The Problem of Overpopulation: Proenvironmental Concerns and Behavior Predict Reproductive Attitudes

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Abstract

Human overpopulation continues to be a pressing problem for the health and viability of the environment, which impacts the survival and well-being of human populations. Limiting the number of offspring one produces or deciding to remain child-free may be viewed as a proenvironmental behavior (PEB) that can significantly reduce one's carbon footprint. Nonetheless, few researchers have examined the relations between environmental concerns, reported PEB, and reproductive attitudes. The goal of the current study was to examine the above relations in a sample of 200 Canadian undergraduates. Environmental concern as part of an ecologically conscious worldview (the New Ecological Paradigm) was found to negatively predict pro-reproductive attitudes. In contrast, more self-oriented (egoistic) and human-centric (altruistic) environmental concerns positively predicted pro-reproductive attitudes. Additionally, self-reported PEB was found to negatively predict pro-reproductive attitudes. All of the above relations were found to be statistically significant while controlling for the influence of age, sex, and religious status. These findings add to a limited empirical literature on environmental concerns, PEB, and attitudes toward reproducing, which can help inform discussion regarding the environmental issues associated with human overpopulation and potential ways to mitigate these dilemmas. Key Words: New Ecological Paradigm—Environmental concern—Proenvironmental behavior—Reproductive attitudes—Human overpopulation.

Introduction

As the salience of global environmental issues continues to grow, people worldwide are increasingly considering how to mitigate environmentally destructive behavior (Gifford & Nilsson, 2014; Harper, Harper, & Snowden, 2017). In particular, human overpopulation is contributing to the depletion of natural resources and hindering the resilience of the ecosystems upon which human beings depend for survival (Campbell, 2012; Dunlap, Van Liere, Mertig, & Jones, 2000; Engelman, 2012; Kazdin, 2009; Kopnina & Washington, 2016; O'Neill et al., 2010; Peacock, 2018). Therefore, reproductive decisions represent one means of influencing the impact humans have on the environment that is receiving an increasing amount of public attention (e.g., Astor, 2018; Minter, 2018). A recent *New York Times* survey of 1,858 child-free American women and men aged 20–45 showed that, when asked about the reason (or reasons) for remaining child-free, 33% of respondents selected "Worried about climate change," and 27% selected "Worried about population growth" (Miller, 2018). These results indicate that some people are deciding not to have children, or to limit the number of offspring they produce, in order to benefit the environment. In addition, people may not want to bring children into a world characterized by environmental degradation because of the negative impact it can have on the health of potential offspring (Ghimire & Mohai, 2005; Homburg & Stolberg, 2006). Building on the work of others (e.g., Arnocky, Dupuis, & Stroink, 2012), the goal of the current research was to examine the potential relations between environmental concerns, proenvironmental behavior (PEB), and attitudes toward reproducing among Canadian undergraduates.

Human overpopulation

Human overpopulation occurs when the demand a group imposes on the environment (i.e., its ecological footprint) surpasses the

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capacity of that geographic space to sustain the population (i.e., its carrying capacity; see Kopnina & Washington, 2016, and Peacock, 2018). It is inseparably tied to the phenomenon of *human overconsumption,* whereby resource use outpaces the carrying capacity of a particular environment. The topic of overpopulation is emotionally charged and divisive because it occurs at the intersections of sex, reproductive rights, political and religious affiliations, culture, and violations of human rights (Campbell, 2012). Some contend that overpopulation is a non-issue used by the elite in the "global North" to maintain current unsustainable consumption patterns while blaming the poor, women, people of color, immigrants, and those residing in the "global South" who produce a negligible impact on the environment (Fletcher, Breitlin, & Puleo, 2014; Hartmann, 2010; Kuumba, 1993; White, 1994). These proponents raise concerns that government policies and actions in the name of overpopulation across many cultures have historically been marginalizing, such as compulsory sterilization, eugenics, child quota, and birth credit programs. Those unconcerned about overpopulation tend to adhere to *demographic transition theory,* through which it is believed that increases in social-economic welfare and reproductive autonomy results in declining birth rates, which will effectively stabilize the global population in the 21st century (see Kopnina & Washington, 2016, and Smail, 2016 for discussion). Others express a belief that science, technology, and human ingenuity will right any issues associated with overpopulation, which has been a familiar foe for environmental researchers (see Dunlap et al., 2000).

Given the global surplus in food, the unsustainable and inequitable patterns of consumption and distribution in many wealthy nations, such as the United States, Canada, and Australia, must change (Kopnina & Washington, 2016). It is also integral to empower girls and women by ensuring their access to education and family planning services. Both of the above humane and noncoercive measures will produce a positive benefit for the environment. This does not, however, preclude the influence of population size as something that magnifies the impacts of consumption (Campbell, 2012; Peacock, 2018; Smail, 2016). Indeed, Dietz and O'Neill (2013) have argued that "we need smaller footprints, but we also need fewer feet" (p. 52). The United Nations has recently predicted that the Earth's population will increase to 8.5 billion by 2030, 9.7 billion by 2050, and 11.2 billion by 2100, with population densities being highest in developing countries (United Nations, 2017). The "developing world" continues to increase its consumption (Washington, 2015), and it is unethical to deny members of other cultures access to the rights and privileges afforded to those in more developed contexts that may exacerbate current environmental dilemmas. For these reasons, it is prudent to examine the impact of reproductive decisions on the environment and to consider the potential multitude of reasons why individuals may decide to remain child-free, such as concern for the environment (Arnocky et al., 2012).

Environmental impact produced by offspring among Western nations

Across several Western countries, Wynes and Nicholas (2017) categorized having one fewer child as a "high impact action" that resulted in approximately 23,700–117,700 kg reduced carbon dioxide (CO_2) output per year. The next closest high impact act, "living car free," resulted in an estimated 1,000–5,300 kg reduction in CO_2 per year. Similarly, Murtaugh and Schlax (2009) found in the United States that every child born was estimated to contribute roughly 9,441 metric tons of CO_2 to the "carbon heritage" of their mothers. These results show how deciding not to have offspring can significantly reduce one's carbon footprint. Despite evidence showing that having fewer children has a larger impact on the environment relative to other kinds of PEB, such as recycling, buying energy-efficient products, and switching to a plant-based diet (Murtaugh & Schlax, 2009; Wynes & Nicholas, 2017), few researchers have examined the relations between environmental concerns, PEB, and fertility attitudes. This is important as environmentalists, researchers, and policymakers search for socially responsible ways of mitigating the issues caused or exacerbated by human overpopulation.

Linking reproductive attitudes and environmentalism

Reproductive attitudes constitute the positive and negative evaluations people hold toward having and raising children, which impact fertility intentions (e.g., ideal number of offspring) and behavior (e.g., pregnancy rates; Iacovou & Tavares, 2011; Langridge, Sheeran, & Connolly, 2005). Reproductive attitudes and intentions are influenced by many social, economic, and individual-level factors, including reliance on children as companions, agricultural workers, and helpers around the home; female autonomy; educational level; the availability of contraceptives; normative cultural values; religious affiliation; and financial status (see Iacovou & Tavares, 2011). In previous work, reproductive attitudes and fertility intentions have been linked to environmental concerns (e.g., Arnocky et al., 2012). *Environmental concerns* can be defined as generic positive or negative attitudes one holds about a particular object (or objects) of environmental protection that are guided by cognitive and affective processes (Bamberg, 2003). Despite the discrepancy between green attitudes and behavior (Bamberg, 2003), environmental concerns have been shown to predict reported PEB (Arnocky & Stroink, 2011;

Arnocky, Stroink, & DeCicco, 2007; Davis & Stroink, 2016; Schultz et al., 2005).

In previous work, Ghimire and Mohai (2005) investigated the relations between contraceptive use and certain environmental concerns (perceptions of agricultural productivity, water quality, and the status of groundwater table) among Nepalese people. They discovered that trepidation about crop production was positively linked to contraceptive use. In contrast, Biddlecom, Axinn, and Barber (2005) found that increased environmental degradation and a greater reliance on publicly owned natural resources over a 3-year period were positively associated with a preference for a larger family and higher pregnancy rates in people from Nepal. Similar results were reported by Filmer and Pritchett (2002) for Pakistani families. Sutherland, Carr, and Curtis (2004) found that, in Guatemala, those perceiving greater land availability had significantly fewer offspring than those viewing land resources as scarce. Haq (2013) found a relation between perceived decline in land productivity and preferences for more sons among indigenous families in Bangladesh. Thus, some evidence appears to support the *vicious circle* argument, where environmental dissolution contributes to population growth because of higher fertility intentions. In "developing" (i.e., lower-income) contexts, children may be required to exploit natural resources for the family, and as resource scarcity increases, having more children may be advantageous (Dasgupta, 1998). However, it is important not to "blame the victim" and to dig into the political, economic, and historic imbalances that create and perpetuate the contexts for environmental dissolution (Krings, 2002). Indeed, evidence shows that poverty is a consequence of land degradation, which forces marginalized peoples to extract more resources from the land (see Way, 2016).

In a more "developed" (i.e., higher-income) context with Canadian undergraduates in Ontario, Arnocky et al. (2012) examined the relations between reproductive attitudes, population health-related worry, and a widely used index of environmental concern known as the New Ecological Paradigm (NEP; Dunlap et al., 2000). The NEP is argued to embody people's generalized beliefs about human-nature relationships that aggregate to form a coherent worldview. Specifically, those endorsing the NEP believe that humans have the ability to upset the balance of nature, that human overpopulation and other anthropogenic pressures place a strain on Earth's resources, that science and technology are not a panacea for solving current environmental ills, and that it is unethical for humans to try to dominate nature for our own gain. Arnocky et al. (2012) found that population health-related concerns negatively predicted pro-reproductive attitudes and intentions to have children, as well as positively predicted anti-reproductive attitudes above the influence of age, sex, and religious status. The NEP was also found to negatively predict pro-reproductive and positively predict anti-reproductive attitudes. Similarly, Andrijevic and Striessnig (2017) found that a particular dimension of the NEP called "possibility of an eco-crisis" was negatively related to intentions to have children among Austrian university students. In a sample of German participants, Homburg and Stolberg (2006) found that pollution-related health concerns were linked to increased engagement in a range of PEB. In contrast, De Rose and Testa (2015), using Eurobarometer data from 27 European Union countries, did not find any evidence for a link between the perceived future severity of climate change and intentions to have children. Furthermore, their results were not moderated by country or education level. The above studies have provided important insight into the relations between environmental concern, PEB, and fertility attitudes/intentions from a psychological perspective among more economically secure young adults in a developed cultural context. This demographic is important to examine because many developed economies (e.g., the United States, Japan, Australia, and Canada) produce the greatest negative total and per capita environmental impact measured through various metrics (e.g., forest loss, water pollution, carbon emissions; Bradshaw, Giam, & Sodhi, 2010; McMichael, Powles, Butler, & Uauy, 2007). Nonetheless, it is important to consider that several developing, or emerging market, economies rank highly in terms of absolute environmental degradation (e.g., China, India, and Peru). Additionally, researchers have produced mixed findings regarding whether financial development increases (Tang & Tan, 2014), reduces (Al-Mulali, Tang, & Ozturk, 2015), or has a negligible impact (Ozturk & Acaravci, 2013) on energy consumption and CO_2 emissions.

Pollution-related health concerns and the NEP are, however, somewhat restricted in providing insight into the particular ecological resource (or resources) people value and their motivation (or motivations) for wanting to protect the environment. Under value-belief-norm theory (Stern & Dietz, 1994), three kinds of proenvironmental values have been outlined that relate to three types of environmental concern: *egoistic, altruistic,* and *biospheric*. Within this tripartite model, each type of concern denotes people's beliefs about the perceived negative outcomes of environmental dissolution on various valued "objects" (Schultz, 2001). When these valued objects are threatened, people become motivated to protect them. For those expressing egoistic concern, the primary valued object is the self. In contrast, those with altruistic concern value all of humanity. Lastly, the valued objects of those with biospheric concern extend to a diverse array of organisms within the biosphere.

This tripartite model is important because previous researchers have shown that egoistic, altruistic, and biospheric values differentially predict engagement in PEB. Those harboring egoistic concern are much less likely to engage in reported PEB (Arnocky & Stroink, 2011; Arnocky et al., 2007; Davis & Stroink, 2016; Schultz et al., 2005), unless framed in terms of self-interest and personal benefits (De Dominicis, Schultz, & Bonaiuto, 2017). This may be because egoistic concern denotes a shallow level of nature connectedness, an individualistic definition of self, and a proclivity toward enhancing one's own gains over others (i.e., self-enhancement; Davis & Stroink, 2016; De Groot & Steg, 2009; Schultz, 2001; Schultz & Zelezny, 1999). In comparison, altruistic concern embodies a higher degree of nature-self overlap, a collectivistic definition of self, and a penchant for cooperation. Altruistic concern, however, inconsistently predicts reported PEB because these values only extend to other human beings, which attenuates the likelihood of incurring a cost to oneself to protect the natural world for its own sake. Biospheric concern is argued to represent the highest degree of nature inclusivity and a definition of self that extends to the entire biosphere. Biospheric concern consistently predicts reported PEB and corresponds to valuing and respecting ecological resources for their perceived inherent right to exist (Arnocky & Stroink, 2011; Arnocky et al., 2007; Davis & Stroink, 2016).

The current study

The goal of the current study was to examine the relations between various kinds of environmental concern, PEB, and reproductive attitudes. Specifically, following Arnocky et al. (2012), we investigated the association between an index of environmental concern (the NEP; Dunlap et al., 2000) and pro-reproductive attitudes (i.e., positive attitudes toward reproducing). Additionally, the relations between specific kinds of environmental concern that place a differential amount of emphasis on the self (egoistic), other people (altruistic), and the biosphere (biospheric) with pro-reproductive attitudes were assessed. The potential link between ecologically conscious behavior and pro-reproductive attitudes was also examined. Given these objectives, the following hypotheses were proposed:

Hypothesis 1: Greater endorsement of the NEP would negatively predict pro-reproductive attitudes.

Hypothesis 2: Higher egoistic and altruistic environmental concern would positively predict pro-reproductive attitudes, whereas biospheric concern would negatively predict these attitudes.

Hypothesis 3: Greater engagement in self-reported PEB would negatively predict pro-reproductive attitudes.

Method

Participants

The sample included 200 participants recruited from undergraduate psychology courses at a midsized university in Ontario, Canada. Of the sample, 15.2% ($n = 30$) were male and 84.8% ($n = 167$) were female. The participants ranged from 18 to 48 years old, with a mean age of 20.21 ($SD = 4.50$). Of the sample, 57.5% ($n = 100$) identified as Christian, 14.9% ($n = 26$) as atheist, 9.8% ($n = 17$) as agnostic, 7.7% ($n = 7$) as unaffiliated.

Materials

Reproductive Attitudes Scale. This 10-item scale was developed by Arnocky et al. (2012) to measure a person's endorsement of pro-reproductive and anti-reproductive attitudes. Example items denoting pro-reproductive attitudes include "My having children is important for my entire family" and "Having children is the greatest personal accomplishment one can hope for." Example items describing anti-reproductive attitudes include "If I had fewer children it would save me a great deal of time and money" and "What I am made up of carries on regardless of whether I personally reproduce." These orthogonal dimensions have been supported by factor analysis in previous work (Arnocky et al., 2012). Participants responded to items along a 7-point Likert response scale. Following Arnocky et al. (2012), an attitudes toward reproduction mean scale score was calculated by positively coding the pro-reproductive items and reverse coding the anti-reproductive items. This Reproductive Attitudes Scale was found to be internally consistent in the present study ($\alpha = .73$), with higher scores representing more positive attitudes toward reproducing (lower scores representing anti-reproductive attitudes).

New Ecological Paradigm Revised Scale (NEP-R). This 15-item self-report survey developed by Dunlap et al. (2000) is intended to measure a person's ecologically conscious worldview. Participants responded to items along a 5-point Likert-type scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Example items include "Plants and animals have as much right as humans to exist" and "The balance of nature is very delicate and easily upset." Items for the NEP-R were averaged to create a mean scale score that had acceptable internal consistency in the current study ($\alpha = .77$).

Environmental Concern Scale. This 12-item self-report scale created by Schultz (2001) measures the unique proenvironmental values a respondent holds based upon the kind of environmental concern they express in response to environmental destruction. Participants respond to items along a 7-point Likert-type scale ranging from 1 (*Not*

important) to 7 (*Supreme importance*). Type of concern for environmental destruction is divided into three subscales: egoistic, altruistic, and biospheric. The egoistic facet is designed to measure if an individual's environmental concern is self-centered and individualistic in nature (e.g., "My health"). The altruistic dimension examines if a person's environmental concern extends to all of humanity and not just the individual self (e.g., "All people"). Lastly, the biospheric subscale measures level of environmental concern for the entire biosphere (e.g., "Marine life"). The three-factor model has been supported in previous research (Schultz, 2001). Items were averaged to create mean scale scores for each type of concern, which were all internally consistent in the present study (egoistic, $\alpha = .83$; altruistic, $\alpha = .81$; and biospheric, $\alpha = .85$ concern).

Environmental Behavior Scale. A list of 25 proenvironmental (e.g., "Recycle" and "Monitor the length of your showers") and anti-environmental (e.g., "Drive a car" and "Leave the water running while you're brushing your teeth") behavior created by Mayer and Frantz (2004) was used in the current study. Participants responded to how often they had generally engaged in each behavior along a 7-point Likert-type scale ranging from 1 (*Very rarely*) to 7 (*Very often*). Antienvironmental behavior items are reverse scored, and all items were averaged to create a mean scale score for proenvironmental behavior. The Environmental Behavior Scale was found to be internally consistent in the present study, $\alpha = .71$.

Procedure

Students from psychology courses were asked to participate in the "Altruism and Environmental Behavior Study" and were recruited through campus posters and digital recruitment messages. Inclusion criteria for this study were that participants needed to be undergraduate psychology students enrolled in courses that offered course credit as a form of compensation for their participation. If interested, participants accessed the study through the SONA online survey system containing a cover letter, screen of informed consent, and the self-report scales of interest. None of the measures were counterbalanced in the online survey. Upon completing the survey, participants were shown a debriefing screen and awarded partial course credit as compensation. The current research was approved by an appointed institutional research ethics board. A personality psychology perspective was used to guide the present research, where variations in thoughts, feelings, and behavior are measured to help understand characteristics of the individual and/or how a complex myriad of developmental, social-cultural, biological, and evolutionary processes come together to form a person as a whole (Larsen, Buss, King, & Ensley, 2017).

Results

All data were examined using SPSS (version 20). The EXPLORE program was run to examine evidence of non-normality, extreme values, and missing data. All variables assumed an approximately normal distribution; however, 21 outlying values were flagged. Extreme scores were windsorized to the next highest or lowest values for each scale in order to retain data (Ghosh & Vogt, 2012). This resulted in there being no more outlying values. There was no missing data across any of the variables measured. Descriptive statistics were calculated for each mean scale score in the current study (see Table 1). Zero-order correlations were calculated for age and each measured

Table 1. Descriptive Statistics and Zero-Order Correlations for All Measures

	M	*SD*	1.	2.	3.	4.	5.	6.
1. Repro. Attitudes	3.84	0.88	1.0					
2. NEP-R	3.72	0.48	−.31**	1.0				
3. Egoistic Concern	5.53	0.87	.28**	−.17*	1.0			
4. Altruistic Concern	5.77	0.85	.27**	.04	.55**	1.0		
5. Biospheric Concern	5.77	0.97	−.18*	.45**	.07	.32**	1.0	
6. PEB	4.50	0.65	−.26**	.40**	−.17*	−.02	.35**	1.0

Note. Zero-order correlations significant at *$p < .05$ and **$p < .01$ (two-tailed). Higher scores on Repro. Attitudes represent pro-reproductive attitudes and lower scores represent anti-reproductive attitudes.

variable. None of the variables in the present study were significantly correlated with age. To examine potential sex differences (coded female = 1, male = 0), a series of Welch's *t*-tests were conducted. This test was chosen because it does not assume homogeneity of variance and is robust to unequal sample sizes (Zumbo & Zimmerman, 1993), which was important given the large number of female ($n = 167$) in comparison to male participants ($n = 30$). A statistically significant sex difference was only found for altruistic environmental concern, $t(36) = 11.18$, $p = .002$, $d = 0.71$, with females ($M = 5.87$, $SD = 0.78$) scoring higher than males ($M = 5.23$, $SD = 1.00$). In order to assess potential differences in religious status, those identifying with a mainstream religion (e.g., Christianity, Islam, and Taoism) were aggregated into a group labeled "religious" ($n = 113$; coded 1), and those unaffiliated (e.g., atheist, agnostic, and spiritual) were collapsed into a group labeled "non-religious" ($n = 61$; coded 0). A series of independent samples *t*-tests were then conducted. A statistically significant difference was found for pro-reproductive attitudes, $t(172) = -3.94$, $p < .001$, $d = 0.61$, with religious participants espousing stronger attitudes ($M = 4.03$, $SD = 0.77$) in comparison to nonreligious people ($M = 3.50$, $SD = 0.96$). A statistically significant difference was also found for the NEP-R, $t(172) = 2.42$, $p = .016$, $d = 0.40$, with nonreligious participants reporting a significantly stronger proenvironmental worldview ($M = 3.85$, $SD = 0.42$) relative to religious people ($M = 3.67$, $SD = 0.48$).

Zero-order correlations for all variables were calculated for informative purposes (see Table 1). Of note, the NEP-R correlated negatively with pro-reproductive attitudes. In addition, egoistic and altruistic concern both correlated positively, while biospheric concern correlated negatively, with pro-reproductive attitudes. Moreover, PEB correlated negatively with pro-reproductive attitudes.

In order to test our hypotheses, a series of linear regression analyses were carried out (Table 2). We statistically controlled for age, biological sex, and religious status in each analysis. The NEP-R was found to negatively predict pro-reproductive attitudes (Hypothesis 1). Egoistic and altruistic concerns positively predicted pro-reproductive attitudes; however, biospheric concern did not emerge as a significant predictor of these attitudes (Hypothesis 2). Reported PEB was found to negatively predict pro-reproductive attitudes (Hypothesis 3).

Table 2. Results for Linear Regression Analyses

		OUTCOME: PRO-REPRODUCTIVE ATTITUDES		
MODEL		β	*t*	*p*
1	Age	.02	0.33	.744
	Sex	−.05	−0.71	.481
	Religious status	.26	3.38	.001
	NEP	−.26	−3.60	<.001
	F		7.66	<.001
	R^2		.16	
2	Age	.01	0.16	.871
	Sex	−.11	−1.53	.127
	Religious status	.30	3.99	<.001
	Egoistic values	.26	3.67	<.001
	F		7.80	<.001
	R^2		.16	
3	Age	−.02	−0.27	.790
	Sex	−.16	−2.16	.032
	Religious status	.30	4.08	<.001
	Altruistic values	.29	3.87	<.001
	F		8.23	<.001
	R^2		.17	
4	Age	.01	0.11	.911
	Sex	−.06	−0.84	.405
	Religious status	.29	3.79	<.001
	Biospheric values	−.14	−1.87	.064
	F		5.66	.001
	R^2		.11	
5	Age	.04	0.47	.637
	Sex	−.05	−0.69	.489
	Religious status	.28	3.62	<.001
	PEB	−.22	−3.02	.003
	F		6.62	<.001
	R^2		.14	

Note. Sex coded as 1 = female and 0 = male. Religious status coded as 1 = affiliated with mainstream religion (e.g., Christianity, Islam, Taoism) and 0 = unaffiliated (e.g., atheist, agnostic, spiritual). β, *F*, and R^2 values for regression models included both covariates and predictors.

Discussion

Many environmental researchers and academics in related disciplines of study agree that human overpopulation poses a serious risk to the viability and longevity of the environment (Campbell, 2012; Dunlap et al., 2000; Engelman, 2012; Kazdin, 2009; Kopnina & Washington, 2016; O'Neill et al., 2010; Peacock, 2018). One way that

individuals may significantly reduce their carbon footprint is by limiting the number of offspring that they produce, or by deciding to remain child-free (Murtaugh & Schlax, 2009; Wynes & Nicholas, 2017). Few researchers have examined the potential links between environmental concern and PEB in relation to fertility attitudes, intentions, and behavior (Arnocky et al., 2012; Haq, Vanwing, & Hens, 2010). In the current study, in support of Hypothesis 1, we replicated the finding by Arnocky et al. (2012) that environmental concern (measured through the NEP; Dunlap et al., 2000) negatively predicted pro-reproductive attitudes above the influence of age, sex, and religious status. Therefore, Canadian undergraduates expressing concern that the Earth's finite resources can be threatened by anthropogenic pressures (e.g., human overpopulation) may not view procreating as a personal goal, duty, or accomplishment and something that is necessarily important to their families. However, environmental concerns vary in terms of the value-orientations that they are associated with. Different environmental values have been described that place a differential amount of emphasis on the self (egoistic), others (altruistic), and nonhuman animal life (biospheric; Schultz, 2001).

In partial support of Hypothesis 2, egoistic and altruistic environmental concerns positively predicted pro-reproductive attitudes above the influence of age, sex, and religious status. However, biospheric concern was not a significant predictor of reproductive attitudes. Nonetheless, biospheric concern correlated negatively with pro-reproductive attitudes. This finding shows that Canadian undergraduates with positive attitudes toward reproducing are principally concerned about the consequences of environmental dissolution because of the impact that it may have for themselves (egoistic), their children (real or hypothetical), family, and community (altruistic), but not because of the negative influence it will have on flora and fauna (biospheric).

Homburg and Stolberg (2006) found that being concerned about pollution because of the negative health consequences it would have for oneself was associated with increased engagement in PEB. However, few researchers have examined the associations between PEB and fertility attitudes, intentions, and behavior. In support of Hypothesis 3, a higher reported frequency of PEB negatively predicted pro-reproductive attitudes above the influence of age, sex, and religious status. Hence, those who behave in a more environmentally conscious manner appear to have less positive attitudes toward reproducing.

Limitations

Several limitations of the current study are worth noting. First, a convenience sample of Canadian undergraduates was used. Furthermore, the data reported were cross-sectional, which precluded an examination of causal relations. It would be advantageous to conduct longitudinal work to test whether different kinds of environmental concerns and behavior can predict reproductive attitudes across time. Additionally, we focused on reproductive attitudes and did not assess fertility intentions and behavior. Although there is a close positive relation between reproductive attitudes and intentions (Arnocky et al., 2012), it would be beneficial to examine environmental concern and PEB in relation to patterns of contraceptive use, ideal number of children, family size preferences, and pregnancy rates in future work. Political orientation has also been shown to be an important predictor of environmental attitudes (Dunlap, 1975), such as those revolving around the social-ecological dilemma of climate change (Ziegler, 2017), in addition to reproductive attitudes (Sigillo, Miller, & Weiser, 2012). Thus, it is likely that political affiliation is a key demographic variable that should be included in future work on environmental orientation and reproductive attitudes.

Conclusion

In the current study, we add to a limited empirical literature on environmental concerns, PEB, and reproductive attitudes. Environmental concern embodying a pro-ecological worldview (i.e., the NEP) was found to negatively predict, while more self-oriented (egoistic) and human-centric (altruistic) environmental concerns positively predicted, pro-reproductive attitudes among a sample of Canadian undergraduates. In addition, a higher frequency of self-reported engagement in PEB negatively predicted favorable attitudes toward reproducing. As environmentalists, researchers, and policymakers search for ways to curb the negative environmental impacts associated with human overpopulation, it is beneficial to unravel the reasons why some people choose to limit the number of offspring that they produce or to remain child-free. This is particularly important in more "developed" cultural contexts, wherein greater access to education, higher gender-parity, and wider availability of contraceptives provides individuals with more power to make these decisions. This demographic is also important because many developed economies are among the greatest contributors to total and per-capita environmental degradation (Bradshaw et al., 2010; McMichael et al., 2007). The results of the current study suggest that valuing the environment to ensure the survival of all biological life and engaging in ecologically conscious behavior are associated with more anti-reproductive attitudes. Therefore, encouraging the expression of biospheric values and engagement in PEB may help mitigate the environmental issues associated with human overpopulation.

Author Disclosure Statement

All authors declare that there were no conflicts of interest concerning the present research.

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