Motivation and Emotion (2026) 50:174–192
https://doi.org/10.1007/s11031-025-10152-y

ORIGINAL PAPER

# Fundamental freedoms and optimal functioning: Nussbaum's capabilities predict wellness in a dual process model via basic psychological need satisfaction and frustration

Emma L. Bradshaw[1] · Kelly A. Ferber[1] · Cody R. DeHaan[2] · Richard M. Ryan[1,2,3]

Accepted: 29 June 2025 / Published online: 23 July 2025


## Abstract

Across three studies we explore the interface between self-determination theory (SDT) and Nussbaum's philosophy of capabilities by exploring how societal capabilities relate to wellness via basic psychological needs. In Study 1 (N = 778, from Australia, India, Philippines, South Africa, and the United States) and Study 2 (N = 495 Americans), we examined Lorgelly et al.'s (Social Science & Medicine 142:68–81, 2015) measure of capabilities, identifying a four-factor solution yielding variables for freedom of expression, freedom from discrimination, well-being, and home safety. We assessed links between freedom of expression and freedom from discrimination and wellness outcomes via basic psychological needs in Study 1, Study 2, and Study 3 (N = 203, Indigenous Australians, 500 non-indigenous Australians). Aligned with SDT's dual process model, need satisfaction appears to account for the paths to well-being, and need frustration may account for paths to ill-being. This work steers SDT in a new direction by extending the dual process model beyond interpersonal contexts and more fully integrating philosophical perspectives on capabilities to shed light upon how macro-level societal affordances relate to wellness through basic psychological needs.

**Keywords** Primary goods · Economic conditions · Well-being · Positive psychology · Pervasive environments

The political and economic conditions within which individuals live are a pervasive influence on their lives, affecting motivations, aspirations, self-evaluations, values, and subjective wellness (Ryan & DeHaan, 2023). The economic supports and social safety nets provided within these pervasive environments (or lack thereof) have direct and objective impacts on people's welfare—they affect health care, access to education and work, familial supports, and other factors bearing on stress and wellness (Oishi et al., 2012; Radcliff, 2013). Several widely discussed theories in economics and philosophy argue that, to best support individual wellness, societies should provide the freedoms and resources necessary for people to pursue meaningful, valued activities (Nussbaum, 2000; Rawls, 1971/2009; Sen, 2009). Rawls' (1971/2009) theory of justice centers on the fair distribution of so-called primary goods—basic rights, liberties, and resources—to support people in pursuing the lives they want. Sen (2009) and Nussbaum (2000) introduced the *capabilities* approach. Sen's (2009) economic philosophy of capabilities critiques the work of Rawls (1971/2009), arguing that simply possessing resources does not guarantee that individuals can use them effectively due to personal and social economic factors. Similarly, Nussbaum's (2000) capabilities framework emphasizes that justice relates not just to the distribution of resources but also people's real abilities to use them. From this perspective, economic infrastructure is valuable insofar as it expands the substantive freedoms—capabilities—that enable people to live the lives they have reason to value.

*Self-determination theory* (SDT; Ryan & Deci, 2017) offers a complementary psychological lens, positing that human thriving hinges on the satisfaction (versus frustration) of three basic psychological needs: autonomy, competence, and relatedness. SDT has primarily focused on

✉ Emma L. Bradshaw
emma.bradshaw@acu.edu.au

[1] Institute for Positive Psychology and Education, Australian Catholic University, North Sydney, Australia

[2] Immersyve Inc, Celebration, FL, USA

[3] Ewha Womans University, Seoul, South Korea

how interpersonal-contextual features support or thwart these needs, but only recently have researchers begun to ask how societal-level affordances matter (e.g., Bradshaw et al., 2021; DeHaan et al., 2016). By empirically integrating SDT with philosophy concerning people's capabilities, the present studies extend SDT's dual process model to macro-structural freedoms. In doing so, we direct SDT's application toward the broader social fabric and test how these societal freedoms cascade through need satisfaction and frustration to shape well-being and ill-being across diverse populations. In this way, we recast societal freedoms as distal need supports, extending SDT's explanatory reach to the structural forces that permeate everyday life.

## The capabilities approach

Broadly speaking, the capabilities approach represents an attempt within the fields of economics and philosophy to evaluate justice in a society and its promotion of human wellness by considering the social and physical conditions that afford the exercise of basic human abilities. Sen (1999), a major proponent of the capabilities approach, argued that societies ought to provide individuals with economic opportunities to exercise their human capacities, allowing them the chance to pursue that which is worth valuing, and thereby be more likely to live a full life and flourish. Sen (1999) argued that wellness requires persons to have capabilities, or the freedoms to achieve valuable functionings (Sen, 1985). Capabilities thus open up what people "are free to do" and functionings are "what they do" (Anand et al., 2009). From the capabilities perspective, societies must not focus on material wealth or even specific ends, but rather on equipping persons to pursue a variety of activities and goals that they deem worthwhile.

Nussbaum (2011) defined capabilities as the combination of "personal abilities and the political, social, and economic environment" (p. 20) that provide the basis for living a good life, striving to identify those characteristics of human activity that are "so central that they seem definitive of a life that is truly human" (Nussbaum, 1999, p. 40). Based on consideration of these central characteristics of a good life, Nussbaum (1999) specified 10 capabilities that are foundations for well-being: (1) a normal life expectancy; (2) bodily health; (3) bodily integrity, including freedom of movement and freedom from assault; (4) being able to use senses, imagination, and thought; (5) ability and freedom of emotions and attachments; (6) practical reasoning; (7) affiliation with others and respect for relationships; (8) appreciation and access to other species and nature; (9) play; (10) control over one's life, both political and physical. To the extent that a person has access to these capabilities, they have capacity for wellness and full functioning. For Nussbaum (2006), this list is a minimum, and both a person and a society cannot achieve flourishing unless these capabilities are present for all.

## Self-determination theory

SDT (Ryan & Deci, 2017) is a comprehensive theory of human motivation and wellness. The theory posits that human beings are inherently oriented toward growth and integration, provided a conducive environment for those propensities is available. SDT suggests that environments that support human growth and wellness are those that support three basic psychological needs; autonomy (volition and choice), competence (capability and efficacy), and relatedness (closeness with others). In SDT, these basic psychological needs are not preferences, but rather essential psychological requirements. Whether or not a person values these needs, when they are not supported or experienced, individuals' full functioning and wellness is compromised (Ryan & Deci, 2017). To the extent that the three basic psychological needs are satisfied, people flourish, and to the extent that they are unsatisfied or actively frustrated, individuals suffer.

Supporting the claim that basic psychological needs undergird wellness, Diener et al. (2010) showed that psychological need satisfaction was among the strongest predictors of positive affect in 132 countries in a 2005–2006 survey. Milyavskaya et al. (2013) demonstrated the importance of general, domain-specific, and episodic need satisfaction on well-being, highlighting the critical role of need satisfaction at all three levels of generality for individuals' well-being. In addition, the necessity of the three needs for wellness has been shown to be independent of many factors, including age, gender, culture, and other socioeconomic factors. For example, Chen et al. (2015) tested both basic psychological need satisfaction and frustration in Belgium, China, the United States, and Peru, finding that need satisfaction predicted well-being and need frustration predicted ill-being, with results not moderated by country or individual differences in valuing of, or desires for, these needs (Ryan et al., 2022; Slemp et al., 2024).

## Integrating the capabilities approach and self-determination theory

SDT provides a theoretical account of the psychological processes that may connect capabilities with well-being. Specifically, SDT's dual process model of basic psychological needs holds that events such as perceived access

to capabilities link to positive outcomes (e.g., well-being) insofar as they support basic psychological need satisfaction (more so than protect against need frustration). Meanwhile, negative events such as restricted capabilities access would link to negative outcomes via basic psychological need frustration (more so than basic psychological need satisfaction) (e.g., see Bradshaw et al., 2024). There is prior evidence to support some of these claims. Evidence from the United States found that socioeconomic status and income inequality affected people's well-being through basic psychological need satisfaction (Di Domenico & Fournier, 2014). Similarly, in a sample from the United Kingdom, financial insecurity was shown to undermine basic psychological need satisfaction and therefore well-being (Weinstein & Stone, 2018).

More directly, SDT researchers have shown that capabilities were positively linked to well-being, partially accounted for basic psychological need satisfaction, across samples from the U.S and India (DeHaan et al., 2016). Notably, however, all these studies focused on the pathway to wellness through need satisfaction. As DeHaan et al. (2016) highlighted, the evidence base would be progressed via a more holistic approach to measuring wellness that includes measures of ill-being. By examining how restricted access to capabilities relates to depression and anxiety via basic psychological need frustration, we can better understand the important role of need frustration in how societal affordances—or the lack thereof—relate to suffering as well as well-being.

### Measurement of perceived capabilities

People's capabilities are often measured using objective metrics such as personal or household income or GDP (e.g., Marmot, 2004; Scholten et al., 2017). However, it is important to note that broad economic conditions may not infer equal provision of capabilities to all societal members, and even where equally provided, members may not *perceive* capabilities as equally accessible. To explore the role of *perceived* capabilities, Anand et al. (2009) developed a measure of Nussbaum's (2000) ten capabilities. The capability indicators derived by Anand et al. (2009)—using a panel of 1,048 respondents from the United Kingdom—together predicted substantial variance in subjective well-being. This pattern was later replicated by DeHaan et al. (2016), using a wider set of well-being outcome measures.

Anand et al.'s (2009) measure comprises 66 items with varied response styles, making for a complex and lengthy survey. To try and make the assessment more targeted and efficient, Lorgelly et al. (2015) used a multi-step approach to reduce and refine Anand et al.'s (2009) capabilities questionnaire. Using focus groups, interviews, and factor analytic methods Lorgelly et al. (2015) reduced the measure to 18 items through which individuals report on various capabilities. In our study, we used Lorgelly et al.'s (2015) 18-item capability index (OCAP-18) to index capabilities.

#### Refining the measurement of capabilities

Some of Nussbaum's (2000) specific capabilities—and the corresponding items on the Lorgelly et al. (2015) measure—refer to and measure the well-being and depression outcomes that capabilities are expected to predict (e.g., "At present how easy or difficult do you find it to enjoy the love, care, and support of your family and friends?" and "In the past 4 weeks, how often have you lost sleep over worry?"). From a predictive utility standpoint, if capabilities are the foundation of human well-being, including well-being and depression items in the measure is likely to confound the prediction of outcomes, since they overlap with the variables they are expected to predict. Additionally, the current categorization of capabilities has been more philosophically than empirically derived. Advancing the literature linking capabilities to wellness via basic psychological needs requires clarity on what latent constructs the Lorgelly et al. (2015) measure captures. Perhaps there are particular 'ingredients' within the measure of perceived capabilities that relate uniquely with basic psychological needs and wellness outcomes. Therefore, before tackling our substantive aim to analyze the links between capabilities and wellness outcomes via needs, we conducted a structural analysis of the Lorgelly et al. (2015) measure, striving to discern the specific factors the items measure and enhance the statistical robustness and predictive value of the capabilities measure in relation to SDT variables.

## The current research

The first aim of the present research was to better understand Lorgelly et al.'s (2015) measure of capabilities through a structural analysis. Through these analyses we strived to identify specific capabilities that may serve as the 'active ingredients' in the link between people's capabilities and their wellness through psychological needs. Our second aim was to expand the work of DeHaan et al. (2016) by examining capabilities from the perspective of SDT's dual process model (Bradshaw et al., 2024; Donald et al., 2022; Haerens et al., 2015; Jang et al., 2016). Our third aim was to test the model linking capabilities to wellness across different groups. We sought to meet these aims across three studies using a range of analytical approaches.

In Study 1, we used parallel analysis and exploratory factor analysis (EFA) to analyze the structure of the OCAP-18

(Lorgelly et al., 2015), aiming to uncover its latent structure and optimize its statistical fit and predictive utility. In Study 2, we replicated the structural analysis to evaluate the robustness and reliability of the capabilities factors identified in Study 1. We then used the capabilities variables (derived in Study 1 and replicated in Study 2) to explore the links between capabilities and well-being via basic psychological needs—using structural equation modeling (SEM)—in all three studies. In Study 3, we tested the model in samples of Indigenous and non-Indigenous Australians to test its equivalence across groups. This progression from structural to substantive analysis not only clarifies the measurement of capabilities but also deepens our understanding of how communities, societies, and countries can support the well-being of their constituents by targeting specific capabilities to enhance need satisfaction and therefore happiness. We made the following predictions:

**Hypothesis 1** *Following Nussbaum's predictions and evidence reported by DeHaan et al. (2016), we expected that perceived access to capabilities would relate positively with well-being and relate negatively with ill-being indices.*

**Hypothesis 2** *Consistent with the dual process model of basic psychological needs, we expected that basic psychological need satisfaction would account for the relations between capabilities and well-being, and basic psychological need frustration will account for the relation between (low) capabilities and ill-being.*

**Table 1** Country-specific demographics of the sample

| | Australia | India | Philippines | South Africa | United States |
|---|---|---|---|---|---|
| n | 146 | 153 | 147 | 160 | 146 |
| Gender | | | | | |
| Female | 0.51 | 0.47 | 0.59 | 0.49 | 0.60 |
| Male | 0.47 | 0.52 | 0.39 | 0.51 | 0.38 |
| Transgender | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| Not listed | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| Prefer not to answer | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| Age (mean) | 50.92 | 31.29 | 31.44 | 34.18 | 43.27 |
| Age (SD) | 16.61 | 8.49 | 8.59 | 11.91 | 11.78 |
| Race/ethnicity | | | | | |
| African | 1 | 0 | 0 | 49 | 10 |
| Caribbean | 0 | 0 | 0 | 1 | 1 |
| Caucasian | 127 | 0 | 0 | 85 | 115 |
| East Asian | 3 | 31 | 37 | 0 | 0 |
| Latino/Hispanic | 1 | 1 | 0 | 1 | 10 |
| Middle Eastern | 1 | 0 | 0 | 1 | 0 |
| South Asian | 5 | 105 | 82 | 4 | 2 |
| Mixed | 3 | 3 | 7 | 5 | 4 |
| Not listed | 5 | 13 | 21 | 14 | 4 |
| Education (mean years) | 13.34 | 15.12 | 13.93 | 13.90 | 14.03 |
| Education (SD) | 3.11 | 3.12 | 2.73 | 2.98 | 2.74 |

## Ethics and transparency

Study 1 obtained ethical clearance from the University of Rochester Research Subjects Review Board (RSRB00065940) and Studies 2 and 3 received ethical approval from the Australian Catholic University Human Research Ethics Committee (2020–245E and 2022-2762HI) prior to data collection. All participants gave informed consent prior to completing the study materials. Study 1 was funded by the Department of Clinical and Social Sciences in Psychology at the University of Rochester. Studies 2 and 3 were funded by Australian Catholic University Research Funds granted to the senior author. The authors have no relevant financial or non-financial competing interests to report.

# Study 1

## Method

### Participants

Seven-hundred and seventy-eight English-speaking adult participants were recruited from five countries (Australia, India, Philippines, South Africa, and the United States) through the survey panel company SSI. Our aim in collecting a diverse sample was not to claim that the groups would be representative of their countries. Rather, since our claim is one of generalizability we sought a "non-WEIRD" sample, such that our results may be considered relevant to varied groups and individuals. Of the original 778 participants, some were excluded from the analysis based on two criteria. First, if a participant was missing more than 10% of responses on key study variables, they were excluded. One participant was excluded based on this criterion. Second, if participants had no standard deviation on half or more of the main study scales—that is, if they were 'straight-liners', selecting the same response for each item in a scale—they were excluded. Twenty-six of the participants were removed from the analysis for this criterion, leaving a total of 752 in the final sample. The demographics of the final sample are reported below in Table 1.

### Materials

**Capabilities** Nussbaum's (2000) capabilities were measured using the OCAP-18 (Lorgelly et al., 2015), which measures Nussbaum's (2000) ten capabilities via 18 items.

Participants responded to items such as "Does your health in any way limit your daily activities, compared to most people of your age?" and "I am free to decide for myself how to live my life." Items used several response formats, and each response was scored either 0 (does not have the capability) or 1 (has the capability), we then used these items in the structural analyses of capabilities (as described below) and the structural equation model.

**Basic psychological needs** Basic psychological need satisfaction and frustration were measured using the 24-item Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015). Items assessed autonomy satisfaction (e.g., "I feel a sense of choice and freedom in the things I undertake"), autonomy frustration (e.g., "I feel forced to do many things I wouldn't choose to do"), relatedness satisfaction (e.g., "I feel connected with people who care for me, and for whom I care"), relatedness frustration (e.g., "I feel that people who are important to me are cold and distant towards me"), competence satisfaction (e.g., "I feel capable at what I do"), and competence frustration (e.g., "I feel insecure about my abilities"), each responded to on a five-point scale (1 = completely untrue to 5 = completely true). Cronbach's α of 0.91 for need satisfaction and 0.90 for need frustration indicated good internal consistency.

**Well-being** We assessed well-being using two well-validated scales:

**Life satisfaction** The Satisfaction with Life Scale (Diener et al., 1985) consists of five items assessing an individual's life satisfaction. Participants responded to items such as "In most ways my life is close to my ideal" and "I am satisfied with my life" on a seven-point scale (1 = strongly disagree to 7 = strongly agree). These items demonstrated good internal consistency (Cronbach's α = 0.89).

**Vitality** The Subjective Vitality Scale (Ryan & Frederick, 1997) uses seven items to assess vitality in daily life. Participants responded to items such as "I feel alive and vital" and "I have energy and spirit" on a seven-point scale (1 = not at all true to 7 = very true). The vitality items demonstrated good internal consistency (Cronbach's α = 0.92).

**Ill-being** We indexed ill-being also using two reliable and valid scales:

**Depression** Depressive symptoms were measured using a 10-item short-form (Bjorgvinsson et al., 2013) of the full Center for Epidemiological Studies-Depression scale (Radloff, 1977). Participants responded how frequently they had experienced varied depressive symptoms (e.g., "I was bothered by things that usually don't bother me") on a four-point scale (1 = rarely or none of the time to 4 = most of or all the time). These items demonstrated good internal consistency (Cronbach's α = 0.88).

**Anxiety** Anxiety was measured using a six-item short form (Marteau & Bekker, 1992) of the Spielberger State-Trait Anxiety Inventory (Spielberger et al., 1983). Participants responded to statements about themselves in general (e.g., "I feel tense" and "I am worried") on a four-point scale (1 = not at all to 4 = very much). The anxiety items demonstrated good internal consistency (Cronbach's α = 0.86).

## Results

### Structural analysis of capabilities

We provide a detailed summary of the preliminary structural analyses performed on the OCAP-18 (Lorgelly et al., 2015), including parallel analysis and confirmatory factor analyses. Given these steps were not central to the substantive aims of the present study, we have reported these analyses in Online Supplementary Materials S1 and S2. Our aim was not to re-evaluate the OCAP-18 (Lorgelly et al., 2015) or its underpinnings, rather we strove to uncover the underlying factor structure with the most utility in relation to continuous well-being and ill-being outcomes. All analyses were conducted in R version 4.0.2 (R Core Team, 2020).

### Exploratory factor analyses

We used maximum likelihood estimation factor analyses with oblique oblimin rotation as we expected correlated factors. We retained items with a factor loading above 0.30 as recommended by Tabachnick and Fidell (2007). The item factor loadings for each of the latent variables is shown below in Table 2. In the two-factor solution, four items

**Table 2** Item factor loadings for each of the latent variables in a two-, three-, and four-factor exploratory factor analysis of the OCAP-18

| Items | 2-Factors | | 3-Factors | | | 4-Factors | | | |
|---|---|---|---|---|---|---|---|---|---|
| | LV1 | LV2 | LV1 | LV2 | LV3 | LV1 | LV2 | LV3 | LV4 |
| ocap6rc | | | | | | | | 0.30 | |
| ocap1rc | | | | 0.44 | | | | 0.47 | |
| ocap15rc | 0.39 | | | 0.37 | | | | 0.30 | |
| ocap16rc | | | | | | | | | 0.72 |
| ocap17rc | | 0.55 | | | 0.52 | | 0.46 | | |
| ocap8rc | 0.55 | | 0.52 | | | 0.51 | | | |
| ocap12rc | 0.58 | | 0.68 | | | 0.68 | | | |
| ocap3rc | 0.57 | | | 0.61 | | | | 0.64 | |
| ocap4rc | 0.30 | | | 0.57 | | | | 0.52 | |
| ocap11rc | 0.60 | | 0.58 | | | 0.58 | | | |
| ocap2rc | 0.33 | | | 0.36 | | | | 0.41 | |
| ocap10rc | 0.56 | | 0.60 | | | 0.59 | | | |
| ocap9rc | 0.56 | | 0.59 | | | 0.59 | | | |
| ocap5rc | 0.57 | | | 0.61 | | | | 0.58 | |
| ocap7rc | 0.41 | | 0.32 | | | 0.31 | | | |
| ocap1314rc | | | | | | | | | |
| ocap18rc | | 0.78 | | | 0.77 | | 0.80 | | |
| ocap19rc | | 0.85 | | | 0.88 | | 0.85 | | |

See Online Supplementary Materials S3 for detailed item content

*LV* latent variable

failed to load meaningfully on either latent variable. These items included: ocap6 ("Until what age do you expect to live, given your family history, dietary habits, lifestyle, and health status?") which represents the entire "Life" subscale from the OCAP-18, ocap1 ("Does your health in any way limit your daily activities, compared to most people of your age?") which is from the "bodily health" subscale of the OCAP-18; ocap16 ("Please indicate how safe you feel walking alone in the area near your home") which is from the "bodily integrity" subscale and ocap1314 which is the capacity to own a home element of the "control over one's life" subscale (see Online Supplementary Materials S3 for the full list of item contents). Similarly, in the three-factor solution, ocap6, ocap16, and ocap1314, again, did not load on a latent variable. In the four-item solution, only ocap1314 failed to load on a latent variable. Given the breadth and item inclusivity of the four-factor solution, coupled with acceptable model fit ($\chi^2(87)=228.90$, $p<0.001$, TLI = 0.90, RMSEA = 0.03), we proceeded with latent variables from the four-factor solution. However, we reported correlations between the variables and item ocap1314 because we were not seeking to reduce or modify the scale in general, rather to operationalize the items differently in service of predictive utility. Evidently, item ocap1314 (which regards the ability to own a home) did not 'hang' together with the other capabilities from a statistical point of view, though its relation to other variables was still of interest from a philosophical and theoretical standpoint.

The factor loadings in the four-factor solution collapsed capabilities into four simple and theoretically coherent latent variables. Using a factor loading threshold of 0.40, the first latent variable included the items from the "senses, imagination, and thought" subscale (e.g., "I am free to express my views, including political and religious views" and "I am free to use my imagination and to express myself creatively (e.g., through art, literature, music, etc.)"), and the items from the "practical reason" subscale (e.g., "I am free to decide for myself how to live my life") and the "species" subscale (e.g., "I am able to appreciate and value plants, animals, and the world of nature"). The first latent variable also included one item from the "affiliation" subscale (e.g., "I respect, value, and appreciate people around me") and one from the "control over one's life" subscale (e.g., "I am able to influence decisions, affecting my local area"). Taken together, these items index feeling able to participate in society freely and openly, as such, we termed the first latent variable *freedom of expression*.

Items loading on the second latent variable included one from the "bodily integrity" scale ("Please indicate how likely you believe it to be that you will be assaulted in the future (including sexual and domestic assault)"), one from the "control over one's life" subscale ("In your current of any future employment, how likely do you think it is that you will experience discrimination?", and one item from the "affiliation" subscale ("Outside of any employment, in your everyday life, how likely do you think it is that you will experience discrimination?"). These items are scored such that high scores indicate low perceived risk, therefore, despite coming from different conceptual subscales, these three items clearly measure feeling physically and emotionally at

risk of discrimination and violence, so we called the second latent variable *freedom from discrimination*.

The third latent variable comprised the "life" subscale ("Until what age do you expect to live, given your family history, dietary habits, lifestyle, and health status?"), all the items from the "bodily health" subscale ("Does your health in any way limit your daily activities, compared to most people of your age?" and "How suitable or unsuitable is your accommodation for your current needs?"), all the items from the "emotions" subscale ("At present how easy or difficult do you find it to enjoy the love, care, and support of your family and friends?" and "In the past 4 weeks, how often have you lost sleep over worry?"), the item measuring the "play" subscale ("In the past 4 weeks, how often have you been able to enjoy your recreational activities?"), and one item from the "affiliation" subscale ("Are you able to meet socially with friends, relatives, or work colleagues?"). Evidently, the third latent variable comprised items measuring one's capacity to maintain their physical, emotional, and social well-being, thus we termed the third latent variable *general well-being*.

Finally, the fourth latent variable included a single item from the "bodily integrity" subscale ("Please indicate how safe you feel walking alone in the area near your home"). Which suggests that feeling safe at and around one's home is a distinct capability. We referred to the fourth latent variable as *home safety*.

## Inter-correlations

Having established a statistically sound structure of capabilities, we assessed the degree to which the four capabilities variables correlated with each other, with basic psychological needs, and with our dependent variables using the corx package (Conigrave, 2020), the results are shown in Table 3. (Correlations between Nussbaum's 10 capabilities variables are presented in Online Supplementary Materials S4 and correlations for each country sample are presented in Online Supplementary Materials S5). For capabilities, we included the four factors derived using EFA, as well as the single item that measures one's capability of owning a home (home ownership in Table 3). As expected, all four capabilities positively correlated, except for freedom from discrimination and home ownership, which were uncorrelated. The magnitude of the associations between the capabilities was small to moderate indicating the capabilities are related but not redundant with one another.

Importantly, the four capabilities derived using EFA correlated positively with basic psychological need satisfaction, and negatively with basic psychological need frustration. Home ownership was weakly positively correlated with basic psychological need satisfaction and not associated

**Table 3** Inter-correlations between the capabilities variables (derived using exploratory factor analysis), basic psychological needs, and the well-being and ill-being outcomes in study 1

| | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Freedom of expression | 0.80 | 0.13 | – | | | | | | | | | |
| 2. Freedom from discrimination | 0.54 | 0.24 | 0.13*** | – | | | | | | | | |
| 3. General well-being | 0.72 | 0.17 | 0.35*** | 0.21*** | – | | | | | | | |
| 4. Home safety | 0.75 | 0.25 | 0.25*** | 0.28*** | 0.24*** | – | | | | | | |
| 5. Home ownership | 0.61 | 0.49 | 0.09** | 0.02 | 0.18*** | 0.12** | – | | | | | |
| 6. BPNS | 4.05 | 0.68 | 0.56*** | 0.20*** | 0.47*** | 0.19*** | 0.16*** | – | | | | |
| 7. BPNF | 2.53 | 0.87 | −0.26*** | −0.33*** | −0.44*** | −0.14*** | −0.07 | −0.48*** | – | | | |
| 8. Life satisfaction | 4.35 | 1.46 | 0.36*** | 0.16*** | 0.46*** | 0.27*** | 0.26*** | 0.62*** | −0.35*** | – | | |
| 9. Vitality | 4.60 | 1.43 | 0.41*** | 0.17*** | 0.46*** | 0.22*** | 0.21*** | 0.64*** | −0.34*** | 0.67*** | – | |
| 10. Depression | 2.07 | 0.67 | −0.29*** | −0.32*** | −0.58*** | −0.26*** | −0.16*** | −0.53*** | 0.65*** | −0.55*** | −0.62*** | – |
| 11. Anxiety | 2.14 | 0.72 | −0.35*** | −0.26*** | −0.52*** | −0.28*** | −0.21*** | −0.57*** | 0.52*** | −0.62*** | −0.68*** | 0.81*** |

*BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

**$p<0.01$, ***$p<0.001$

with need frustration. Consistent with our expectation that perceived capabilities relate to individual well-being, each of the capabilities variables correlated positively with life satisfaction and vitality, and negatively with depression and anxiety.

### Structural equation model

Having established a sound structure of capabilities, we pursued our primary aim of assessing the degree to which basic psychological needs accounted for the associations between perceived capabilities and well-being and ill-being. To assess the paths of interest we used SEM with maximum likelihood estimation in the lavaan package (Rosseel, 2012). Ideally, latent variables in a SEM should be indexed by a minimum of three items (Kenny, 1979). Given that the capability for home ownership was indexed by a single item, and it correlated only minimally with the other capabilities, we did not include home ownership as a predictor in the SEM. Similarly, because the capability for home safety was indicated by just one item, we opted not to include this subscale in the SEM. In addition, because the capability for general well-being was equivalent to our outcome variables (e.g., life satisfaction and depression), we did not include this latent variable in the SEM. Thus, we used freedom of expression and freedom from discrimination as the key predictors in our model in this and in the subsequent studies. This strategy allowed us to use phenomena indexed by the OCAP-18 distinct from well-being, to assess their links with well-being and ill-being via basic psychological needs.

In the model, we specified basic psychological need satisfaction and basic psychological need frustration as higher-order latent variables, each comprising three first-order needs (i.e., autonomy, competence, and relatedness). The model also included the correlated residuals between freedom of expression and freedom from discrimination, as well as between basic psychological need satisfactions and frustrations, and between items with parallel wording (e.g., "I feel that my decisions reflect what I really want" and "I feel my choices express who I really am", which both measure autonomy satisfaction). The model fit the data well, $\chi^2(1431) = 25{,}722.34$, $p < 0.001$, CFI = 0.94, TLI = 0.93, RMSEA = 0.04, SRMR = 0.05, according to the commonly accepted fit criteria of CFI/TLI ≥ 0.90, RMSEA ≤ 0.06 and SRMR ≤ 0.08 (Bentler, 1990; Hu & Bentler, 1999). We used non-parametric bootstrapping (bootstrapping 10,000 times) to estimate confidence intervals for the total, direct, and indirect effects.

Table 4 reflects the bootstrapped results for the total and direct effects of both capabilities (i.e., freedom of expression and freedom from discrimination) on outcomes, as well as the indirect effects via basic psychological need satisfaction and frustration. Figure 1 shows the full SEM. The total effects of both capabilities on the well-being and ill-being variables were consistent with our hypotheses, and their underlying philosophy and theory. The total effects of freedom of expression on well-being (life satisfaction and vitality) were positive, strong, and statistically significant (average effect, $d = 0.46$). Similarly, the total effects of freedom from discrimination on well-being were positive, small, and statistically significant (average effect, $d = 0.13$). In relation to ill-being, the total effects of freedom of expression were negative, moderate in size, and statistically significant (average effect, $d = -0.29$), and the total effects of freedom from discrimination to ill-being were negative, moderate in size, and statistically significant (average effect, $d = -0.28$).

Basic psychological need satisfaction accounted for most of the variation in the links between capabilities and well-being, while basic psychological need frustration accounted for most of the associations with ill-being. The direct effects—paths from predictors to outcomes controlling for basic psychological needs—were all rendered statistically non-significant. In relation to life satisfaction, the links with both capabilities were fully accounted for by the combination of basic psychological need satisfaction and frustration, though considerably more by need satisfaction. For vitality, the positive links with both capabilities were fully accounted for by basic psychological need satisfaction. In relation to ill-being, basic psychological need frustration fully accounted for the associations between anxiety and both capabilities. And, for depression, the link with freedom from discrimination was fully accounted for by need frustration, while need satisfaction and frustration accounted for the link with freedom of expression, though considerably more so via need frustration.

## Brief discussion

In Study 1, a structural analysis of the OCAP-18 (Lorgelly et al., 2015) revealed two key latent variables relevant to an analysis of how perceived capabilities might relate to wellness via basic psychological needs: freedom of expression and freedom from discrimination. The identification of these two variables as key capabilities is consistent with the theoretical foundations of SDT. In SDT, autonomy refers to the feeling of volition and willingness in one's actions, which is essential for well-being (Ryan & Deci, 2017). Freedom of expression, encompassing aspects of self-determination (e.g., "I am free to decide for myself how to live my life" and self-expression (e.g., "I am free to express my views, including political and religious views") clearly reflects means by which pervasive environments might support individuals' sense of autonomy. However, this variable is

**Table 4** Total and direct effects from a structural equation model of freedom of expression and freedom from discrimination linked with well-being and ill-being outcomes, with indirect effects via basic psychological need satisfaction and frustration and 95% confidence intervals bootstrapped 10,000 times in study 1

| Cap | Outcome | Total | | via BPNS | | via BPNF | | Direct | |
|---|---|---|---|---|---|---|---|---|---|
| | | Est. [SE] | 95% CI | Est. [SE] | 95% CI | Est. [SE] | 95% CI | Est. [SE] | 95% CI |
| FEXP | Life Sat | 0.44 [0.05] | [0.34, 0.52] | 0.32 [0.03] | [0.28, 0.38] | 0.06 [0.02] | [0.02, 0.10] | 0.05 [0.05] | [− 0.05, 0.15] |
| FDISC | Life Sat | 0.16 [0.05] | [0.06, 0.25] | 0.07 [0.02] | [0.03, 0.11] | 0.06 [0.02] | [0.03, 0.10] | 0.03 [0.04] | [− 0.05, 0.11] |
| FEXP | Vitality | 0.47 [0.04] | [0.38, 0.55] | 0.49 [0.06] | [0.39, 0.61] | − 0.01 [0.02] | [− 0.02, 0.04] | − 0.03 [0.06] | [− 0.15, 0.09] |
| FDISC | Vitality | 0.10 [0.05] | [0.01, 0.19] | 0.10 [0.03] | [0.04, 0.16] | − 0.01 [0.02] | [− 0.03, 0.04] | − 0.01 [0.04] | [0.08, 0.07] |
| FEXP | Depression | − 0.29 [0.04] | [− 0.97, − 0.20] | − 0.11 [0.05] | [− 0.21, − 0.01] | − 0.22 [0.04] | [− 0.30, − 0.15] | 0.04 [0.06] | [− 0.08, 0.16] |
| FDISC | Depression | − 0.30 [0.05] | [− 0.39, − 0.22] | − 0.02 [0.01] | [− 0.05, 0.00] | − 0.24 [0.04] | [− 0.32, − 0.17] | − 0.04 [0.04] | [− 0.12, 0.04] |
| FEXP | Anxiety | − 0.29 [0.05] | [− 0.37, − 0.20] | − 0.08 [0.05] | [− 0.18, 0.02] | − 0.20 [0.04] | [− 0.28, − 0.14] | − 0.00 [0.06] | [− 0.13, 0.12] |
| FDISC | Anxiety | − 0.25 [0.05] | [− 0.34, − 0.16] | − 0.02 [0.01] | [− 0.04, 0.00] | − 0.22 [0.04] | [− 0.30, − 0.15] | − 0.01 [0.05] | [− 0.10, 0.08] |

*Cap* capability, *FEXP* freedom of expression, *FDISC* freedom from discrimination, *Life Sat* life satisfaction, *Est.* estimate, *SE* standard error, *CI* confidence interval, *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need satisfaction. Grey shading indicates statistical significance

considerably holistic, also signifying means of competence support through creative expression (e.g., "I am free to use my imagination and to express myself creatively (e.g., through art, literature, music, etc.") and relatedness support through connection to others and nature (e.g., "I respect, value, and appreciate people around me" and "I am able to appreciate and value plants, animals, and the world of nature"). It is therefore sensible that we found positive and substantial associations between people's perceived access to the capability of freedom of expression and their basic psychological needs satisfaction, which accounted for the associations with life satisfaction and vitality. Need frustration only minimally accounted for the link with life satisfaction and not at all for the link with vitality, consistent with the dual process model.

Freedom from discrimination speaks to the safety and security aspects of an individual's life (e.g., "…in your everyday life, how likely do you think it is that you will experience discrimination?", with high scores indicating lower perceived risk of discrimination). If one's freedom from discrimination is undermined, and people feel at risk of violence or unfair bias, it will clearly frustrate their ability to move and act freely (i.e., their autonomy), trust and form close bonds (i.e., their relatedness), and feel like their skills are useful or appropriate (i.e., their competence). Discrimination or the threat thereof can frustrate basic needs, leading to psychological distress (Chen et al., 2015). Indeed, this is what we found. Freedom from discrimination linked negatively with depression and anxiety, fully accounted for by reductions in basic psychological need frustration. All the direct effects were statistically non-significant, meaning that, to the extent that access to a capability increases need satisfaction and reduces need frustration, so too will they likely lead to gains in well-being and reductions in ill-being in the populace. In Study 2, we sought to replicate the analyses from Study 1 both to test the reliability of the newly derived structure of capabilities and the effects of those capabilities on wellness outcomes.

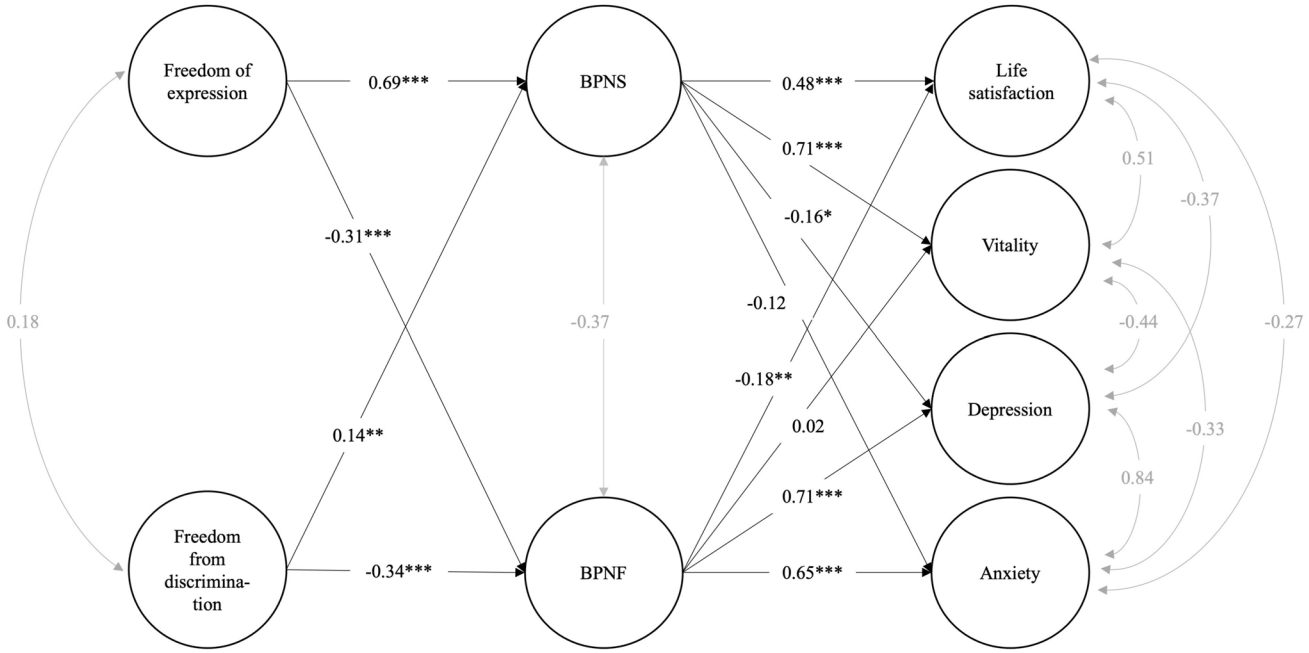


**Fig. 1** Structural equation model of the capabilities for freedom of expression and freedom from discrimination in relation to well-being and ill-being outcomes, with indirect effects via basic psychological need satisfaction and frustration in study 1. *$p$<.05, **$p$<.01 ***$p$<.001. Covariances between predictors, mediators, and outcomes are low-lighted in grey. *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

## Study 2

### Method

#### Participants

We recruited 499 Americans from the general population using Qualtrics, a professional survey company. The online survey used forced choice responses so there were no missing data. However, some participants were excluded based on their response style. Participants who had a standard deviation of zero for four or more scales or subscales (i.e., 'straightliners') were excluded from the analysis, which resulted in four participants being excluded. The final sample comprised 495 individuals (257 females, 236 males, and 2 preferred not to say their gender) ranging in age from 18 to 86 ($M$=43.96, $SD$=18.14). Most of the participants identified as white (74.55%) with the remaining participants identifying as African American (15.76%), American Indian (1.8%), or another ethnicity (7.89%).

#### Materials

**Capabilities** In Study 2 we again used OCAP-18 (Lorgelly et al., 2015), which measures Nussbaum's ten capabilities using 18 items.

**Basic psychological needs** In Study 2 we again used the 24-item Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015). Cronbach's alphas of 0.91 for need satisfaction and need frustration indicated good internal consistency.

**Well-being** In Study 2 we used the Satisfaction with Life Scale (Diener et al., 1985) and a shortened version of the Subjective Vitality Scale (Ryan & Frederick, 1997) that uses three items to assess vitality in daily life. The three vitality items were "I feel alive and vital", "I have a lot of positive energy and initiative", and "I feel a sense of liveliness and spark". These items were responded to on a 1 = strongly disagree to 5 = strongly agree scale. Given the strong positive correlations between life satisfaction and vitality in Study 1 we opted to combine them into a single well-being index.

Cronbach's α for the well-being index was 0.88, indicating it was highly internally consistent.

**Ill-being** We measured ill-being using a six-item short form (Marteau & Bekker, 1992) of the Spielberger State-Trait Anxiety Inventory (Spielberger et al., 1983). The items demonstrated good internal consistency (Cronbach's α = 0.83).

## Results

### Structural analysis of capabilities

The aims of Study 2 were more confirmatory than the exploratory aims of Study 1. However, we repeated the structural analyses from Study 1 in Study 2, to test for the reliability of the freedom of expression and freedom from discrimination variables. We report the results of the Study 2 parallel analysis and the factor loadings from exploratory factor analyses of capabilities in Online Supplementary Materials S6 and S7. To summarize, the results matched those from Study 1. The parallel analysis indicated that the scale comprised four factors, and in the four-factor solution we derived the same latent variables, indexed by the same items.

### Inter-correlations

Correlations between the Study 2 variables were consistent with those reported in Study 1 (see Table 5 below). The two capabilities variables—freedom of expression and freedom from discrimination—were positively correlated with each other, and with basic psychological need satisfaction and well-being. The capabilities were also negatively correlated with basic psychological need frustration and ill-being. The inter-correlations suggest that the constructs functioned reliably across the two studies.

### Structural equation model

In Study 2, we again estimated the SEM with maximum likelihood estimation in the lavaan package (Rosseel, 2012). The model fit the data adequately, $\chi^2(955) = 1956.63$, $p < 0.001$, CFI = 0.91, TLI = 0.91, RMSEA = 0.05, SRMR = 0.07. Table 6 shows the bootstrapped total, direct, and indirect effects of freedom of expression and freedom from discrimination on well-being and ill-being outcomes via basic psychological need satisfaction and frustration. The total effect of freedom of expression on well-being was positive and statistically significant, accounted for largely by basic psychological need satisfaction. Unexpectedly, the direct effect (i.e., controlling for needs) of freedom of expression on well-being was negative (despite having a positive zero-order correlation), which suggests a complex interplay between these variables (that we discuss later). For ill-being, the total effect of freedom from expression was negative, accounted for by a combination of basic psychological need satisfaction and frustration, though primarily the latter. For freedom from discrimination, the total effect on well-being was not statistically significant, but the total effect of freedom from discrimination on ill-being was negative and statistically significant, accounted for primarily by basic psychological need frustration (see Fig. 2).

## Brief discussion

Study 2 lends support to the results from Study 1. Both the parallel analysis and exploratory factor analyses identified the same capabilities, showing that the derived factor structure is robust and reliable. The correlations in Study 2 were also consistent with those in Study 1. However, Study 2 revealed some possible complexities regarding the role of psychological needs in the relations between freedom of expression and psychological wellness. Although freedom of expression was generally linked to higher well-being via greater need satisfaction, the direct effect of freedom of expression—controlling for psychological need experiences—was unexpectedly negative. This suggests that the

**Table 5** Inter-correlations between the capabilities variables (derived using EFA), basic psychological needs, and the well-being and ill-being outcomes in study 2

| | *M* | *SD* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| 1. Freedom of expression | 0.76 | 0.18 | – | | | | |
| 2. Freedom from discrimination | 0.65 | 0.27 | 0.28*** | – | | | |
| 3. BPNS | 3.64 | 0.83 | 0.51*** | 0.27*** | – | | |
| 4. BPNF | 2.63 | 0.95 | −0.17*** | −0.31*** | −0.40*** | – | |
| 5. Well-being | 3.32 | 0.91 | 0.42*** | 0.18*** | 0.79*** | −0.29*** | – |
| 6. Ill-being | 2.54 | 0.96 | −0.35*** | −0.30*** | −0.66*** | 0.70*** | −0.61*** |

*BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

***$p < 0.001$

**Table 6** Total and direct effects from a structural equation model of freedom of expression and freedom from discrimination linked with well-being and ill-being, with indirect effects via basic psychological need satisfaction and frustration and 95% confidence intervals bootstrapped 10,000 times in study 2

| Cap | Outcome | Total | | via BPNS | | via BPNF | | Direct | |
|---|---|---|---|---|---|---|---|---|---|
| | | Est. [SE] | 95% CI | Est. [SE] | 95% CI | Est. [SE] | 95% CI | Est. [SE] | 95% CI |
| FEXP | Well-being | 0.41 [0.06] | [0.30, 0.52] | 0.56 [0.07] | [0.43, 0.70] | − 0.01 [0.00] | [− 0.02, 0.01] | − 0.14 [0.05] | [− 0.24, − 0.05] |
| FDISC | Ill-being | 0.09 [0.06] | [− 0.03, 0.21] | 0.13 [0.06] | [0.01, 0.24] | − 0.01 [0.01] | [− 0.04, 0.01] | − 0.02 [0.04] | [− 0.10, 0.06] |
| FEXP | Well-being | − 0.32 [0.05] | [− 0.41, − 0.22] | − 0.26 [0.05] | [− 0.36, − 0.18] | − 0.09 [0.03] | [− 0.16, − 0.03] | 0.04 [0.04] | [− 0.04, 0.13] |
| FDISC | Ill-being | − 0.23 [0.05] | [− 0.34, − 0.13] | − 0.06 [0.03] | [− 0.11, − 0.01] | − 0.19 [0.04] | [− 0.27, − 0.11] | 0.01 [0.04] | [− 0.06, 0.08] |

*Cap* capability, *FEXP* freedom of expression, *FDISC* freedom from discrimination, *Est.* estimate, *SE* standard error, *CI* confidence interval, *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need satisfaction. Grey shading indicates statistical significance

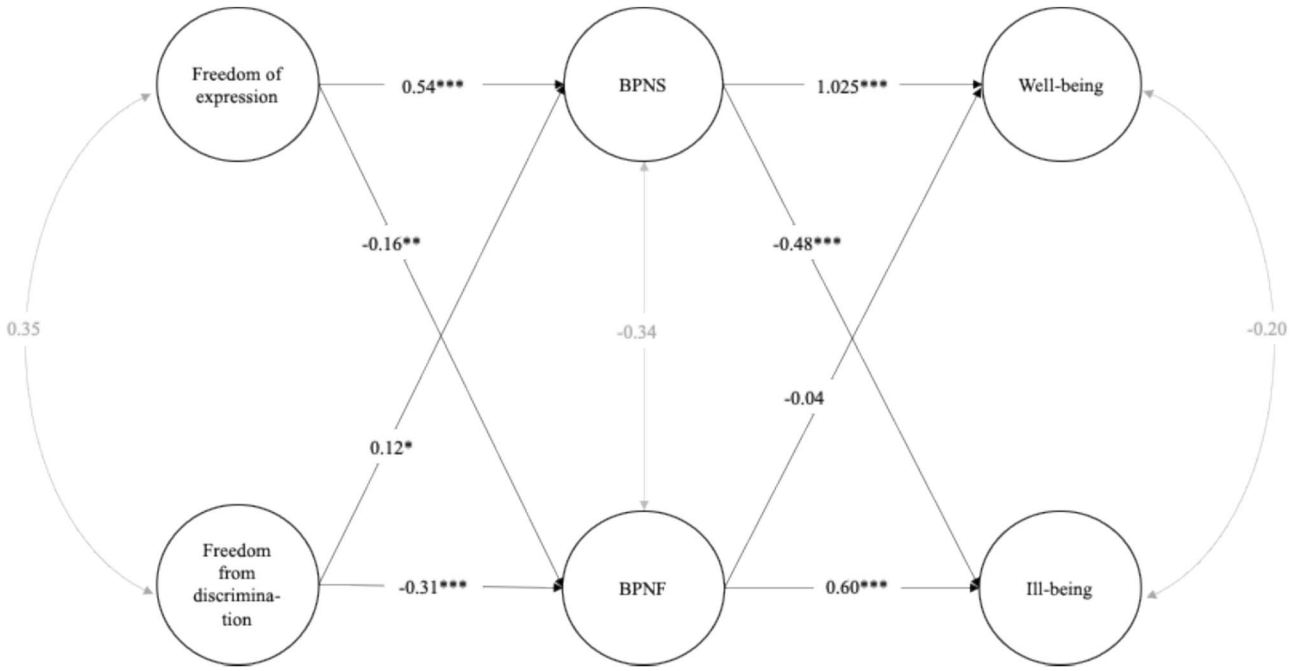


**Fig. 2** Structural equation model of the capabilities for freedom of expression and freedom from discrimination in relation to well-being and ill-being outcomes, with indirect effects via basic psychological need satisfaction and frustration in study 2. *$p$<.05, **$p$<.01 ***$p$<.001. Covariances between predictors, mediators, and outcomes are low-lighted in grey. *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

benefits of freedom of expression may depend on whether it facilitates need satisfaction or reduces need frustration and may be shaped by the social context in which expression occurs. One possibility is that expressing one's views—particularly when they diverge from prevailing norms—could invite conflict, isolation, or reputational cost, thereby diminishing well-being (Vitak et al., 2017). Alternatively, these findings may reflect bidirectional processes: individuals with lower well-being may perceive their environment as more threatening or less supportive of open expression. Given the cross-sectional design and the specificity of the effect, replication with longitudinal data is essential to clarify its reliability and meaning.

Freedom from discrimination was not significantly related to well-being but was linked to lower ill-being, primarily via reductions in need frustration. These findings

underscore the potential role of basic psychological needs in accounting for the effects of these capabilities on psychological outcomes, and in particular, the important role of need frustration in ill-being outcomes. In Study 3, we sought to compare perceptions of freedom of expression and freedom from discrimination in majority versus historically marginalized groups from Australia.

## Study 3

### Method

#### Participants

We recruited 703 Australians from the general population using Qualtrics ranging in age from 18 to 86 ($M$=44.71, $SD$=17.71). The sample comprised 203 Indigenous Australians who identified as Aboriginal or Torres Strait Islander ($Mage$=44.71, $SD$=17.71) and 500 non-Indigenous Australians ($Mage$=49.11, $SD$=17.68).

#### Materials

**Capabilities** In Study 3 we again used items from the OCAP-18 (Lorgelly et al., 2015). Participants were asked to complete only the items from our previously derived capabilities variables of freedom of expression and freedom from discrimination. Both freedom of expression (Cronbach's α=0.73) and freedom from discrimination (Cronbach's α=0.78) demonstrated acceptable internal consistency.

**Basic psychological needs** In Study 3 we used a 12-item shortened version of the Basic Psychological Need Satisfaction and Frustration Scale (Chen et al., 2015). Both need satisfaction (6-items; Cronbach's α=0.83) and need frustration (6-items; Cronbach's α=0.85) demonstrated good internal consistency.

**Table 7** Inter-correlations between the capabilities variables, basic psychological needs and the well-being and ill-being outcomes for the Indigenous Australians in study 3

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Freedom of expression | – | | | | |
| 2. Freedom from discrimination | 0.02 | – | | | |
| 3. BPNS | 0.69*** | 0.04 | – | | |
| 4. BPNF | −0.15* | −0.42*** | −0.28*** | – | |
| 5. Well-being | 0.62*** | −0.09 | 0.77*** | −0.16* | – |
| 6. Ill-being | −0.11 | −0.34*** | −0.22** | 0.81*** | −0.18* |

*BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

*$p$<0.05, **$p$<0.01, ***$p$<0.001

**Well-being** In Study 3 we used a composite measure of well-being including one item from the Satisfaction with Life Scale (Diener et al., 1985) and five items from a shortened version of the Subjective Vitality Scale (Ryan & Frederick, 1997). The five vitality items were "I feel alive and vital", "Sometimes I feel so alive I just want to burst", "I have energy and spirit", "I nearly always feel alert and awake", and "I feel energized". Cronbach's α for the well-being index was 0.87, indicating it was highly internally consistent.

**Ill-being** In Study 3 we measured ill-being using a shortened 6-item version of the DASS-21 (Lovibond & Lovibond, 1995), including three items measuring depression (e.g. "I felt that I had nothing to look forward to") and three items measuring anxiety (e.g. "I felt I was close to panic"). The items demonstrated good internal consistency (Cronbach's α=0.88).

### Results

#### Inter-correlations

For the Indigenous Australian sample, inter-correlations showed that the two capabilities variables—freedom of expression and freedom from discrimination—were unrelated (see Table 7). Freedom from discrimination was negatively correlated with need frustration and ill-being, yet unrelated to need satisfaction and well-being. Freedom of expression was positively correlated with need satisfaction and well-being, negatively correlated with need frustration, and not correlated with ill-being. For the non-Indigenous Australian sample, the inter-correlations were consistent with those seen in Studies 1 and 2. The two capabilities variables were positively correlated with each other, as well as positively associated with need satisfaction and well-being, and negatively correlated with need frustration and ill-being (see Table 8).

#### Group differences

A series of Bonferroni corrected $t$-tests were run to test for group differences in freedom of expression, freedom from discrimination, basic psychological need satisfaction, basic psychological need frustration, well-being and ill-being across the Indigenous and non-Indigenous Australian

**Table 8** Inter-correlations between the capabilities variables, basic psychological needs and the well-being and ill-being outcomes in study 3 for non-Indigenous Australians

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Freedom of expression | – | | | | |
| 2. Freedom from discrimination | 0.27*** | – | | | |
| 3. BPNS | 0.66*** | 0.30*** | – | | |
| 4. BPNF | −0.40*** | −0.43*** | −0.54*** | – | |
| 5. Well-being | 0.51*** | 0.27*** | 0.78*** | −0.46*** | – |
| 6. Ill-being | −0.39*** | −0.39*** | −0.55*** | 0.84*** | −0.46*** |

*BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

***$p<0.001$

groups. As per the means in Table 9, there were statistically significant differences. Indigenous Australians reported lower levels of freedom from discrimination ($t(365)=10.19$, $p<0.001$), and higher levels of basic psychological need frustration ($t(360)=-5.56$, $p<0.001$) and ill-being ($t(365)=-5.60$, $p<0.001$). There were no group differences in freedom of expression ($t(365)=1.06$, $p=0.29$), basic psychological need satisfaction ($t(370)=0.97$, $p=0.33$), or well-being ($t(361)=1.03$, $p=0.30$).

## Structural equation models

In Study 3, we estimated two SEMs with maximum likelihood estimation in the lavaan package (Rosseel, 2012), one for the Indigenous Australians and one for the non-Indigenous Australians. Both models fit the data adequately, $\chi^2(442)=792.25$, $p<0.001$, CFI = 0.90, TLI = 0.89, RMSEA = 0.06, SRMR = 0.07 for the Indigenous Australians, and $\chi^2(444)=1327.83$, $p<0.001$, CFI = 0.90, TLI = 0.89, RMSEA = 0.06, SRMR = 0.07. In Study 3, the sample sizes were insufficient relative to the models' complexity to bootstrap the confidence intervals. Larger sample sizes are often required to provide the necessary variability for bootstrapping to yield reliable estimates in complex SEMs (Kline, 2023), so we report the standard maximum likelihood estimates. Although bootstrapping is a widely recommended approach for testing indirect effects, its accuracy and power improve with sample size and can vary across methods (Hayes & Scharkow, 2013). Given our more modest sample and the complexity of the model, this constraint likely reduces the precision of the reported effects and underscores the need for replication with larger samples.

**Indigenous Australian sample** As shown in Table 10, the results for Indigenous freedom of expression showed a strong positive total effect on well-being, accounted for by basic psychological need satisfaction. Interestingly, freedom from discrimination was unrelated to well-being for the Indigenous Australians, but it was strongly and negatively associated with ill-being, an association primarily accounted for by basic psychological need frustration. However, freedom from discrimination, paradoxically, had a positive direct effect. In Study 2, the same paradoxical pattern appeared but for freedom of expression instead of freedom from discrimination, suggesting reductions in discrimination may have carried unexpected consequences in

**Table 9** Means and standard deviations (SD) for freedom of expression and freedom from discrimination, basic psychological needs, and the well-being and ill-being outcomes across indigenous and non-indigenous Australian groups in study 3

| | Indigenous Australians | Non-indigenous Australians |
|---|---|---|
| | Mean [SD] | Mean [SD] |
| Freedom of expression | 0.73 [0.17] | 0.75 [0.16] |
| Freedom from discrimination | 0.45 [0.25] | 0.66 [0.25] |
| BPNS | 5 [1.12] | 5.09 [1.10] |
| BPNF | 3.96 [1.42] | 3.27 [1.36] |
| Ill-being | 3.79 [1.51] | 3.09 [1.47] |
| Well-being | 4.02 [1.23] | 4.12 [1.18] |

Grey shading indicates variables that differed statistically significantly between groups. *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need frustration

**Table 10** Total and direct effects from a structural equation model of freedom of expression and freedom from discrimination in relation to well-being and ill-being outcomes, with indirect effects via basic psychological need satisfaction and frustration for Indigenous Australians in study 3

| Capability | Outcome | Total | via BPNS | via BPNF | Direct |
|---|---|---|---|---|---|
| Freedom of expression | WB | 0.78*** | 0.91** | −0.01 | −0.12 |
| Freedom from discrimination | WB | −0.10 | −0.01 | −0.03 | −0.06 |
| Freedom of expression | IB | −0.11 | 0.10 | −0.20* | −0.01 |
| Freedom from discrimination | IB | −0.44*** | −0.00 | −0.65*** | 0.21* |

*WB* well-being, *IB* ill-being, *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need satisfaction

*$p<0.05$, **$p<0.01$, ***$p<0.001$

**Table 11** Total and direct effects from a structural equation model of freedom of expression and freedom from discrimination in relation to well-being and ill-being outcomes, with indirect effects via basic psychological need satisfaction and frustration for non-Indigenous Australians in study 3

| Capability | Outcome | Total | via BPNS | via BPNF | Direct |
|---|---|---|---|---|---|
| Freedom of expression | WB | 0.59*** | 1.03*** | −0.04 | −0.40** |
| Freedom from discrimination | WB | 0.13** | 0.10 | −0.04 | 0.07 |
| Freedom of expression | IB | −0.41*** | −0.14* | −0.39*** | 0.13 |
| Freedom from discrimination | IB | −0.31*** | −0.01 | −0.36*** | 0.06 |

*WB* well-being, *IB* ill-being, *BPNS* basic psychological need satisfaction, *BPNF* basic psychological need satisfaction

*$p<0.05$, **$p<0.01$, ***$p<0.001$

this Indigenous Australian group, such as perceived inequity or community disharmony.

**Non-indigenous Australian sample** As shown in Table 11, for the non-Indigenous Australians, freedom of expression again showed strong positive total and indirect effects via basic psychological need satisfaction alongside a statistically significant negative direct effect. Freedom of expression and from discrimination were both associated with reductions in ill-being, primarily and fully accounted for by reductions in need frustration, respectively.

## General discussion

Our investigation, anchored in SDT and Nussbaum's (2000) capabilities framework, sheds light on the qualities of pervasive environments that relate to people's basic psychological need satisfaction and frustration, and thus their psychological well-being and ill-being. Across three studies we uncovered a replicable factor structure within the capabilities measure developed by Lorgelly et al. (2015). We then tested links between specific capabilities and well-being and ill-being outcomes and explored the degree to which basic psychological need satisfaction and frustration accounted for these associations. While psychological needs consistently linked capabilities to wellness, the pattern of associations differed across studies. In Study 1, these links were largely accounted for by need satisfaction and frustration. In Studies 2 and 3, some associations remained even after accounting for needs, suggesting that capabilities may relate to wellness both through and beyond their impact on psychological needs. These differences may reflect contextual or sample-specific factors and highlight the need for longitudinal research to clarify directionality. By incorporating both satisfaction and frustration, this work clarifies that societal capabilities are not simply positively-valenced supports—when absent, they may function as sources of need frustration, helping to explain their links with psychological distress. Overall, our findings support SDT's dual-process model, revealing that basic psychological need satisfaction and frustration each play unique roles in accounting for the links between societal capabilities and wellness outcomes.

## Freedom of expression and freedom from discrimination: key capabilities

Our study first sought a psychometrically oriented latent structure of the OCAP-18 questionnaire (Lorgelly et al., 2015), rather than one led purely by philosophy. We identified four latent variables capturing distinct dimensions of people's perceived capabilities: freedom of expression, freedom from discrimination, general well-being, and home safety. Freedom of expression encompassed the capacity for individuals to engage and participate in society openly and freely. Freedom from discrimination measured the perception of feeling physically and emotionally safe from discrimination and violence. General well-being comprised items measuring one's capacity to maintain their physical,

emotional, and social well-being. Home safety was a distinct one-item capability that centered around feeling safe at and around one's home. We focused on freedom of expression and freedom from discrimination for two key reasons. First, we sought to predict well-being, so the general well-being factor would have confounded our analysis. Second, home safety was represented by a single item, and was thus less amenable to SEM. By focusing on freedom of expression and freedom from discrimination, we progressed SDT by homing in on latent measures of experiences within pervasive environments that may conduce to well-being and protect against ill-being as a function of basic psychological needs.

Consistent with Nussbaum's (2000) predictions, we found that capability indices positively linked with well-being and negatively linked with ill-being indices (Hypothesis 1). Our results corroborate Nussbaum's (2000) predictions regarding the importance of societal resources and affordances in relation to individuals' overall wellness. Specifically, individuals who perceive greater access to freedom of expression and freedom from discrimination are more likely to experience well-being. Whereas individuals who perceive lower levels of access to these capabilities are more likely to experience ill-being.

## Dual process effects

Previous studies evaluating the link between capabilities and psychological wellness, such as that by DeHaan et al. (2016), predominantly focused on the indirect effects accounted for by need satisfaction. However, recent advancements have emphasized the importance of also measuring need frustration to capture a more comprehensive range of experiences (Chen et al., 2015). For instance, the dual process model suggests that need satisfaction is associated with beneficial gains while need frustration is linked to detrimental outcomes (Bradshaw et al., 2024; Donald et al., 2022; Haerens et al., 2015; Jang et al., 2016). By incorporating both basic psychological need satisfaction and frustration, and by differentiating well-being and ill-being outcomes, we provided a nuanced understanding of the potential mechanisms underlying the relations between capabilities and psychological outcomes. Our findings revealed that basic psychological need satisfaction likely plays a prominent role in accounting for the links between freedom of expression and freedom from discrimination and well-being, while basic psychological need frustration appears to be more prominent in accounting for the link between these societal capabilities and ill-being (Hypothesis 2).

From a governance standpoint, these results suggest that improving access to capabilities could be an important way to improve communities' mental health. For example, promoting freedom of expression might require not only legal protections but also social norms that encourage respectful disagreement and reduce the risk of social backlash. Reducing discrimination may involve structural efforts such as legislative reform, educational programs, and inclusive policy design. Tailoring interventions to enhance specific capabilities in contextually sensitive ways may help improve individual and collective wellness.

## Nuanced effects across Indigenous and non-Indigenous Australian groups

Study 3 also shed light on the complex interplay between societal capabilities and basic psychological needs across different groups. Freedom of expression consistently contributed to well-being across groups, primarily through the satisfaction of basic psychological needs, highlighting the potential generalizability of its importance for psychological health. However, the unexpected finding that freedom from discrimination had a positive direct effect on ill-being in the Indigenous Australian sample when controlling for psychological needs suggests more nuanced dynamics. Here it may be that reductions in discrimination that do not yield lower need frustration can be problematic for this historically marginalized group. This complexity was echoed in the non-Indigenous Australian sample, for whom freedom of expression showed both positive and negative impacts, indicating varied perceptions of autonomy and its role in well-being.

The negative direct effect of freedom of expression, again appearing when controlling for basic psychological needs, suggests that even if one lives in a pervasive environment that they feel supports their ability to be self-expressive—which overall is very positive for well-being—can have costs when freedom of expression does not yield need satisfaction. Possibly, openly expressing one's thoughts could result in social backlash or exclusion if those expressions conflict with social norms, thereby undermining well-being separate from the benefits accounted for by basic psychological needs. This duality highlights the importance of considering the context and group dynamics within which freedom of expression and freedom from discrimination occur. This effect was only seen in Studies 2 and 3, and only for the non-Indigenous Australian group in Study 3 so its reliability and group specificity should be further examined. Future research could also explore how the interplay between these fundamental freedoms and environmental factors shapes individuals' experiences and psychological wellness. By understanding the conditions under which these freedoms generate need satisfactions and lower need frustrations, and for whom they do so, interventions and policies can be tailored to foster environments that promote

self-expression while and reduce discrimination equitably, mitigating potential risks.

Integrating philosophical perspectives with SDT—which is itself fundamentally philosophically anchored (Ryan & Deci, 2017)—is essential for deepening our understanding of human motivation and well-being within social and economic infrastructures. The combination of theory and philosophy provides a broader perspective that considers internal motivations alongside external conditions that extend from proximal to pervasive. By integrating Nussbaum's (2000) philosophy of capabilities with SDT, this research helps move SDT beyond just a social psychology of interpersonal situations to a broader view of societal affordances and obstacles to thriving. The hope is that such research can inform social frameworks and policies that support individuals' basic psychological needs and, therefore, their ability to flourish. Considering how policies might satisfy (or alternatively frustrate) basic psychological needs could be a good litmus test for whether or not they stand to benefit people's well-being. For example, improving people's capability to access education may satisfy the psychological need for competence, while policies that support the inclusion of historically marginalized groups would likely satisfy group members' need for relatedness, and therefore their well-being. Understanding such connections could enable researchers and policymakers to more effectively tackle complex societal issues such as inequality, discrimination, and access to resources.

### Limitations

We acknowledge the limitations of our sampling method and design. While we were able to access diverse samples across multiple countries and varying ethnicities, all data were collected from online platforms such as Qualtrics, which may under-represent individuals who are not able to access a computer or internet access. This limitation may be especially salient to analyses of capabilities because our data collection methods may be missing people for whom capabilities access is especially low.

Our studies relied on cross-sectional, single-source data, limiting our ability to test causal associations and making it difficult to test potential reciprocal effects between variables. While our structural equation models point to the potential mediating roles of basic psychological need satisfaction and frustration in the associations between capabilities and psychological wellness, longitudinal studies are needed to validate and further elucidate the temporal nature of these effects. Moreover, larger samples, especially where special interest groups are concerned, would have bolstered our comparative analyses.

Our cross-sectional, self-report design also carries the possibility of common method variance (CMV). CMV is a common limitation in psychological survey research, yet the available statistical remedies for it—such as Harman's one-factor test—are increasingly viewed as weak indicators that often fail to detect method bias unless it is extreme (Fuller et al., 2016; Podsakoff et al., 2012). In multifactorial models like ours, such techniques can actually obscure method effects rather than clarify them. Accordingly, we did not conduct formal CMV tests but acknowledge this as a design limitation. Stronger remedies are design-based; future research should incorporate longitudinal, multi-source, or time-lagged data to more effectively disentangle substantive effects from measurement artifacts.

## Conclusion

Together, our studies have demonstrated the connection between people's perceived access to freedom of expression and freedom from discrimination and psychological wellness, with a focus on the possible pathways to wellness via basic psychological needs. These insights lay important groundwork for future research to further explore SDT and its dual process model in the context of capabilities. Our research speaks to the role pervasive environments may play in supporting individuals flourishing, by serving as environments that act to either support or thwart individuals' basic psychological needs.

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s11031-025-10152-y.

**Funding** Open Access funding enabled and organized by CAUL and its Member Institutions. This work was funded by University of Rochester, Australian Catholic University.

**Data availability** The dataset for this study can be made available upon reasonable request.

### Declarations

**Conflict of interest** The authors have no conflicts of interest to declare.

**Research involving human and animals participants** Study 1 obtained ethical clearance from the University of Rochester Research Subjects Review Board (RSRB00065940), Study's 2 and 3 were approved by the Australian Catholic University's Human Research Ethics Committee under 2020–245E and 2022-2762HI, respectively.

**Informed consent** All participants provided informed consent.

## References


Anand, P., Hunter, G., Carter, I., Dowding, K., Guala, F., & Van Hees, M. (2009). The development of capability indicators. *Journal of Human Development and Capabilities, 10*(1), 125–152. https://doi.org/10.1080/14649880802675366

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238–246. https://doi.org/10.1037/0033-2909.107.2.238

Björgvinsson, T., Kertz, S. J., Bigda-Peyton, J. S., McCoy, K. L., & Aderka, I. M. (2013). Psychometric properties of the CES-D- 10 in a psychiatric sample. Assessment, 20(4), 429- 436. https://doi.org/10.1177/1073191113481998

Bradshaw, E. L., DeHaan, C. R., Parker, P. D., Curren, R., Duineveld, J. J., Di Domenico, S. I., & Ryan, R. M. (2021). The perceived conditions for living well: Positive perceptions of primary goods linked with basic psychological needs and wellness. *Journal of Positive Psychology, 18*(1), 44–60. https://doi.org/10.1080/17439760.2021.1991446

Bradshaw, E. L., Duineveld, J. J., Conigrave, J. C., Steward, B. A., Ferber, K. A., Joussemet, M., Parker, P. D., & Ryan, R. M. (2024). Disentangling autonomy-supportive and psychologically controlling parenting: A meta-analysis of self-determination theory's dual process model across cultures. *American Psychologist*. https://doi.org/10.1037/amp0001389

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., & Mouratidis, A. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion, 39*(2), 216–236. https://doi.org/10.1007/s11031-014-9450-1

Conigrave, J. (2020). *corx: Create and format correlation matrices*. In https://CRAN.R-project.org/package=corx

Contributor biographical information http://www.loc.gov/catdir/enhancements/fy0723/97050576-b.html

DeHaan, C. R., Hirai, T., & Ryan, R. M. (2016). Nussbaum's capabilities and self-determination theory's basic psychological needs: Relating some fundamentals of human wellness. *Journal of Happiness Studies, 17*(5), 2037–2049. https://doi.org/10.1007/s10902-015-9684-y

Di Domenico, S. I., & Fournier, M. A. (2014). Socioeconomic status, income inequality, and health complaints: A basic psychological needs perspective. *Social Indicators Research, 119*(3), 1679–1697. https://doi.org/10.1007/s11205-013-0572-8

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Diener, E., Ng, W., Harter, J., & Arora, R. (2010). Wealth and happiness across the world: Material prosperity predicts life evaluation, whereas psychosocial prosperity predicts positive feeling. *Journal of Personality and Social Psychology, 99*(1), 52. https://doi.org/10.1037/a0018066

Donald, J. N., Bradshaw, E. L., Conigrave, J. H., Parker, P. D., Byatt, L. L., Noetel, M., & Ryan, R. M. (2022). Paths to the light and dark sides of human nature: A meta-analysis of the prosocial benefits of autonomy and the antisocial costs of control. *Psychological Bulletin, 147*(9), 921–946. https://doi.org/10.1037/bul0000338

Fukuda-Parr, S. (2003). The human development paradigm: Operationalizing Sen's ideas on capabilities. *Feminist Economics, 9*(2–3), 301–317. https://doi.org/10.1080/1354570022000077980

Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise, 16*, 26–36. https://doi.org/10.1016/j.psychsport.2014.08.013

Hayes, A. F., & Scharkow, M. (2013). The relative trustworthiness of inferential tests of the indirect effect in statistical mediation analysis: Does method really matter? *Psychological Science, 24*(10), 1918–1927. https://doi.org/10.1177/0956797613480187

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction, 43*, 27–38. https://doi.org/10.1016/j.learninstruc.2016.01.002

Kenny, D. A. (1979). *Correlation and causality*. Wiley.

Kline, R. B. (2023). *Principles and practice of structural equation-modeling*. Guilford Publications.

Lorgelly, P. K., Lorimer, K., Fenwick, E. A., Briggs, A. H., & Anand, P. (2015). Operationalising the capability approach as an outcome measure in public health: The development of the OCAP-18. *Social Science & Medicine, 142*, 68–81. https://doi.org/10.1016/j.socscimed.2015.08.002

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Psychology Foundation.

Marmot, M. G. (2004). *The status syndrome: How social standing affects our health and longevity* (1st ed.). Times Books.

Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology*, 31(3), 301−306. https://doi.org/10.1111/j.2044-8260.1992.tb00997.x

Milyavskaya, M., Philippe, F. L., & Koestner, R. (2013). Psychological need satisfaction across levels of experience: Their organization and contribution to general well-being. *Journal of Research in Personality, 47*(1), 41–51. https://doi.org/10.1016/j.jrp.2012.10.013

Nussbaum, M. C. (1999). *Sex and social justice*. Oxford University Press.

Nussbaum, M. C. (2000). Women's capabilities and social justice. *Journal of Human Development, 1*(2), 219–247. https://doi.org/10.1080/713678045

Nussbaum, M. C. (2006). *Frontiers of justice*. Harvard University Press.

Nussbaum, M. C. (2011). *Creating capabilities: The human development approach*. The Belknap Press of Harvard University Press. https://doi.org/10.1080/10705422.2012.699712

Oishi, S., Schimmack, U., & Diener, E. (2012). Progressive taxation and the subjective well-being of nations. *Psychological Science, 23*(1), 86–92. https://doi.org/10.1177/0956797611420882

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations

on how to control it. *Annual Review of Psychology, 63*, 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

R Core Team. (2020). *R: A language and environment for statistical computing (Version 4.0.2)*. In R foundation for statistical computing. http://www.r-project.org/

Radcliff, B. (2013). *The political economy of human happiness: How voters' choices determine the quality of life*. Cambridge University Press.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401. https://doi.org/10.1177/014662167700100306

Rawls, J. (1971). *A theory of justice*. Harvard University Press.

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software, 48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development and wellness*. Guilford Press.

Ryan, R. M., & DeHaan, C. R. (2023). The social conditions for human flourishing: Economic and political influences on basic psychological needs. In R. M. Ryan (Ed.), *The Oxford handbook of self-determination theory.* Oxford University Press.

Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory. *Psychological Bulletin, 148*(11–12), 813–842. https://doi.org/10.1037/bul0000385

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality, 65*(3), 529–565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x

Scholten, S., Velten, J., Neher, T., & Margraf, J. (2017). Wealth, justice and freedom: Objective and subjective measures predicting poor mental health in a study across eight countries. *SSM-Population Health, 3*, 639–648. https://doi.org/10.1016/j.ssmph.2017.07.010

Sen, A. K. (1985). *Commodities and capabilities*. Oxford University Press.

Sen, A. K. (1999). *Development as freedom*. Knopf.

Sen, A. K. (2009). *The idea of justice*. Harvard University Press.

Slemp, G. R., Field, J. G., Ryan, R. M., Forner, V. W., Van den Broeck, A., & Lewis, K. J. (2024). Interpersonal supports for basic psychological needs and their relations with motivation, well-being, and performance: A meta-analysis. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspi0000459

Spielberger, C., Gorsuch, R., Lushene, R., Vagg, P., & Jacobs, G. (1983). *Manual for the state-trait anxiety inventory*. Consulting Psychologists Press.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (7th ed.). Pearson.

Table of contents only http://www.loc.gov/catdir/enhancements/fy0604/97050576-t.html

Vitak, J., Chadha, K., Steiner, L., & Ashktorab, Z. (2017). Identifying women's experiences with and strategies for mitigating negative effects of online harassment. In *Proceedings of the 2017 ACM conference on computer supported cooperative work and social computing* (pp. 1231–1245). Association for Computing Machinery.

Weinstein, N., & Stone, D. N. (2018). Need depriving effects of financial insecurity: Implications for well-being and financial behaviors. *Journal of Experimental Psychology: General, 147*(10), 1503–1520. https://doi.org/10.1037/xge0000436