactions between each Big Five facet and sociocultural norms (lines 18–32). As in Experiment 2, the cross-level interaction involving A-Trust was significant and the Bayesian support for it was substantial. At the same time, the cross-level interactions involving the other two facets of Agreeableness were not significant and the Bayesian analyses revealed substantial to strong support for the null hypotheses (i.e., the absence of cross-level interactions). Unlike in Experiment 2, the cross-level interaction involving C-Responsibility was not significant and the Bayesian support for the null hypothesis was substantial. This "failure" to replicate Experiment 2's result regarding C-Responsibility resonates with the difficulties we had to explain that finding in Experiment 2. As in Experiment 2, the cross-level interaction involving O-Intellectual Curiosity was significant and the Bayesian support for it was decisive. At the same time, the cross-level interactions involving the other two facets of Openness were not significant and the Bayesian analyses strongly supported the null hypotheses. Finally, and unexpectedly, a significant cross-level interaction involving E-Energy emerged (this interaction was not significant in Experiment 2). Yet, the Bayesian support for this interaction was inconclusive. We therefore hesitate to give this (nonreplicable) interaction too much weight (it also appeared difficult to find a theoretical explanation for that interaction).

Externals-as-Predictors Model

We did not expect to find significant main effects of the external process variables on personal preferences. That expectation was met for social attention, Estimate = 0.01, 95% CI [−0.01, 0.02], BF_{10} = 0.02, but the main effects of rational thought, Estimate = 0.02, 95% CI [3e-03, 0.04], BF_{10} = 0.17, and need for cognition, Estimate = 0.02, 95% CI [1e-03, 0.04], BF_{10} = 0.12, reached significance. Importantly, however, the Bayesian analyses revealed evidence for the null hypothesis (i.e., the absence of a main effect) for all external process variables (including rational thought and need for cognition).

More important, all three external process variables interacted with sociocultural norms in predicting personal preferences. Rational Thought × Sociocultural Norms: Estimate = 0.18, 95% CI [0.12, 0.24], BF_{10} = 3e+05; Need for Cognition × Sociocultural Norms: Estimate = −0.17, 95% CI [−0.22, −0.11], BF_{10} = 1e+06; Social Attention × Sociocultural Norms: Estimate = 0.19, 95% CI [0.14, 0.24], BF_{10} = 3e+12. Notably, the empirical evidence for all three cross-level interactions was decisive.[19] In sum, all three external process variables qualified as possible mediators in an indirect-effects analysis (described next).

[18] As in Experiment 2, we also computed the latent scores for all Big Five domains and repeated the full-sociocultural-norm model with those latent scores. We report the results in Online Supplement S7. Again, these results were conceptually identical to the main-text results, which are based on manifest scores for the Big Five domains.

[19] For completeness reasons, we also computed separate models for rational thought, need for cognition, and social attention. We report the results in Online Supplement S5. These results conceptually replicated the main-text results.

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Full-Sociocultural-Norm Model

Table 3 (lines 6–10) includes the results of the full-sociocultural-norm model. First, we found an indirect effect of higher Agreeableness on more normative preferences through A-Trust (line 6). This suggests that Agreeableness predicts socioculturally normative preferences positively because agreeable people trust more the members of their sociocultural context and, thus, behave as those members do.

Second, we found an indirect effect of higher Conscientiousness on more normative preferences through rational thought (line 7). This suggests that Conscientiousness predicts socioculturally normative preferences positively because conscientious people's behavior is typically guided by rational thought and that generally means to behave in accord with sociocultural norms.

Third, we found an indirect effect of higher Openness on less normative preferences through need for cognition (line 8). This suggests that Openness predicts socioculturally normative preferences negatively because open people are independent thinkers and rely little on the conformity heuristic (if at all), whereas closed-minded people rely a lot on that heuristic.[20]

Finally, we found an indirect effect of higher Extraversion on more normative preferences through social attention (line 9). This suggests that Extraversion predicts socioculturally normative preferences positively because extraverted people seek positive social attention and normative behavior typically leads to such positive attention.

In sum, the results of Experiment 3 suggest four highly specific and distinct mechanisms underlying the SNP—one for each descriptive Big Five domain.[21] These mechanisms are in stark contrast to the highly unspecific mechanisms assumed by the SMP (i.e., two elusive motives to swim with the sociocultural tide and to swim against it). Moreover, the mechanism identified for Openness (i.e., independent thought) implies that open people are sociocultural mavericks, rather than contrarians (as assumed by the SMP).

General Discussion

Why do the Big Five predict such a wide variety of preferences, decisions, and behaviors? Answers to this why-question are sparse, even though providing them is an essential next goal for personality psychology (Benet-Martínez et al., 2015; Fleeson, 2007). To help reach this goal, the present research developed the SNP—a critical revision and extension of the SMP. Below, we describe the current theoretical state of the SNP, summarize the SNP's empirical evidence, and point to limitations and future directions. We close with the broader benefits of the SNP beyond the concrete benefit to help answer the why-question of Big Five prediction.

Theoretical State of the SNP

Figure 3 depicts the current theoretical state of the SNP. The SNP provides norm-based, culture-focused, and mechanism-attentive explanations for why all four descriptive Big Five domains predict preferences, decisions, and behaviors:

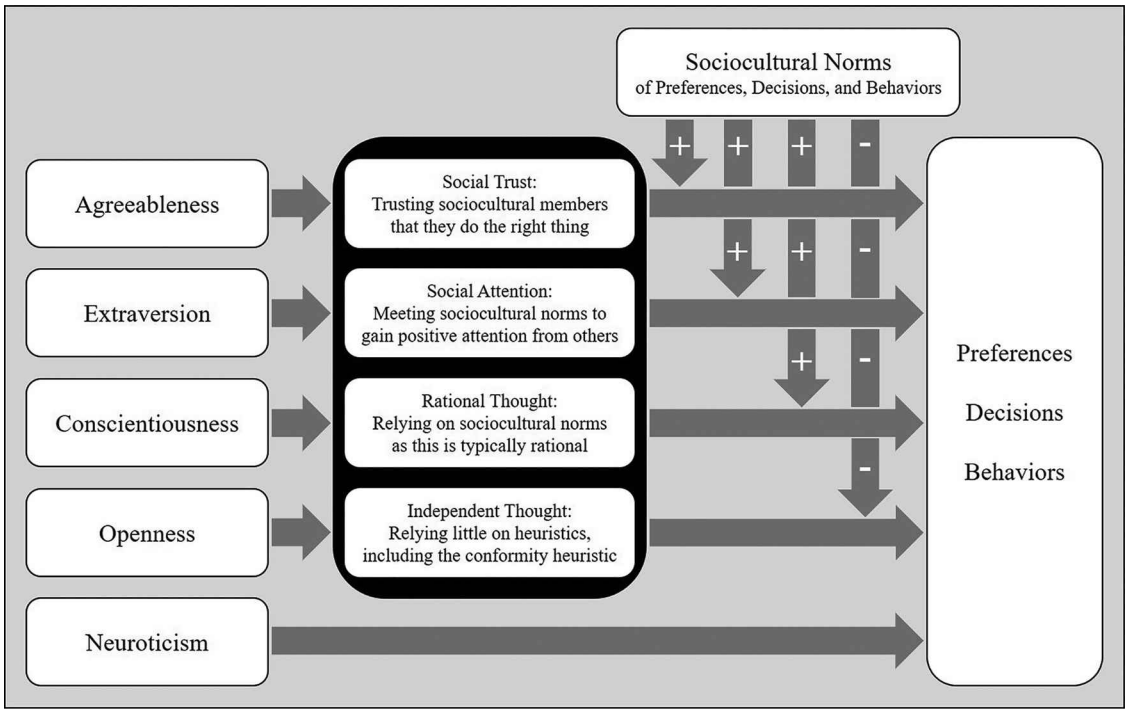
Agreeableness predicts a given outcome positively if that outcome is socioculturally normative. More precisely, agreeable people trust the members of their sociocultural context and, thus, behave in accord with those members. Extraversion also predicts a given outcome positively if that outcome is socioculturally normative. Yet, the mechanism identified for this Extraversion effect is different from the mechanism identified for the Agreeableness effect. Specifically, extraverted people seek positive social attention and, thus, behave commendably by meeting sociocultural norms. Conscientiousness, too, predicts a given outcome positively if that outcome is socioculturally normative. However, again, the mechanism is different from the other mechanisms. As it seems, conscientious people engage in rational thought and following sociocultural norms typically is the rational thing to do. Openness predicts a given outcome negatively if that outcome is sococulturally normative. In particular, open people engage in independent thought and, thus, rely little on the conformity heuristic (whereas closed-minded people rely on that heuristic a lot).

To be sure, Big Five effects are multidetermined. Therefore, the SNP provides explanations complementary to other explanations (e.g., people strive for consistency between their personality and their behavior; Allport, 1937; see also Footnote 3). Thus, although the SNP predicts positive effects of Agreeableness, Extraversion, and Conscientiousness on socioculturally normative outcomes, the effects on a given outcome do not have to be positive in an absolute sense. Rather, the effects on a given outcome should be more positive (or less negative) if that outcome is socioculturally normative (vs. not normative). For example, according to the SNP, the association between Extraversion and religiosity should be more positive in religious cultures than in secular cultures. So, either of the following two (hypothetical) results would be in line with the SNP: (a) A strongly positive association between Extraversion and religiosity in religious cultures and only a moderately positive association between Extraversion and religiosity in secular cultures. (b) A somewhat positive association between Extraversion and religiosity in religious cultures and a somewhat negative association between Extraversion and religiosity in secular cultures. The same rationale applies to Openness: Although the SNP predicts a negative effect of Openness on socioculturally normative outcomes, the effect on a given outcome does not have to be negative in an absolute sense. Rather, the Openness effect on a given outcome should be more negative (or less positive) if that outcome is socioculturally normative (vs. not normative).

[20] The introduction to Experiment 3 describes that O-Intellectual Curiosity and need for cognition are two alternative indicators of the same mechanism. In line with this description, the two are highly correlated, r (2,540) = .66, 95% CI [.64, .68]. Moreover, we conducted an alternative full-sociocultural-norm model in which we replaced need for cognition with O-Intellectual Curiosity (and rescored Openness such that O-Intellectual Curiosity was removed from the Openness score; see Experiment 2's Statistical Modeling section). Online Supplement S8 includes the results of that indirect-effects analysis. These results were conceptually identical to those in the main text (Table 3).

[21] We also tested whether any mediator in the full-sociocultural-norm model mediated the effects of multiple Big Five domains. For example, we tested whether social trust (i.e., the mediator for Agreeableness) mediated the effect of higher Extraversion on more normative preferences. Online Supplement S9 includes those indirect effects. They show that no mediator substantially mediated the effect of a Big Five domain other than the domain postulated by the SNP (some indirect effects even evinced an opposing direction). These results are noteworthy because they underscore that each mechanism in the SNP is largely unique to one Big Five domain.

Figure 3
Sociocultural Norm Perspective on Big Five Prediction



Empirical Evidence for the SNP

We consider the present empirical evidence robust and we do so for five reasons. First, all three experiments capitalized on large samples (> 2,000 participants per experiment; N_{total} = 7,404). Second, each participant underwent multiple norm manipulations and provided multiple personal preferences (the three experiments contain a total of 224,751 successful norm manipulations and personal-preference reports). Third, we used mixed-effects modeling and, thus, made full use of our design's power. Fourth, we relied on traditional null-hypothesis significance testing as well as Bayesian analyses. Finally, we reported all data ever collected on the Big Five and the minimal norm paradigm.

The empirical evidence can be economically summarized by dividing it into two parts. Part I concerns the outer part of Figure 3 (grey background). That is, whether or not sociocultural norms play a role in Big Five prediction. Part II concerns the inner part of Figure 3 (black background). That is, the psychological mechanisms that underlie the SNP.

Part I: The Role of Sociocultural Norms in Big Five Prediction

This part concerns evidence that sociocultural norms are relevant for Big Five prediction. Our experiments consistently showed that Agreeableness, Extraversion, and Conscientiousness predicted personal preferences positively if those preferences were socioculturally normative. Openness, by contrast, predicted personal preferences negatively if they were socioculturally normative. Notably, in all three experiments, the Bayesian support for Agreeableness and Openness was decisive. For Extraversion, the Bayesian support ranged from substantial to decisive, overall indicating convincing evidence. For Conscientiousness, the Bayesian support was less clear—a finding we discuss below. Moreover, for Neuroticism, our experiments consistently provided strong Bayesian support for the null hypothesis (i.e., the absence of a cross-level interaction). In other words, Neuroticism is the only Big Five domain that does not interact with sociocultural norms in predicting its outcomes (a finding that squares with Neuroticism's special status in the Big Five taxonomy as the only Big Five domain that is primarily affective rather than descriptive; Gebauer et al., 2015).

In sum, the Bayesian analyses indicated that the present empirical evidence for the SNP was convincing. But what was the effect size of the Big Five Domain × Sociocultural Norms interactions in our experiments? So far, there are no established guidelines on how effect sizes can be estimated and interpreted in mixed-effects models. Yet, we wanted to provide at least some rough estimate on the power of sociocultural norms to alter Big Five effects in our experiments. We therefore used a recent approach to approximate effect sizes in mixed-effects models (Gebauer et al., 2017; see also Entringer et al., 2020; Gebauer et al., 2020). According to that approach, the power of sociocultural norms is approximated by comparing Big Five effects between the two sociocultural norms conditions (majority prefers left character/value vs. majority prefers right character/value; see Online Supplement S10 for a detailed description of the approach). The approximated effect size for the power of sociocultural norms to alter Big Five effects in our experiments was .21 (a standardized effect size interpretable analog to *r*). This effect size is similar to the median effect size of meta-analyses in personality and social psychology (r = .19; Gignac & Szodorai, 2016; r = .18; Richard et al., 2003) and the median effect size of meta-analyses across psychological disciplines (r = .16; Cafri et al., 2010).

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Part I's evidence overcomes past findings relevant for the SNP on three counts. First, past findings have been limited to religiosity as the sole outcome (Big Five as predictors: Entringer et al., 2020; Gebauer et al., 2014, HEXACO as predictors: Ashton & Lee, 2019)—a highly specific and particularly confound-prone outcome (Saroglou, 2010, 2017). Our newly developed minimal norm paradigm, by contrast, uses different minimalist outcomes. Specifically, it uses pairs of Chinese characters (which are meaningless for people who do not speak Chinese) and pairs of social values (which are generally meaningful for people). This helps buttress the broad applicability of the SNP to diverse outcomes and renders the results relatively immune to confounds.[22] Second, relevant past findings have been entirely correlational and, thus, precluded any causal conclusions. The minimal norm paradigm, by contrast, experimentally manipulates sociocultural norms and, thus, allows particularly strong causal conclusions regarding a key concept of the SNP—that is, sociocultural norms. Finally, relevant past findings have been unable to tell apart whether the SNP applies to Extraversion or not. Our results from the minimal norm paradigm, by contrast, show that the SNP does apply to Extraversion, and thus, to all four descriptive Big Five domains.

Part I's evidence has another merit. It buttresses and clarifies Gebauer et al.'s (2014) interpretation of cross-cultural differences in the associations between the Big Five and religiosity (see also Entringer et al., 2020). More precisely, the present results suggest strongly that those cross-cultural differences are indeed due to the role of sociocultural norms in Big Five prediction rather than because of some religiosity-specific confound (cf. Joshanloo & Gebauer, 2020) or some religiosity-specific alternative explanation (Saroglou, 2010, 2017). We consider it striking that past and present results are so similar despite vast methodological differences (past: cross-cultural correlational studies with religiosity as the outcome, present: experiments with a diverse set of minimalist outcomes). Considered in tandem, those results attest the SNP high validity (past evidence more on the side of external validity, present evidence more on the side of internal validity).

Part II: Psychological Mechanisms That Underlie the SNP

This part concerns evidence for the psychological mechanisms that underlie the SNP. Experiments 2–3 investigated this part. Those experiments identified one key mechanism for each descriptive Big Five domain. Those mechanisms provide distinct and highly plausible explanations for why the Big Five interact with sociocultural norms in predicting their outcomes. The high plausibility is partly due to the fact that those mechanisms reflect established ideas from social psychology: social trust (Rotter, 1980), social attention (James, 1890/1950), rational thought (Gigerenzer et al., 1999), and independent thought/need for cognition (Cacioppo et al., 1996). It is a strength that our research connects the Big Five with these established ideas.

Part II's evidence is particularly novel at the conceptual level. First, the SMP considers as mechanisms two elusive motives to swim with the sociocultural tide and to swim against it (Gebauer et al., 2014). In sharp contrast, the present mechanisms are not elusive at all but clearly defined and highly specific (see Figure 3). Second, the present research identified two pairs of mechanisms. One pair is social in nature (social trust and social attention), which fits the view that their corresponding domains (Agreeableness and Extraversion) are the two social domains of the Big Five (Gebauer et al., 2015; Leary & Hoyle, 2009). The other pair is cognitive in nature (rational thought and independent thought), which fits growing realization that cognitive elements are key to their corresponding domains (Conscientiousness and Openness; Costa & McCrae, 1992; Soto & John, 2017). Cognitive mechanisms have never been considered before in this line of research. Thus, the discovery of those mechanisms made the SNP much more cognitive than the SMP. Finally, the SMP characterizes open people as contrarians, who seek to oppose sociocultural norms (Gebauer et al., 2014). The present research, by contrast, shows that open people are better characterized as mavericks (Efferson et al., 2008), who seek independence from sociocultural norms.

Limitations and Future Directions

We tested the proposed effects of the Big Five on their process variables by cross-sectional means only. We relied on such a test because "personality traits are not easily manipulated" (McCrae & Sutin, 2018; p. 163). In other words, valid manipulations of the Big Five do not exist. If they were commonplace, we would have eagerly used them in the present research. Notably, though, the Big Five domains are basic traits, whereas all four process variables are more specific traits. According to the standard view of trait structure (i.e., the reflective view; Bollen & Lennox, 1991; Edwards & Bagozzi, 2000), the causal direction between basic traits and specific traits is indisputable: Basic traits manifest in (i.e., partly cause) specific traits and not vice versa.[23] That causal direction is particularly self-evident in the two cases where Big Five facets served as process variables (A-Trust and O-Intellectual Curiosity; cf. Asendorpf, 2016; McCrae, 2016). In sum, we consider our cross-sectional evidence appropriate for this first test of mechanisms. One promising line of future research concerns additional mechanisms. We have identified one major mechanism per descriptive Big Five domain. Yet, there is probably more than one

[22] Were our results entirely driven either by Chinese characters or by social values? To find out, we included Outcome Category (Chinese characters vs. social values) as an additional moderator in the domains-as-predictors model. Online Supplement S11 includes the results of that moderation analysis. In brief, we found three (and only three) significant Big Five Domain × Sociocultural Norms × Outcome Category interactions. In other words, three Big Five Domain × Sociocultural Norms interactions differed significantly between Chinese characters and social values. Importantly, however, these three two-way interactions were significant for both Chinese characters and social values.

[23] The formative view (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000) and the network view (Cramer et al., 2012; Schmittmann et al., 2013) are two alternatives to the reflective view. If those two views applied to the Big Five, the conclusions drawn from our indirect-effects analyses would be slightly different. Importantly, however, our indirect-effects analyses would still be informative for understanding why the Big Five domains interact with sociocultural norms in predicting their outcomes. According to the formative view, basic traits are determined by more specific traits. In other words, specific traits are the components that form the basic traits (Bollen & Lennox, 1991; Edwards & Bagozzi, 2000). Correspondingly, our process variables would constitute the formative components of the Big Five domains that drive domain effects. According to the network view, basic traits are networks that result from causal links between more specific traits (Cramer et al., 2012; Schmittmann et al., 2013). Thus, our process variables would constitute the knots in the Big Five networks that drive network effects.

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mechanism per domain (the mechanisms in the full-sociocultural-norm model explained 66% on average).

Our experiments consistently showed that Agreeableness, Extraversion, Conscientiousness, and Openness significantly interacted with sociocultural norms in predicting their outcomes. Moreover, the Bayesian support for Agreeableness, Extraversion, and Openness was clear and highly convincing. The Bayesian support for Conscientiousness, however, was less clear. In hindsight, this may not be surprising because Conscientiousness is characterized by inhibition (e.g., cautiousness, dutifulness) as well as proactivity (e.g., achievement-striving, persistence; McCrae & John, 1992; Wiggins & Trapnell, 1996). Importantly, only inhibition predicts more normative behavior (see results on rational thought). Proactivity, by contrast, is related to "getting ahead" goals (Roberts & Robins, 2000) and, thus, may predict less normative behavior (cf. Gebauer et al., 2020). Future research should also examine mechanisms like these, which oppose each other.

The minimal norm paradigm has many strengths. One of them is that it manipulates sociocultural norms regarding preferences (i.e., whether it is ostensibly normative in one's culture to prefer the left or the right Chinese character/social value of a pair). Stated otherwise, the minimal norm paradigm "creates" (normative aspects of) culture experimentally. This is a strength because experimental creation means tight experimental control, which renders it unlikely that confounding variables account for the results. Of course, any experimentally created culture is nested in the real-world culture of participants. In our experiments, we sampled people from the U.S. and, thus, participants' real-world national culture was the U.S. culture. The U.S. culture appears to be comparatively high in Agreeableness, Extraversion, and Conscientiousness and moderate in Openness (Gebauer et al., 2015). How would our results have looked like if we had sampled people from a culture with Big Five levels largely different from those of the U.S. culture? Future research is needed to answer this question, but clear hypotheses can be derived from the present research:

In cultures like Estonia, where people are comparatively low in Agreeableness, Extraversion, and Conscientiousness and comparatively high in Openness (Gebauer et al., 2015), participants should, on average, be less likely to report normative preferences in the minimal norm paradigm. In other words, the main effect of sociocultural norms on personal preferences should be weaker in Estonia than in the U.S. More important, though, Estonian participants relatively high in Agreeableness, Extraversion, and Conscientiousness should nonetheless report more normative preferences than Estonian participants relatively low in Agreeableness, Extraversion, and Conscientiousness. Conversely, Estonian participants relatively high in Openness should nonetheless report less normative preferences than Estonian participants relatively low in Openness. In other words, the cross-level interactions between the Big Five and our (experimentally created) sociocultural norms should emerge across (real-world) cultures. That is, we expect our focal results to replicate panculturally.

The minimal norm paradigm is novel. Therefore, it may have limitations of which we are not yet aware. For example, in the learning and recall phases of Block 1, participants do not know that they will provide their own preferences later. In Blocks 2–6, though, they do know. Is this knowledge necessary for our effects and, thus, are our effects entirely driven by data from Blocks 2–6? Online Supplement S12 shows that the Big Five Domain × Sociocultural Norms interactions did not differ significantly between Block 1 and Blocks 2–6. The four significant Big Five Domain × Sociocultural Norms interactions emerged for both Block 1 and Blocks 2–6. Evidently, our results hold even if participants learn and recall sociocultural norms without knowing that they have to provide their own preferences later.

Moreover, do participants possess self-insight into whether their preferences are affected by sociocultural norms or are participants oblivious to the influence? To get a first idea, we asked our participants at the end of the study whether "... the preferences of the majority influenced your own preferences?" The large majority of participants chose "No" (74.8%). Online Supplement S13 shows that the Big Five Domain × Sociocultural Norms interactions replicated when we reran our analyses with those oblivious participants only. Evidently, self-insight is no necessary precondition for our effects to emerge. Future research should further scrutinize the minimal norm paradigm.

Broader Relevance of the SNP

Big Five effects vary across cultures. The prevalent view is to consider this variation an "inconsistency" which threatens the predictive validity of the Big Five (cf. Mischel, 1968). However, if that cross-cultural variation followed predictions from the SNP, the apparent validity threat would actually support the predictive validity of the Big Five. Thus, the SNP is directly relevant for discussions about the replicability of Big Five effects (Soto, 2019; 2021).

The Big Five and sociocultural norms interact in predicting personal outcomes (see Part I of the Empirical Evidence section). We conceptualized the Big Five as predictors and sociocultural norms as moderators in those interactions. Of course, it is equally legitimate to think of sociocultural norms as predictors and of the Big Five as moderators. Therefore, our evidence also shows that sociocultural norms have an effect on personal outcomes and the Big Five qualify this effect. This finding is relevant for social psychological research on norms (Asch, 1955; Sherif, 1935) and for social psychological theories which predict that norms exert causal effects on personal outcomes (e.g., theory of planned behavior; Ajzen, 1985; focus theory of normative conduct; Cialdini et al., 1990). If the Big Five were *powerful* qualifiers of norm effects, research and theories involving norms might benefit from attention to the Big Five. We tested how powerful the Big Five actually were as qualifiers in our experiments by comparing the effects of sociocultural norms on personal preferences for two groups of people. The first group contained people with a Big Five profile that is particularly conducive to norm conformity—namely, people high in Agreeableness, Extraversion, and Conscientiousness ($M + 1\ SD$) and low in Openness ($M - 1\ SD$). The second group contained people with a Big Five profile that is particularly unconducive to norm conformity—namely, people low in Agreeableness, Extraversion, and Conscientiousness ($M - 1\ SD$) and high in Openness ($M + 1\ SD$). The effect of sociocultural norms on personal preferences was more than three times larger in the first group (Estimate = 1.62, 95% CI [1.53, 1.70]) than in the second (Estimate = 0.50, 95% CI [0.42, 0.59]). Thus, the above-mentioned social psychological research and theories would gain considerable predictive accuracy from attention to the Big Five.

Finally, the Big Five, conformity, and sociocultural norms are utterly central within personality, social, and cross-cultural psychology, respectively. In fact, those concepts may well be the most central ones in their respective subdiscipline (cf. Jetten & Hornsey, 2012; Lanning, 2017; Zou & Leung, 2015). At the most abstract level, the SNP ties together the Big Five, conformity, and sociocultural norms and, thus, helps integrate personality, social, and cross-cultural psychology—a much needed integration (Brewer, 2013; Leary & Hoyle, 2009).

Concluding Remark

A large body of research has documented the Big Five's ability to predict preferences, decisions, and behaviors. By contrast, research on why the Big Five possess that predictive ability is still sparse, even though such research has been declared a major goal for personality psychology. The present research helped achieve this goal. The result is the SNP—a norm-based, culture-focused, and mechanism-attentive answer to the why-question of Big Five prediction.

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Received October 23, 2020
Revision received April 18, 2021
Accepted April 23, 2021 ■

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