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Recent advances in behavioral ecology suggest that curiosity, as an adaptive behavioral trait, should display some degree of plasticity across ecologies. In particular, it should be modulated according to the availability of resources in the local environment: It should increase in resource-rich environments where the inherent risks of exploration are mitigated and the long-term benefits of information gains are enhanced. In line with this prediction, this study examines the relationship between socioeconomic status (SES) and curiosity. Analyzing data from 962 U.S. participants using the five-dimensional curiosity scale, our findings reveal a significant positive correlation between current SES (but not childhood SES) and levels of curiosity across all five dimensions—joyous exploration, deprivation sensitivity, stress tolerance, social curiosity, and thrill-seeking. Although these results do not prove causality, they are consistent with our hypothesis: Curiosity dynamically responds to the individual's ecological context.

Public Significance Statement
Higher socioeconomic status is associated with increased curiosity, as evidenced across five distinct dimensions, suggesting flexibility in curiosity levels with resource availability. This correlation persists even after controlling for age and gender. Such findings are in line with studies on animal behavior, where richer environments lead to more exploratory behaviors.

Keywords: curiosity, phenotypic plasticity, local ecology, socioeconomic status

Curiosity is what drives the pursuit of new information—which may not be instrumental right away (Berlyne, 1966). Results from functional imaging studies (Blanchard & Gershman, 2018; Bunzeck & Düzel, 2006), computational studies (Gottlieb et al., 2013; Kakade & Dayan, 2002), and pharmacological manipulation studies (V. D. Costa et al., 2014; see Chakroun et al., 2020, for a combination of all three approaches) align with psychological theories suggesting that the brain perceives new information as intrinsically satisfying (Liquin & Lombrozo, 2020), motivating

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Edgar Dubourg and Nicolas Baumard contributed equally to the conceptualization of the main idea and to the outline design and final paper. Edgar Dubourg served as lead for data curation, analysis, and writing–original draft. Both authors contributed to the article and approved the submitted version.

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us to explore (DeYoung, 2013; Hsiung et al., 2023). In line with these observations, it has been suggested that curiosity is an adaptive mechanism that evolved in some animal species because it promoted the management of uncertainty, contributing to our ancestors' fitness by motivating the gain of critical knowledge about resources, threats, and opportunities in the environment (Cashdan & Gaulin, 2016; Hills, 2006).

Recent research in behavioral ecology and ecological psychology suggests that, on average, ecological parameters (e.g., density, relatedness, sex ratio, mortality likelihood, resources, disease) explain a substantial amount of human psychological variation (Sng et al., 2018; Wormley et al., 2023). In this article, we focus on the effect of resource availability on the individual variations in curiosity.

In both a life history framework and an optimal resource allocation framework, we do expect such variations in curiosity aligning with the characteristics of the local ecology (Baumard, 2019; Boon-Falleur et al., 2024; Dubourg & Baumard, 2022; Frankenhuis et al., 2016; Mell et al., 2021; Nettle, 2010, 2019; Schiralli et al., 2019). Why? In harsh or unpredictable environments, the act of exploration incurs significant costs (see Frankenhuis & Gopnik, 2023; Jacquet et al., 2019). In this situation, the risks involved are high, and the rewards uncertain, making exploration less advantageous than exploiting the resource immediately. This scenario is compounded by opportunity costs: Delaying resource collection for exploration means forgoing immediate benefits for uncertain future gains. Conversely, in more affluent environments, the risks associated with exploration are mitigated. Surrounded by abundant resources, individuals can afford short-term losses for potential long-term gains (Martínez & Maner, 2023; Mell et al., 2021). In other words, individuals in resource-rich environments are more likely to discount the immediate costs of exploration in favor of potential future rewards, leading to heightened levels of curiosity and exploratory behavior (Chu et al., 2021; Sadeghiyeh et al., 2020).

In line with this hypothesis, experimental research across many species, from honeybees to parrots to orangutans, has provided evidence that individuals in more resource-rich environments exhibit greater exploratory behaviors (e.g., Damerius et al., 2017; Forss et al., 2015; Katz & Naug, 2015; Mettke-Hofmann et al., 2002). In humans, some studies showed that familial socioeconomic levels or other factors of environmental quality were associated with higher levels of curiosity in kindergarten (Shah et al., 2023; see also: Xu et al., 2023), more creativity in elementary school children (Zhang et al., 2018), and heightened levels of openness in adolescence (Lloyd et al., 2022; see Oh et al., 2023, for longitudinal data; see Menardo et al., 2017, for a negative association between childhood adversity and exploration in a behavioral task). Data from the World Values Survey also demonstrate a strong correlation between a country's gross domestic product per capita, a proxy for environmental affluence, and the average level of trait openness to change in this country: Individuals in higher gross domestic product societies tend to be more open to change (Korotayev et al., 2019).

In summary, both animal studies and human data suggest that ecological factors, particularly resource availability, significantly influence the expression of curiosity and exploratory behavior, with increasing levels of available resources leading to higher levels of curiosity across the board. Such results are in line with optimal resource allocation theory (Boon-Falleur et al., 2024). However, it has not been straightforwardly tested whether humans within a single country adaptively modulate their different facets of curiosity in response to varying socioeconomic environments. In this study, we hypothesize that curiosity is positively correlated with socioeconomic status (SES).

We used the five-dimensional curiosity scale developed by Kashdan et al. (2018) to measure different aspects of curiosity among participants (see the Design and Procedure section for a presentation of the scale). While the identification of distinct subscales of curiosity offers valuable insights, the observed correlations between these subscales and their intercorrelations point toward a common underlying factor (see Figure 1). We hypothesize that this common factor is influenced by the availability of resources. Consequently, we propose that resource availability acts as a key source of variability for all five dimensions of the curiosity scale, suggesting a unified pathway through which ecological conditions shape the expression of curiosity across its diverse facets.

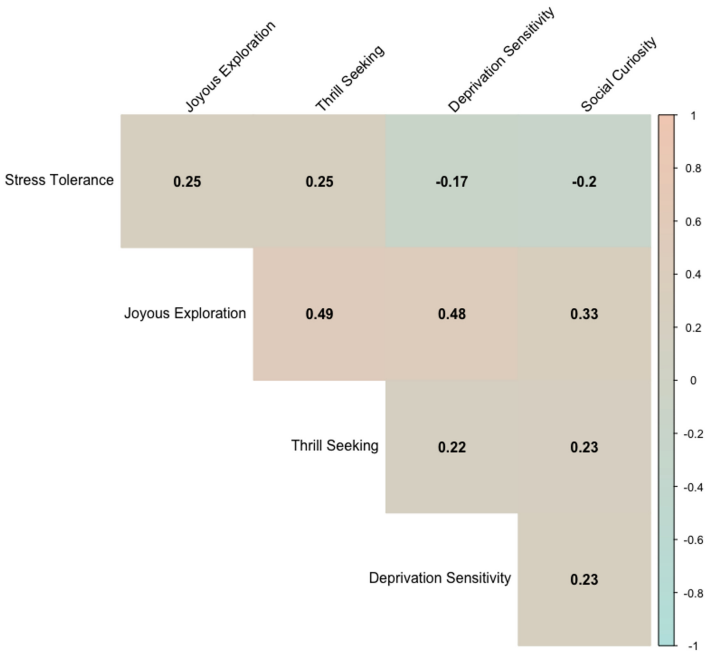
Method

Participants

We recruited 1,000 U.S. participants from the recruitment platform Prolific for our study. We

Figure 1

Correlation Plot of the Five Dimensions of the Five-Dimensional Curiosity Scale



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

excluded 11 participants who failed the attention check (i.e., at one point in a multiple-choice questionnaire using an interest Likert scale, they were told: "This is a control check, please tick 'Not at all interested' here"). We also excluded four participants who reported an age below 2. The new sample size was 988, which still ensured enough statistical power to capture small effect sizes in linear multivariate models with five predictors (i.e., the sample size had to be higher than 514). After exclusion, the sample had a mean age of 36.4 years with a standard deviation of 12.5 years. The gender distribution of the participants was as follows: 490 males, 472 females, 22 individuals identifying as nonbinary or third gender, and 16 participants who preferred not to disclose their gender. For the analysis, as gender has been shown to have an impact on lower level facets of curiosity, we only kept participants who identified as either male or female, for whom the significance and direction of the effect have been assessed. Consequently, we included 962 participants in the final analysis (490 males, 472 females, for age, $M = 36.58$, $SD = 12.59$, minimum = 18, maximum = 72).

Design and Procedure

In our study, we used the five-dimensional curiosity scale developed by Kashdan et al. (2018) to measure different aspects of curiosity among participants. This scale captures five distinct dimensions of curiosity, with for each dimension five items to be rated on a scale from 1 = *strongly disagree* to 7 = *strongly agree*: (a) Joyous exploration reflects a general fascination with new information and experiences that are inherently pleasurable. An example item that participants rated is "I find it fascinating to learn new information." (b) Deprivation sensitivity involves the intrinsic desire to resolve information gaps. For instance, participants were asked to rate the statement, "I work relentlessly at problems that I feel must be solved." (c) Stress tolerance refers to the ability of an individual to manage and cope with the negative emotions that arise from exploring new, complex, uncertain, or unfamiliar situations. A sample item is "I cannot handle the stress that comes from entering uncertain situations" (which was

reversed at the score computation stage). (d) Thrill-seeking relates to the willingness to take risks to gain unique experiences. An item representing this dimension is "Creating an adventure as I go is much more appealing than a planned adventure." Finally, (e) social curiosity emphasizes the importance of understanding and exploring the social world around us. Participants rated their agreement with statements like "I like finding out why people behave the way they do."

Additionally, sociodemographic information — gender, age, and SES (childhood and current) — was collected. SES provides insights into the social and economic environments in which individuals were raised and currently live, which should, according to our theoretical rationale, influence their curiosity expressions. We used a questionnaire to measure sequentially childhood and current, with participants having to report their level of agreement with questions such as: "My family usually had enough money for things when I was growing up" (for childhood SES) or "I don't think I'll have to worry about money too much in the future" (for current sociostatus). This approach follows the methodology used in previous studies such as those by Griskevicius et al. (2013) and Szepsenwol et al. (2017).

Statistical Analyses

In our statistical analysis, we employed linear regression models to investigate the influence of sociodemographic factors on each of the five dimensions of curiosity as defined by the five-dimensional curiosity scale. The same set of predictors was used across all models: gender, age, childhood SES, and current SES. We added two controls to each model because they have been shown to also influence curiosity: age (Chin et al., 2015; Chu et al., 2021; Gualtieri & Finn, 2022; Liquin & Lombrozo, 2020; Mata et al., 2009, 2013; Sumner et al., 2019) and gender (with direction depending on the lower level facets; Kajonius & Johnson, 2018; Weisberg et al., 2011; e.g., women are higher in openness to feelings while men are higher in openness to ideas, P. T. Costa et al., 2001; Feingold, 1994). This approach allowed us to consistently evaluate how variations in socioeconomic backgrounds, both during childhood and currently, impact different aspects of curiosity —namely, joyous exploration, deprivation sensitivity, stress tolerance, social curiosity, and thrill-seeking.

Results

All the results are displayed in Figure 2. In the joyous exploration model, gender showed a significant negative effect ($\beta = -.21$, $p = .0032$), indicating that males reported higher levels of joyous exploration compared to females. Current SES also had a significant positive impact ($\beta = .12$, $p < .001$), suggesting that higher current SES is associated with increased joyous exploration. Age and childhood SES did not show significant effects in this model.

The deprivation sensitivity model revealed that age had a significant positive effect ($\beta = .0084$, $p = .0037$), indicating that older individuals tend to exhibit higher deprivation sensitivity. Current SES also showed a significant positive relationship ($\beta = .066$, $p = .0049$), suggesting that higher current SES enhances deprivation sensitivity. Gender and childhood SES did not have a significant impact in this model.

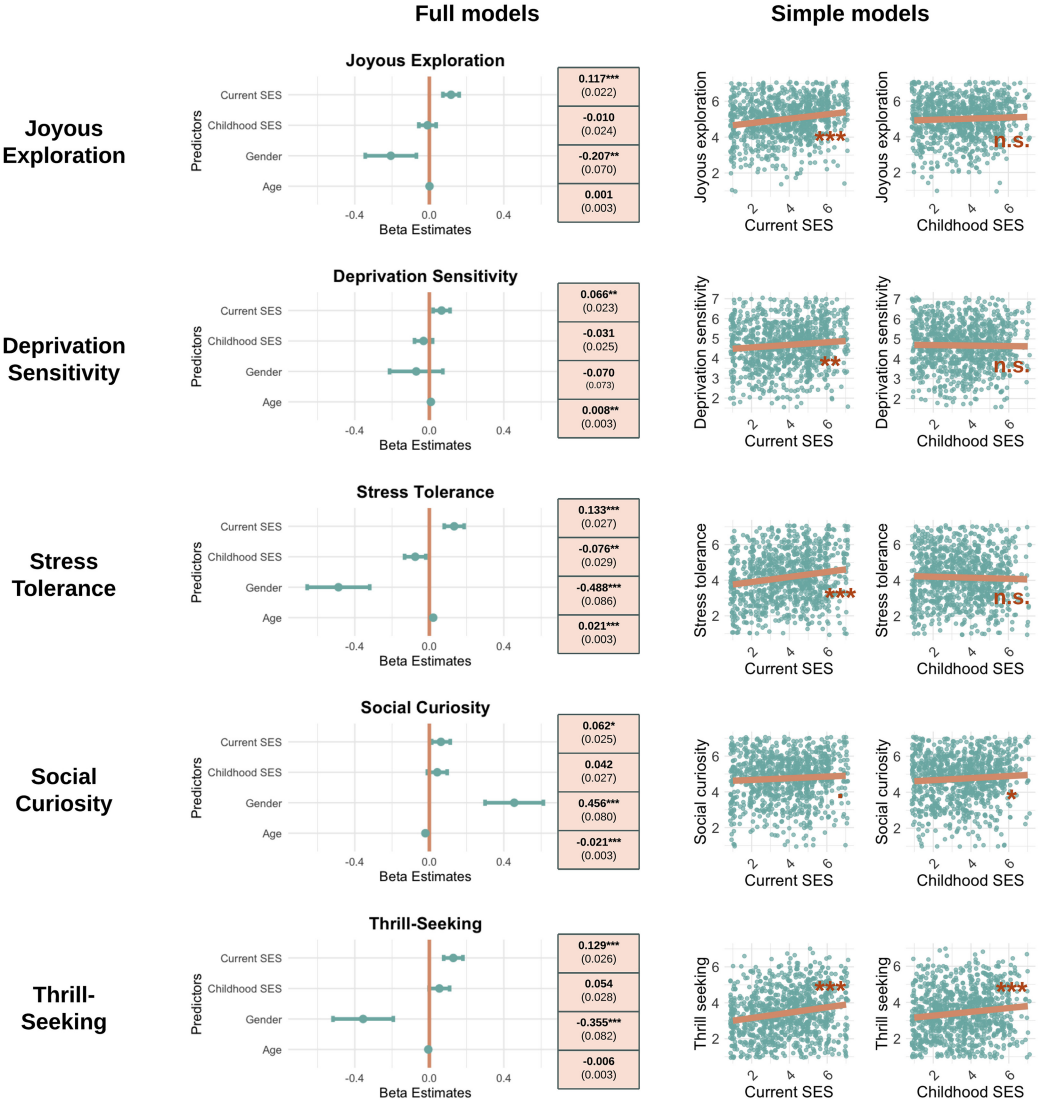
In the stress tolerance model, all factors demonstrated significant effects. Gender showed a significant negative effect ($\beta = -.49$, $p < .001$), indicating that males reported higher stress tolerance compared to females. Age was also positively associated with stress tolerance ($\beta = .021$, $p < .001$), suggesting that stress tolerance increases with age. Childhood SES had a significant negative impact ($\beta = -.076$, $p = .0091$), indicating that individuals with higher childhood SES have lower stress tolerance. And current SES positively influenced stress tolerance ($\beta = .14$, $p < .001$), showing that higher current SES is linked with increased stress tolerance.

The social curiosity model highlighted significant positive effects of gender ($\beta = .46$, $p < .001$) and current SES ($\beta = .0623$, $p = .0146$), with females and individuals with higher current SES reporting higher social curiosity. Conversely, age had a significant negative effect ($\beta = -.021$, $p < .001$), suggesting that social curiosity decreases with age. Childhood SES did not show a significant relationship in this model.

Finally, the thrill-seeking model indicated a significant negative effect of gender ($\beta = -.36$, $p < .001$), with males showing more inclination toward thrill-seeking. Current SES showed a significant positive effect ($\beta = .13$, $p < .001$), indicating that higher current SES is associated with increased thrill-seeking. Age and childhood SES were not significant predictors in this model.

Figure 2

Beta Plots of Each of the Five Models, With Each Facet of Curiosity as the Predicted Variable



Note. The left part of the figure represents, for each of the facets, the plot of simple linear models associating each facet with either current SES or childhood SES. For these graphs, the asterisks indicate the significance of such simple linear models (with no control). SES = socioeconomic status; n.s. = not significant. See the online article for the color version of this figure.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

The analysis of our study's data reveals the expected relationship between SES and all five dimensions of curiosity, both before and after controlling for age and gender. A critical finding is the consistent positive association of current SES with all facets of curiosity. Specifically, individuals with higher current SES reported significantly higher levels of joyous exploration ($\beta = .12$), deprivation sensitivity ($\beta = .07$), stress tolerance ($\beta = .13$), social curiosity ($\beta = .06$), and thrill-seeking ($\beta = .13$), although the effect sizes are overall small (but see Götz et al., 2022, for a review

of small effect size of interest). This pattern still suggests a robust link between an individual's current economic status and their overall curiosity level. In contrast, the only significant association with childhood SES was found in the stress tolerance model, where a higher childhood SES correlated negatively with stress tolerance ($\beta = -.08$).

This observation is in line with the optimal resource allocation framework, which posits that behavioral traits like curiosity adapt in response to the environment's resource availability. In environments where resources are abundant, the usual risks and costs associated with curiosity, such as the possibility of unsuccessful exploration or the chance of not discovering new information, are substantially reduced. This reduction in risk transforms curiosity from a potential liability into a beneficial endeavor. The benefits of curiosity, particularly in terms of gathering valuable information that could be leveraged for future use, become more pronounced in these resource-rich settings, where individuals are more future-oriented (Chu et al., 2021; Sadeghiyeh et al., 2020). The lack of significant correlations with childhood SES in our findings suggests that the plasticity of curiosity extends well beyond early developmental stages. It implies that curiosity may not be irreversibly shaped by childhood contexts but remains a flexible and adaptive trait throughout an individual's life (but see Xu et al., 2023).

Although the observed positive association between current SES and facets of curiosity aligns well with the concept of phenotypic plasticity, these results should not be interpreted as evidence of a direct causal relationship, as our paradigm is not causal. It is plausible that individuals who are inherently more curious may be more likely to pursue and secure high-income jobs, leading to a higher SES. This suggests a potential reverse causality effect where a more fixed curiosity trait, possibly more strongly influenced by genetic factors, could contribute to an individual's economic success. In such a scenario, curiosity would not be just a consequence of higher SES but could also be a contributing factor to achieving it. Moreover, the role of a third variable cannot be discounted. There might be other factors, not accounted for in our study, that simultaneously influence both curiosity and SES. Further research, particularly studies designed to investigate causal relationships and cross-cultural studies outside the United States, is needed. Additionally, a complementary research direction would be to explore potential confounders, such as intelligence (von Stumm & Plomin, 2015), or potential moderators, such as the capacity for higher SES people to create a more stable or secure environment, leading to heightened curiosity levels (Shah et al., 2023).

Our results could shed light on different phenomena. First, at the individual level, resource availability has been shown to have a major impact on human personality (Beuchot et al., 2024), and in particular on openness (Jokela et al., 2017; Peng & Luo, 2021; Smits et al., 2011), which is related to curiosity (Jach et al., 2022; Silvia & Christensen, 2020; but see Jach et al., 2023), and leads to interindividual differences in cultural preferences and behaviors (e.g., the preference for and consumption of fiction with imaginary worlds, Dubourg & Baumard, 2022; Dubourg et al., 2021; social valuation, Kashdan et al., 2013). Second, understanding the impact of resource availability has been shown to be key in the modern environment as it allows us to understand differences in personality across countries with different levels of development and across social classes with different levels of income (Schiralli et al., 2019). Finally, understanding the effect of resources on personality in general and on curiosity in particular could shed light on the differences in cultural behavior that have long been described in cultural sociology (Bourdieu, 1979; de Vries & Reeves, 2022; Roose et al., 2012; Sintas, 2002; Warde & Gayo-Cal, 2009).

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