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Milieu effects on the Dark Triad traits and their sex differences in 49 countries

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ABSTRACT

Most research on the development of personality traits like the Dark Triad (i.e., narcissism, Machiavellianism, and psychopathy) focuses on local effects like parenting style or attachment, but people live in a larger society that may set the stage for any local effects. Here we paired nation-level data on the traits from 49 nations with several milieu indicators (e.g., life expectancy, homicide rates) from three timepoints (and change among them) where the average participant (≈ 22yo) would have been a child (≈ 6yo), a pre-teen (≈ 11yo), and a teenager (≈ 16yo). Congruent with previous research, variance in narcissism was far more sensitive to variance in milieu conditions in general and across all three time points than variance in Machiavellianism or psychopathy. The milieu conditions differentiated the traits somewhat with income and education revealing negative correlations with narcissism, positive correlations with Machiavellianism, and null correlations with psychopathy. Sex differences in Machiavellianism and narcissism were correlated with homicide rates across the three timepoints. The evidence that changes in milieu conditions in ones' past predicts the traits was erratic, but larger sex differences in the traits were associated with decreased life expectancies and homicide rates between childhood and pre-teens.

There is considerable evidence that personality traits are influenced by formative experiences (Brummelman et al., 2018; Kolla et al., 2013; Nguyen & Shaw, 2020). For example, the diathesis-stress model suggests that socialization experiences activate latent dispositional biases in later childhood and adulthood (Thomaes et al., 2018). Also, evolutionary-developmental psychologists propose that personality traits are optimized to solve age-relevant adaptive problems (Bjorklund, 2020) and are sensitive to childhood conditions such as disrupted attachment processes (Brewer et al., 2018; Nickisch et al., 2020; Patch & Figueredo, 2017). However, the pertinent literature focuses on experiences people have over their development at the local level (i.e., within their family or at their school; Dragioti et al., 2012; Moreira et al., 2020; Thomaes et al., 2013), relies on retrospective self-reports of those experiences (Horton et al., 2006; Vignoles & Otway, 2006), and is based on data from one or a few countries (Craparo et al., 2013; Zajenkowska et al., 2014). Individual-level and local approaches are limited: They do not capture the role larger patterns in society have in personality development, and self-reports about childhood experiences may be tainted by response biases. As an alternative, researchers might address what we will call milieu[2] effects or the examination of country-level contextual differences (Berry, 2004; Jonason et al., 2020; Schmitt et al., 2017).

To understand the role of milieu effects on personality development, we focus on the Dark Triad traits (Furnham et al., 2013) of psychopathy (e.g., callous social attitudes and impulsivity; Kavanagh et al., 2013), Machiavellianism (e.g., cynicism and strategic thinking; Jones, 2016), and narcissism (e.g., a sense of entitlement and exhibitionism; Sedikides, 2021). The role of problematic, harsh, competitive, or impoverished conditions in the development of these traits is clear (Thomaes et al., 2013, 2018; Zajenkowski et al., 2021), but, if the traits are calibrated on lived experiences (Chang et al., 2019; Crawford & Anderson, 1989; Jonason et al., 2016), those experiences—their milieu—may be related to the development of different traits. The milieu provides information about patterns in the world, even though these patterns may be somewhat distal from the individual. Such information could be processed in the processes thought to shape personality traits like other more local or personal effects like parental care and nutrition. Nevertheless, some evidence (Jonason et al., 2020) suggests that narcissism (mostly), Machiavellianism (less so), and psychopathy (negligibly) are sensitive to milieu effects (e.g., mortality rates from 49 countries), but these predictors were from the same year as the collected data. To understand developmental processes, it might be necessary to examine similar milieu indicators in participant's past. In this study, we test whether country levels of the Dark Triad traits in adulthood (i.e., 20+; Chopik & Grimm, 2019) are predicted by a range of indicators that described people's milieu when they were children, pre-teens, and teenagers.

To understand country-level patterns in the Dark Triad traits, first we considered measures of harshness and measures of Westernization. Narcissism and psychopathy are related to a competitive approach to life (Żemojtel-Piotrowska et al., 2020), which may be shaped by difficult or harsh childhood conditions (Hoeve et al., 2009). Narcissism and psychopathy may be reasonable responses to living in such conditions (Poraj-Weder, 2014), a hypothesis consistent with the diathesis-stress model of personality (Thomaes et al., 2013, 2018). In contrast, Machiavellianism may not be collinear (but see Miller et al., 2017; Vize et al., 2018) with psychopathy in all matters. Instead, it may be more about tactical maneuvering to consolidate power and build alliances (Jones, 2016). As such, Machiavellianism may be accentuated in more modernized, safe, and stable places (Jonason et al., 2020), including those farther from the equator (Jonason & Schmitt, 2017) where there is more gender equality and civil rights (Van de Vliert & Van Lange, 2019).

Second, we aimed to understand how sex differences at the country-level might be sensitive to milieu variance. There is substantial evidence for sex differences in personality (Del Giudice, 2009, 2013), including the Dark Triad traits (Jonason et al., 2019; Jonason et al., 2020; Neumann et al., 2012). Sex differences in those traits may result from learning mechanisms (Eagly & Wood, 1999) or ancestral patterns in costs and benefits for engaging in way of solving adaptive tasks like survival and reproduction (Buss, 2009). Typically, researchers cannot disentangle these predictions, but the use of cross-cultural data has promise. Constructivist/feminist models of sex differences in personality propose that, as societies become safer and more "modern," sex differences should get smaller. However, evolutionary models propose that, as society's hold on people's behaviors and attitudes (and therefore personality) lessens, people will be freed up to better maximize their preferences, thereby creating larger sex differences. To date, evidence is more consistent with the latter approach (Giolla & Kajonius, 2019; Jonason et al., 2019, 2020; Neumann et al., 2012; Schmitt et al., 2017), but these studies focused on present, not past, milieu effects. Therefore, we replicate and extend work showing that in countries with larger sex differences are more common in "Westernized" (e.g., gender equality) and safe (e.g., homicide rates) places.

We contend that people's developmental milieu provides useful information on how one can calibrate their personality for optimal navigation of the social environment (Berry, 2004). We examine milieu effects at three theoretically selected timepoints and use them to predict (1) country-level mean scores on the Dark Triad traits, and (2) the magnitude of sex differences in young adulthood. Milieu conditions in people's childhood, pre-teen, and teenage years may be important in shaping people's personality just as local conditions are at these periods in life (e.g., Erikson, 1963, 1982).

[2] The Merriam-Webster dictionary defines milieu as "the physical or social setting in which something occurs or develops" (https://www.merriam-webster.com/dictionary/milieu).

1. Method

The research is based on summary data reported previously (Jonason et al., 2020), which included 11,723 participants (66 % women, 34 % men; $M_{Age} = 21.53$; $SD_{Age} = 3.17$) from 49 countries from three W.E.I.R.D. (i.e., North America, Oceania, Western Europe) and five non-W.E.I.R.D. (i.e., Asia, Middle East, non-Western Europe, South America, sub-Saharan Africa). We used the means and sex differences (i.e., Cohen's *d*) for the Dark Triad traits in each country as data derived from the Dirty Dozen measure of the Dark Triad traits (Jonason & Webster, 2010), which were translated and back translated in sites where official translation was lacking.[3] Participants indicated their agreement (1 = *not at all*, 5 = *very much*) to the 12 items, such as "I tend to lack remorse," (psychopathy), "I tend to want others to admire me" (narcissism), and "I have used deceit or lied to get my way" (Machiavellianism). Responses were internally consistent (Cronbach's $\alpha = .75_P$; $\alpha = .85_N$; $\alpha = .84_M$) and had metric (and partial scalar) measurement invariance within and between WEIRD and non-WEIRD world regions, metric invariance across countries, scalar invariance for comparisons of men and women, and congruence between the individual and group levels (Jonason et al., 2020; Rogoza et al., 2021).

In building our dataset, we paired these country-level details about the Dark Triad traits with several country-level factors from when the average participant would have been a child (≈6), an pre-teen (≈11), and a teenager (≈16), as well as differences between these time points, as measures of cultural change.[4] We collected several country-level variables from the Official United Nation Development Report Data Center.[5] First, we used the *Income Index* (2001, 2006, 2011), which is the GNI (gross national index) per capita (2017 PPP International $, involving a natural logarithm) expressed as an index with a minimum value of US$100 and a maximum value US$75,000. Second, we implemented the *Unemployment Index* (2000, 2005, 2010), which represents the percentage of the labor force population (ages 15+) not in paid employment or self-employed but who are available for work and have taken steps to seek employment. Third, we used the *Coefficient of Human Inequality* (2010, 2016),[6] which is the average inequality in three basic dimensions of human development (i.e., life expectancy, inequality in education, inequality in income), and is calculated as an arithmetic mean of the values. Fourth, we used the *Education Index* (2001, 2006, 2011), defined as the mean years of schooling (of adults) and expected years of schooling (of children), both expressed as an index obtained by scaling with the corresponding maxima. Fifth, we used the *Life Expectancy Index* (2001, 2006, 2011), which is the life expectancy at birth expressed as an index with a minimum value of 20 years and a maximum value of 85 years; and the *Homicide Rate* (2000, 2005, 2010) which is the number of unlawful deaths inflicted upon a person with the intent to cause death or serious injury, expressed per 100,000 people. And sixth, we used the *Coefficient of Economic Freedom* (2001, 2006, 2011) from the Heritage Foundation official website,[7] which is based on 12 quantitative and qualitative factors, grouped into four categories: Rule of Law (i.e., property rights, government integrity, judicial effectiveness), Government Size (i.e., government spending, tax burden, fiscal health), Regulatory Efficiency (i.e., business freedom, labor freedom, monetary freedom), and Open Markets (i.e., trade freedom, investment freedom, financial freedom). Each of the 12 economic freedoms within these categories is graded on a scale of 0 to 100. A country's overall score is derived by averaging these 12 equally weighted economic freedoms.

2. Results

In Table 1, we report the correlations for the mean rates of the Dark Triad traits in young adulthood. Narcissism was the most sensitive to variance in milieu quality (e.g., lower life expectancies and income across all three timepoints), followed by Machiavellianism (e.g., more education across all three timepoints, less inequality across two timepoints), whereas psychopathy had no links. Collectively, changes in these conditions were erratically associated with mean-level rates of the Dark Triad traits (Table 2).

Next, in Table 3 we present the correlations between magnitudes of sex differences in the traits and the same milieu conditions. More unemployment at childhood predicted more narcissism in young adulthood, whereas more unemployment in one's teens predicted more adult Machiavellianism and psychopathy. More homicides across all three timepoints predicted adult rates of narcissism and Machiavellianism. Lastly, as conditions improved in terms of life expectancies and homicide rates between childhood and pre-teens, larger sex differences emerged in all three traits (Table 4).

3. Discussion

Granted, conditions during one's development are critical in understanding adult behavior. However, much of the relevant literature is limited by a reliance on retrospective reports of one's childhood, an omission of sex differences, and a focus on local, interpersonal indicators of conditions in childhood both in theoretical models and data. In contrast, we consider the role of distal features of one's country to test how milieu effects over one's childhoods predict the Dark Triad traits and sex differences therein. We assembled a database that included descriptive data on the means of the Dark Triad traits from prior research (Jonason et al., 2020) in 49 countries along with sex differences

Table 1
Correlations between mean rates for each trait in relation to milieu conditions.

	Narcissism	Machiavellianism	Psychopathy
Unemployment Index 2000	−0.12	−0.12	−0.12
Unemployment Index 2005	−0.19	−0.26	−0.23
Unemployment Index 2010	−0.14	−0.15	−0.17
Life Expectancy Index 2001	−0.42**	0.12	−0.03
Life Expectancy Index 2006	−0.42**	0.12	−0.03
Life Expectancy Index 2011	−0.43**	0.12	−0.04
Income Index 2001	−0.50**	0.28	−0.13
Income Index 2006	−0.47**	0.33*	−0.12
Income Index 2011	−0.47**	0.30*	−0.14
Homicide Rate 2000	−0.06	<0.01	−0.06
Homicide Rate 2005	−0.12	<0.01	−0.07
Homicide Rate 2010	−0.12	0.01	−0.04
Education Index 2001	−0.39**	0.40**	−0.18
Education Index 2006	−0.38**	0.40**	−0.10
Education Index 2011	−0.39**	0.37**	−0.11
Coefficient of Economic Freedom 2001	−0.32*	0.16	−0.12
Coefficient of Economic Freedom 2006	−0.39**	0.30*	−0.04
Coefficient of Economic Freedom 2011	−0.39**	0.23	−0.11
Coefficient of Human Inequality 2010	0.26	−0.39*	<0.01
Coefficient of Human Inequality 2016	0.29	−0.31*	0.06

* $p < .05$.
** $p < .01$.

[3] The present study was not pre-registered, but the data used are available on the Open Science Framework (https://osf.io/5kwn4/?view_only=faaddf1346264a8088ff28e2b59f70cb).

[4] We adopted this approach because multilevel modeling, as used previously on this topic (Johnson, 2020), did not yield any insight. This may be due to limited power. We calculated changes from one year to another by extracting the value of an indicator from an earlier year from the value of a later year (e.g., Income Index change 2001- > 2006 = Income Index 2006 - Income Index 2001).

[5] http://hdr.undp.org/en/

[6] In this case, 2010 and 2016 were used because the previous years were unavailable.

[7] https://www.heritage.org/index/

Table 2
Correlations between mean rates for each trait and changes in milieu conditions.

	Narcissism	Machiavellianism	Psychopathy
Unemployment Index change 2000->2005	−0.12	−0.23	−0.19
Unemployment Index change 2005->2010	0.14	0.26	0.16
Life Expectancy Index change 2001->2006	<0.01	<0.01	0.01
Life Expectancy Index change 2006->2011	0.18	−0.13	−0.05
Income Index change 2001->2006	0.28	0.25	0.11
Income Index change 2006->2011	0.23	−0.37*	−0.11
Homicide Rate change 2000->2005	−0.03	−0.14	−0.04
Homicide Rate change 2005->2010	0.01	−0.02	0.08
Education Index change 2001->2006	0.39**	0.06	0.17
Education Index change 2006->2011	0.02	−0.30*	−0.04
Coefficient of Economic Freedom change 2001->2006	−0.09	0.25	0.19
Coefficient of Economic Freedom change 2006->2011	0.02	−0.19	−0.17
Coefficient of Human Inequality change 2010->2016	0.07	0.26	0.15

* $p < .05$.
** $p < .01$.

Table 3
Correlations for country-level sex differences in relation to milieu conditions.

	Narcissism	Machiavellianism	Psychopathy
Unemployment Index 2000	0.31*	0.22	0.20
Unemployment Index 2005	0.32*	0.27	0.25
Unemployment Index 2010	0.23	0.32*	0.31*
Life Expectancy Index 2001	−0.07	−0.12	0.05
Life Expectancy Index 2006	−0.12	−0.16	−0.02
Life Expectancy Index 2011	−0.10	−0.15	0.02
Income Index 2001	0.16	0.14	0.22
Income Index 2006	0.14	0.15	0.25
Income Index 2011	0.13	0.13	0.23
Homicide Rate 2000	0.47**	0.41**	0.25
Homicide Rate 2005	0.47**	0.38*	0.25
Homicide Rate 2010	0.47**	0.32*	0.25
Education Index 2001	0.13	0.14	0.21
Education Index 2006	0.13	0.16	0.23
Education Index 2011	0.11	0.14	0.23
Coefficient of Economic Freedom 2001	0.03	0.07	0.20
Coefficient of Economic Freedom 2006	0.04	0.06	0.26
Coefficient of Economic Freedom 2011	−0.03	0.02	0.20
Coefficient of Human Inequality 2010	0.00	−0.05	−0.22
Coefficient of Human Inequality 2016	0.05	−0.06	−0.16

* $p < .05$.
** $p < .01$.

(Cohen's *d*) and paired them with country-level data from online databases that detail the dangerousness, health, economic, equality, and education ratings of each country. We discuss four trends.

First, variance in narcissism at the country-level was sensitive to indicators of milieu harshness like mortality, income, homicide, and education (especially for narcissism) across time periods. We found no such effects for psychopathy which may be because of the greater level of heritability for this trait relative to narcissism (Vernon et al., 2008). Nevertheless, for narcissism, psychodynamic (Dragioti et al., 2012) and

Table 4
Correlations for country-level sex differences in relation to changes in milieu conditions.

	Narcissism	Machiavellianism	Psychopathy
Unemployment Index change 2000->2005	0.01	0.08	0.07
Unemployment Index change 2005->2010	−0.21	0.04	0.08
Life Expectancy Index change 2001->2006	−0.50**	−0.45**	−0.38**
Life Expectancy Index change 2006->2011	0.21	0.19	0.03
Income Index change 2001->2006	−0.18	0.02	0.13
Income Index change 2006->2011	−0.17	−0.22	−0.30*
Homicide Rate change 2000->2005	−0.49**	−0.46**	−0.43**
Homicide Rate change 2005->2010	−0.10	−0.24	−0.03
Education Index change 2001->2006	−0.14	0.15	−0.07
Education Index change 2006->2011	−0.15	−0.17	−0.04
Coefficient of Economic Freedom change 2001->2006	0.02	−0.02	0.09
Coefficient of Economic Freedom change 2006->2011	−0.17	−0.11	−0.16
Coefficient of Human Inequality change 2010->2016	0.11	−0.04	0.09

* $p < .05$.
** $p < .01$.

life history (Figueredo et al., 2006) interpretations consider these traits a coping response that protects the self in the first place and enables local calibration to solve mating and survival challenges in the second. That is psychodynamic models contend that narcissism protects the ego whereas life history models suggest narcissism enables a person to improve their evolutionary fitness (at least in the short-term). Such an interpretation has been immortalized in the 1985 song by Billy Ocean: *When the going gets tough, the tough get going.*

Second, Machiavellianism might be distinct from the other two traits in that is sensitive to conditions of modernized societies. For example, a more stable country with reduced mortality and higher income, economic freedom, and education may produce Machiavellian populations in adulthood. Modern societies are uniquely stable and safe, which serve as inputs into heuristic processes that then generate Machiavellian behaviors and attitudes. In such societies of long-term stability, formal power structures and a numerous population that adopt Machiavellian ways of navigating the social and professional world are likely to engender more favorable outcomes. Stability and predictability where people live can be learned and exploited. Imagine a large university: A Machiavellian employee—building alliances, maneuvering for power—is likely to be far more successful than the impulsive psychopath or grandiose narcissist who may engage in bullying, sexual harassment, and data fraud.

Third, we focused on what accounts for variance in sex differences in various countries. We found limited evidence that sex differences were sensitive to macro-level predictors over the course of people's lives. The most compelling evidence is that greater rates of homicide predict larger sex differences in the Dark Triad traits. This was especially pronounced in the childhood years, an effect that was unsurprisingly coupled with life expectancy rates. Harsher childhood conditions, then, appear to amplify sex differences at the country level. Given the secondary nature of our data, we cannot assert that women fell (becoming more communal), or men rose (becoming more agentic), in their rates of the Dark Triad traits in response to existential threats, but both possibilities are reasonable (Jonason et al., 2019).

Lastly, sex differences in all three traits were sensitive to

unemployment rates, albeit in distinct timepoints: sex differences in narcissism were sensitive to childhood and preteen unemployment, whereas sex differences in the other two traits were sensitive to teenage unemployment rates. This pattern is consistent with the diathesis model in that narcissism is expected to emerge in adulthood in response to childhood conditions (Thomaes et al., 2013, 2018), and the pattern might be extended to the other two traits as well. Perhaps psychopathy and narcissism—as "coping strategies"—are more about solving adult problems (e.g., mating, power), whereas narcissism is also about solving childhood problems (e.g., attention, safety), a proposal which is consistent with a psychodynamic interpretation of the latter trait (Dragioti et al., 2012; Moreira et al., 2020). Alternatively, the Dark Triad traits are heritable (Vernon et al., 2008) which may set the stage for susceptibility to milieu effects. For instance, psychopathy is the most heritable trait which may account for why sex differences in this trait were so insensitive to milieu conditions.

4. Limitations and conclusions

Although we provided the first account of the relationships between mean-level of the Dark Triad traits and sex differences therein across three timepoints in people's past, relying on robust estimates of each, our study has limitations. Our estimates of the Dark Triad traits relied on relatively WEIRD countries with mostly female participants. Also, in the absence of longitudinal data (Baker & Mednick, 1984; Chopik & Grimm, 2019), we can only establish temporal precedence. In addition, the Dirty Dozen measure of the Dark Triad traits has its detractors (Maples et al., 2014), although the measure has stable psychometric properties around the world (Rogoza et al., 2021). Moreover, we did not include the candidate-additions to the Dark Triad traits of sadism (Buckels et al., 2013) and spitefulness (Marcus et al., 2014), and alternative country-level factors, such as pathogen-prevalence (Schaller, 2016) and latitude (Jonason & Schmitt, 2017). Alternatively, there is evidence that the Dark Triad traits are heritable (Vernon et al., 2008) which may serve as a further moderator of the nation-level variance in the traits, but we have no cross-cultural data available on heritability at the same level to use in our analyses. Lastly, our results may be amenable to Type 1 error. Although we did not adjust for this, our tests were a priori fairly underpowered given the reliance on only 49 countries. As such, we considered it tolerable to have more error and important to report the array of effects, not just the ones that were significant. We regard these limitations as calls for subsequent research.

Despite these limitations, we extended knowledge on how milieu factors, like homicide rates, and changes in those factors across different developmental periods are related to country levels of the Dark Triad traits and sex differences therein. As shown previously (Jonason et al., 2020), narcissism is the most susceptible to milieu effects, apparently higher in "harsher" locations, Machiavellianism appears higher in modernized places in terms of enhanced education and income, and psychopathy seems rather insensitive to milieu variance. However, these effects appear to be rather stable across developmental periods. And last, sex differences in the traits appear to be larger in safer places (Jonason et al., 2019; Schmitt et al., 2017), a pattern more consistent with evolutionary models than sociocultural ones. Our study is a leap forward in understanding the etiology of the Dark Triad traits as are situated within broader social contexts.

CRediT authorship contribution statement

PKJ conceptualized, advised on the analyses, and wrote the paper. SKC conducted the data analyses and assisted in the writing of the Results. FT created the database. MŻP and CS provided feedback on the paper prior to submission. All other authors were part of the team that collected the original data from which these secondary data analyses were derived.

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