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# The Intersectional Discrimination Index: Development and validation of measures of self-reported enacted and anticipated discrimination for intercategorical analysis

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ABSTRACT

*Background and objective:* Although intersectional approaches have gained traction in population health research, quantitative discrimination and health studies have tended to focus on a single axis of discrimination (e.g., racism, homophobia). As few discrimination measures function across multiple social identities or positions, we developed the Intersectional Discrimination Index (InDI) for intercategorical intersectionality research, including measures of Anticipated (InDI-A), Day-to-Day (InDI-D), and Major (InDI-M) discrimination that do not require attribution to particular grounds.

*Methods:* We conducted a validity and reliability study with 2016 online survey panel data from Canada and the United States (n = 2583). Internal consistency and dimensionality of the InDI-A were evaluated with exploratory and confirmatory factor analyses. Construct validation included known-groups comparisons, associations with psychological distress, and convergence with existing discrimination measures. Test-retest reliability was examined in a subgroup (n = 150).

*Results:* We found support for use of the InDI-A as a unidimensional scale. As hypothesized, racial and sexual/gender minorities reported higher frequencies of all discrimination types (all $p < 0.001$), and discrimination varied across intersectional categories. Each InDI component was significantly positively associated with psychological distress after controlling for potential confounders. Frequency scores were strongly positively correlated with existing scales. Intraclass correlation coefficients for test-retest reliability of anticipated, lifetime day-to-day, and lifetime major discrimination ranged from 0.70 to 0.72.

*Conclusions:* Final InDI measures include the 9-item InDI-A, 9–item InDI-D, and 13-item InDI-M, for which we have found initial evidence of construct validity and reliability. In combination with sociodemographic information, the InDI measures can be used to evaluate the role of discrimination as a mediator of intersectional health inequalities, and to monitor the prevalence and impacts of discrimination in heterogeneous populations.

## 1. Background

### 1.1. Discrimination and health

Discrimination refers to policies, practices, and behaviors that perpetuate inequities between socially-defined groups (Krieger, 2014). Most health research has focused on perceived interpersonal discrimination self-reported by its targets. Interpersonal discrimination is a psychosocial stressor that can precipitate health-harming emotional, cognitive, and behavioral responses, as well as negative physiologic effects on stress-sensitive diseases and pre-clinical conditions (Lewis et al., 2015). Discrimination can also diminish health directly when it involves physical injury, health care denial, or loss of economic resources (Krieger, 2014).

A growing body of research links discrimination with poorer health. The majority of this literature focuses on the deleterious health impacts of ethnoracial discrimination (racism), however, there is also robust evidence for negative effects of discrimination on the bases of

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characteristics including gender, sexual orientation, disability, mental illness, and body size (Krieger, 2014; Paradies et al., 2015; Pascoe and Smart Richman, 2009; Schmitt et al., 2014). Although within-group study designs predominate (Paradies et al., 2015), the role of discrimination in producing and maintaining health inequalities across groups represents an important area of investigation, particularly as discrimination—unlike most axes of social identity or position—is modifiable (Bauer, 2014; Lofters and O'Campo, 2011).

### 1.2. Intersectional discrimination

Until recently, few studies had explicitly investigated discrimination based on multiple social identities or positions (Bastos et al., 2010; Lewis et al., 2015), resulting in calls for the incorporation of intersectionality frameworks (Bauer, 2014; Lewis et al., 2015). Black feminist theory has long challenged the presumed additivity of oppressions (e.g., Collins, 1990; Combahee River Collective, 1979; King, 1988) and in 1989, Crenshaw coined the term *intersectionality* to describe the discrimination experiences of Black women, which were made unintelligible by legal approaches that considered race and sex separately. Intersectionality has become a central framework for understanding multiple, interacting, and context-dependent forms of social and health (dis)advantage based on social identity and position (Bowleg, 2012; McCall, 2005). Intersectionality scholars argue that health inequalities do not necessarily increase linearly with each additional non-dominant social identity or position, and that the study of one form of discrimination at a time will obscure the experiences of groups facing intersecting forms of discrimination (Bauer, 2014; Bowleg, 2012).

Intersectional population health research has been largely descriptive to date, using an intercategorical approach (McCall, 2005) to examine the patterning of health outcomes across groups cross-stratified by social identity/position. In contrast, we have called for analytic intersectionality studies that "seek to identify the causal processes that drive inequalities of outcome" across intercategorical intersectional groups (Bauer and Scheim, in press). Perceived discrimination represents one such potential mechanism but examining its role in generating inequalities requires measures that function across intersectional groups.

### 1.3. Measuring intersectional discrimination

In recent years quantitative studies on the impacts of intersectional discrimination have begun to emerge and can be broadly categorized into two groups, following McCall's (2005) typology. *Intracategorical* studies focus on the unique experiences of those at particular socio-demographic intersections. These studies may develop and apply intracategorical discrimination measures specific to particular intersections; examples include measures of microaggressions faced by LGBT people of color (Balsam et al., 2011) or Black women (Lewis and Neville, 2015). Alternatively, some intracategorical intersectionality studies have employed multiple non-intersectional discrimination measures (e.g., of HIV-related, gender, and racial discrimination; Logie et al., 2013).

The second group of studies examine *intercategorical complexity* (McCall, 2005), measuring discrimination and its impacts across a range of intersections. Intracategorical measures such as those described above are inappropriate for intercategorical studies as they are only applicable to specific intersections by design. For example, by definition non-Black women and Black men do not experience anti-Black-woman microaggressions; items explicitly measuring this construct from Black female positionality would not be administrable to other intersections, nor include microaggressions specific to those intersections.

Instead, intercategorical analyses have tended to draw on adaptations of existing discrimination measures initially developed to study ethnoracial discrimination, particularly Williams et al.'s (1997; 2008) Everyday (EDS) and Major Discrimination (MDS) measures or Krieger et al.'s Experiences of Discrimination scale (EOD; 2005). The original EOD solicits reports of discrimination based on "race, ethnicity, or color". For an intersectional application, the 2004–2005 U.S. National Epidemiologic Survey on Alcohol and Related Conditions included six versions of the EOD, each adapted to specify a different attribution (Ruan et al., 2008). The EDS and MDS measures first inquire as to whether respondents experienced particular forms of "unfair" treatment, and then request attribution(s). In intersectional studies, multiple attributions are of course permitted (e.g., Earnshaw et al., 2018; Seng et al., 2012).

The use of these extant measures presents conceptual and methodologic challenges for intercategorical intersectionality research. First, qualitative intersectionality research has found that multiply-discriminated individuals may be unable to identify the basis of any given act of discrimination, raising questions as to the validity of survey measures that require them to do so (Bowleg, 2008). Second, these measures were developed and validated to measure ethnoracial discrimination among African-Americans (and Latinxs in the case of the EOD). Thus, they include items which may be less salient for other discriminated groups (Gee et al., 2009; Shariff-Marco et al., 2009) — and even for Black women (Harnois and Ifatunji, 2011)—while excluding manifestations of discrimination (e.g., public ridicule) that may be relevant to other axes of discrimination. More pragmatically, studies that adapt the EOD (or another measure that includes an attribution in the stem) are limited to investigating a small number of discrimination bases determined *a priori*. Further, this approach requires repeating the question set multiple times, posing a high respondent burden and precluding valid assessment of total discrimination burden (as respondents may report the same event multiple times). Researchers are then limited to analyzing the effect of exposure to any discrimination in combination with the number or combination of attributions reported (e.g., Gayman and Barragan, 2013).

The EDS and MDS are attractive for comparative analyses across single or multiple social categories because their format allows for computation of a total discrimination frequency score (Frost, 2017). These measures can also be used to model the number of attributions reported (Seng et al., 2012), however, the number of attributions reported may, to some extent, be a proxy for the number of marginalized social positions one holds. Moreover, given the emphasis of intersectionality frameworks on uncovering the experiences of individuals at various intersections of marginalized and privileged statuses (McCall, 2005), we question to what extent the number of attributions reported is an exposure variable with the potential to contribute to understanding and advancing the health of intersectional social groups.

### 1.4. Anticipated discrimination

Social and minority stress theories posit that stress and vigilance associated with anticipation of discrimination contribute to stigma-related mental health inequities (Meyer, 1995; Wheaton et al., 2012). Correlational and experimental studies have found that anticipated discrimination is associated with psychological distress and cardiovascular stress responses (Quinn et al., 2014; Sawyer et al., 2012). Anticipated discrimination can also contribute to avoidance of health services (Bauer et al., 2014; Henderson et al., 2013). Yet, the construct is rarely included in measures of discrimination (Pascoe and Smart Richman, 2009) and thus has been identified as a priority for future research (Lewis et al., 2015). We are unaware of any attempts to measure anticipated discrimination across social identities or positions.

### 1.5. The present study

We developed the Intersectional Discrimination Index (InDI) to enable intercategorical intersectional analyses of discrimination in population health and social research. It consists of three measures assessing anticipated and enacted (day-to-day and major) discrimination. As perceived discrimination's deleterious impact does not appear

dependent on the grounds it is attributed to (Lewis et al., 2015), and following Bauer's (2014) recommendation for advancing analytic intersectionality, we aimed to develop attribution-free measures of social discrimination. Our elimination of specific attributions from these measures does not reflect the importance we place on social identity and position in understanding discrimination and its health consequences. Rather, the InDI measures are intended to be used in analyses structured around intersectional social identities and positions. A companion paper (Bauer and Scheim, in press) provides an example of one such approach, examining the role of day-to-day discrimination as a mediator of inequalities in psychological distress between intersectional ethnoracial and sexual/gender identity groups, with consideration of the potential for interactive effects of social identities and exposure to discrimination.

We conducted a binational validity and reliability study using members of a commercial survey panel in Canada and the United States sampled for maximum ethnoracial and sexual/gender diversity. We examined acceptability and data quality, internal consistency and dimensionality, construct validity, and test-retest reliability.

## 2. Methods

### 2.1. Development of draft measures

We began with a literature review on intersectionality theory; sociological and psychological models linking stigma, discrimination, and health; and discrimination measures. Review findings were used to generate a construct map for item development and informed our decision to measure three dimensions of discrimination without attributional bases: Anticipated (InDI-A), Day-to-day (InDI-D), and Major (InDI-M). InDI-A uses an unspecified present timeframe, while both enacted discrimination measures inquire about lifetime and past-year experiences. Cognizant that the etiologically relevant timeframe may depend on the outcome of interest (Krieger, 1999), we included both frames to account for the relative rarity and ubiquity of major and day-to-day discrimination respectively (Krieger et al., 2005), as well as to avoid participants forward telescoping (Skogan, 1986) lifetime experiences if only past-year day-to-day discrimination was assessed.

Some draft items were adapted from existing measures and others were developed *de novo*. The construct map was used to ensure balanced coverage of manifestations and settings in which discrimination occurs. InDI-A items intentionally mirror the social domains reflected in the enacted discrimination measures. The content of day-to-day discrimination items was informed by Williams' EDS (1997), Sue's (2010) microaggressions framework, and existing measures of ableism (Brohan et al., 2010), weight discrimination (Myers and Rosen, 1999), racism, (Brondolo et al., 2005; Paradies and Cunningham, 2008), sexism (Klonoff and Landrine, 1995), anti-LGBT discrimination (Diaz et al., 2001; Testa et al., 2015), multi-group discrimination (Bogart et al., 2013), and intersectional discrimination (Balsam et al., 2011; Bastos et al., 2012). We also referred to Cuddy et al.'s (2008) Stereotype Content Model and Behavior from Intergroup Affect and Stereotypes map, which delineate warmth and competence as two dimensions on which group stereotypes are based, and accordingly predict distinct affective and behavioral responses to social groups, including active and passive harm as discriminatory responses. Thus, we aimed to include items reflecting a spectrum of discriminatory actions, from passive (e.g., being treated as if you are unfriendly, unhelpful, or rude) through more active (e.g., being called names).

For utility in monitoring the prevalence of legally actionable forms of discrimination (Currie, 2009) and to limit confounding with current health status, major discrimination items referred to clearly defined and objective end-points where possible (e.g., denial of service rather than receipt of inferior service). Items related to violence and property damage were adapted from measures by Herek (2008) and the Statistics Canada General Social Survey Victimization Survey (2014).

To limit attention to discriminatory treatment rather than general unfairness, without requiring specific attributional bases, we solicited experiences "because of who you are". The following definition was provided at the outset and midway through the questionnaire: "These questions are about experiences related to **who you are**. This includes both how you describe yourself and how others might describe you. For example, your skin color, ancestry, nationality, religion, gender, sexuality, age, weight, disability or mental health issue, and income."

### 2.2. Expert consultation

Input on the draft measures was gathered through consultations with eight research and human rights experts from North America and Australia. Content and wording were revised for better construct coverage and cross-national content validity, and nine items were added on "poor or unfair" treatment by specific social and institutional actors (e.g., an employer). We then pilot-tested the measures with ten students to evaluate item and instruction clarity. All items were reviewed for readability at a seventh-grade level. The full set of test items included in InDI measures for the validation study—11 items for InDI-A, 18 for InDI-D, and 13 for InDI-M—is included in this article's Supplementary Materials, and the final versions of each measure are shown in Figs. 1–3.

### 2.3. Data collection

Legerweb, an online survey panel provider, was contracted to collect data from panel members residing in Canada ($n$ = 1065) and the United States ($n$ = 1518) from August to October 2016. Panel members are recruited by random digit dialing, referrals, and social media and are not provided with internet access. Samples are not representative. We employed quota sampling with the aim of accruing approximately equal numbers of participants in each of six ethnoracial groups (Asian, Black, Indigenous, Latin American, Middle Eastern, white) in each country, as well as an oversample of sexual and gender minorities (SGM). Participants completed a 30-min questionnaire including the InDI, mental health and substance use measures, and sociodemographic variables. A random sample of 150 participants participated in a 10–15-min follow-up survey three to nine weeks later (a mean of 43 days). Follow-up included the InDI measures, as well as Williams et al.'s EDS and MDS (1997; 2008). Participants received their choice of a small honorarium or Air Miles points. The Western University Non-Medical Research Ethics Board approved this study.

### 2.4. Measures

**InDI-A.** Responses to 11 anticipated discrimination items were scored from 0 (strongly disagree) to 4 (strongly agree). Mean scores (0–4) were calculated for individuals who completed at least 80% of items.

**InDI-D.** Lifetime day-to-day discrimination items were coded as 1 for yes (versus 0 for no). Past-year items were coded as 0 for no (never, or not in the past year), 1 for once or twice, and 2 for many times. We ultimately eliminated 9 "poor or unfair" treatment items from the final day-to-day discrimination measure (see Results), with frequency scores based on 9 remaining items thus ranging from 0 to 9 (lifetime) or 0–18 (past-year). If respondents completed at least 80% of items, missing item values were imputed to "no/never"; if not, sum scores were not calculated.

**InDI-M.** Each of 13 lifetime major discrimination items was coded as 0 (never), 1 (once), or 2 (more than once; or in more than one place for Item 9), while each past-year item was coded as 0 (no) or 1 (yes) for frequency scores ranging from 0 to 26 (lifetime) or 0–13 (past-year). Item 9 was given a setting-based rather than a frequency-based response scale to avoid confusion as the question specifically refers to repeated harassment. Missing values were imputed similarly to the

These questions are about experiences related to **who you are**. This includes both how you describe yourself and how others might describe you. For example, your skin color, ancestry, nationality, religion, gender, sexuality, age, weight, disability or mental health issue, and income.

| | | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| 1. | Because of who I am, a doctor or nurse, or other health care provider might treat me poorly. | | | | | |
| 2. | Because of who I am, I might have trouble finding or keeping a job. | | | | | |
| 3. | Because of who I am, I might have trouble getting an apartment or house. | | | | | |
| 4. | I worry about being treated unfairly by a teacher, supervisor, or employer. | | | | | |
| 5. | I may be denied a bank account, loan, or mortgage because of who I am. | | | | | |
| 6. | I worry about being harassed or stopped by police or security. | | | | | |
| 7. | Because of who I am, people might try to attack me physically. | | | | | |
| 8. | I expect to be pointed at, called names, or harassed when in public. | | | | | |
| 9. | I fear that I will have a hard time finding friendship or romance because of who I am. | | | | | |

**Fig. 1.** Intersectional anticipated discrimination scale (InDI-A)—final version.

InDI-D.

Conceptually, major and day-to-day discrimination events are sociological phenomena rather than psychological properties of an individual; thus they are not necessarily expected to correlate or demonstrate internal consistency (Guyon, 2018; Williams et al., 2003). Guided by the social stress research paradigm in which checklist measurement of stressful life events is well-established (e.g., Turner and Wheaton, 1997), an *a priori* decision was made to treat the InDI-D and InDI-M items as causal-formative indicators. These are items that aggregate to form a construct, rather than items that reflect the level of a single underlying construct (Streiner et al., 2014). Therefore, we did not subject them to factor analysis.

These questions are about experiences related to **who you are**. This includes both how you describe yourself and how others might describe you. For example, your skin color, ancestry, nationality, religion, gender, sexuality, age, weight, disability or mental health issue, and income.

**Because of who you are, have you…**

| | | Never | Yes, but not in the past year | Yes, once or twice in the past year | Yes, many times in the past year |
|---|---|---|---|---|---|
| 1. | Heard, saw, or read others joking or laughing about you (or people like you) | | | | |
| 2. | Been treated as if you are unfriendly, unhelpful, or rude | | | | |
| 3. | Been called names or heard/saw your identity used as an insult | | | | |
| 4. | Been treated as if others are afraid of you | | | | |
| 5. | Been stared or pointed at in public | | | | |
| 6. | Been told that you should think, act, or look more like others | | | | |
| 7. | Heard that you or people like you don't belong | | | | |
| 8. | Asked inappropriate, offensive, or overly personal questions | | | | |
| 9. | Been treated as if you are less smart or capable than others | | | | |

**Fig. 2.** Intersectional day-to-day discrimination Index (InDI-D)—final version.

As a reminder, we are interested in experiences related to **who you are**. This includes both how you describe yourself and how others might describe you. For example, your skin color, ancestry, nationality, religion, gender, sexuality, age, weight, disability or mental health issue, and income.

**OPTIONAL: For each of the thirteen major discrimination items:**

[If once or more, or yes for #9] Has this happened to you in the past 12 months? ☐ Yes ☐ No

1. Because of who you are, has a health care provider ever refused you care?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
2. Because of who you are, have you ever been fired or dismissed from a job, or been turned down for a job that you interviewed for?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
3. Because of who you are, have you ever been evicted or denied housing?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
4. Because of who you are, have you ever been unreasonably stopped and questioned, searched, or arrested by police or security?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
5. Because of who you are, have you ever been unreasonably expelled or suspended from school?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
6. Because of who you are, have you ever been unable to open a bank account, cash a cheque, or get a loan?
   - ☐ Never
   - ☐ Once
   - ☐ More than once
7. Because of who you are, have you ever had to move to another neighborhood, town, city, state, province, or country?
   - ☐ Never

**Fig. 3.** Intersectional major discrimination Index (InDI-M)—final version.

**Attributions.** Although attributions to specific grounds are not part of the InDI, a global attribution question was included to assess whether respondents understood the item stem as intended. It asked: "Thinking of all of the times that you have been treated unfairly or poorly because of who you are, how often do you think each of the following was a reason why others treated you this way?". An expansive list of possible reasons was provided, as well as a write-in option. In these analyses, attributions were dichotomized as ever a reason versus never or unsure.

**Williams EDS and MDS** (follow-up survey only). The EDS asks about experiences "in [your] day-to-day life", without specifying a timeframe. It was summed overall (irrespective of attribution), with each of nine items assigned a score from 0 (never) to almost every day (5) for a total possible range of 45 points. The MDS includes nine binary items over a lifetime frame and was scored from 0 (no event) to 9 (all events).

**Sociodemographics.** Participants reported their sex assigned at birth and the gender in which they lived in day-to-day life. Respondents were coded as cisgender (non-transgender) men, cisgender women,

☐ Once

☐ More than once

8. Because of who you are, have you ever lost a close relationship (e.g., with a family member, friend, or partner)?

☐ Never

☐ Once

☐ More than once

9. Because of who you are, have you ever been repeatedly harassed at work or school, where you live, or when accessing services?

☐ No

☐ Yes—in one place

☐ Yes—in more than one place

10. Because of who you are, have you ever been threatened with a physical or sexual attack?

☐ Never

☐ Once

☐ More than once

11. Because of who you are, have you ever been physically attacked (e.g., spit on, had objects thrown at you, hit, punched, pushed or grabbed, beaten)?

☐ Never

☐ Once

☐ More than once

12. Because of who you are, have you ever been made to engage in sexual activity, or been touched in a sexual way, that you didn't want?

☐ Never

☐ Once

☐ More than once

13. Because of who you are, have you ever had someone take, damage, or vandalize your property?

☐ Never

☐ Once

☐ More than once

**Fig. 3.** (*continued*)

transfeminine (assigned male at birth; lives as female or feminine), or transmasculine (assigned female at birth; lives as male or masculine). Individuals who were classified as transgender and/or who reported a non-heterosexual sexual orientation were classified as SGM.

A single check-all-that-apply item assessed race/ethnicity, using U.S.- and Canada-specific response options. To create consistent and mutually exclusive ethnoracial categories, respondents were assigned to the first category they endorsed in the following list: white (only), Indigenous, Latin American, Middle Eastern, Black, and Asian (East, Southeast, or South Asian; includes Native Hawaiian/Pacific Islander in the United States). For analyses stratified by ethnoracial status, respondents were coded as Indigenous and/or racialized (i.e., of color) versus white. A binary variable was created to reflect native-born versus immigrant status in the respondent's country of residence.

Income-to-needs ratio was calculated by dividing annual household income by the number of persons supported, in CAD and USD respectively. For regression analyses, country-specific income quartiles were calculated, and a single income quartile variable was created for both countries. Missing values were imputed based on the country-specific median income-to-needs ratio. Other demographic variables included age (continuous) and education.

**Health outcome.** Psychological distress is the outcome most

consistently associated with self-reported discrimination (Paradies et al., 2015; Pascoe and Smart Richman, 2009). We therefore examined associations between each InDI measure and psychological distress, as indicated by the six-item Kessler 6 (K6). Items were scored from 0 (never) to 4 (all the time), for a total score from 0 to 24, and the recommended cut-point of 13 or above was used to indicate severe psychological distress. The K6 has shown good sensitivity and excellent specificity in U.S. population samples (Kessler et al., 2002). Along with age and income-to-needs ratio, childhood physical or sexual abuse (before age 16) was included as a potential confounder, classified as yes, no, or missing.

### 2.5. Data analysis

**Frequencies.** Descriptive statistics were stratified by country. Data quality, acceptability, and scaling were evaluated by examining missing data patterns, maximum endorsement frequencies, and distribution of scores across the possible range.

**InDI-A: dimensionality and internal consistency.** We hypothesized that the InDI-A would be unidimensional. Exploratory (EFA) and confirmatory (CFA) factor analyses were conducted in MPlus v7.4 (Muthen and Muthen, 2015). An *a priori* decision was made to split the data by country, with Canadian data used for EFA, and United States data used for CFA. This provides an initial assessment of the scale's structural invariance, as cultural differences could contribute to different measurement properties. The MLR estimator (maximum likelihood with robust standard errors) was used to account for non-normality (platykurtosis) in the outcome distribution and the use of Likert items. For EFA, one- and two-factor solutions were requested, using Geomin oblique rotation. Scree and parallel analysis plots were examined to evaluate dimensionality. Goodness of fit for CFA was evaluated using parsimony, incremental, and absolute indices (Root Mean Square Error of Approximation, RMSEA; Comparative Fit Index, CFI; Standardized Mean Square Residual, SMSR). Internal consistency (Cronbach's alpha) and item-total correlations were calculated in SAS 9.4 (SAS Institute Inc., 2013), as were all subsequent analyses.

**Construct validity.** Known-groups comparisons were conducted to confirm that patterns of discrimination reported on the InDI were consistent with well-established patterns (i.e., that marginalized groups report greater discrimination). This approach is used to rule out measures that poorly discriminate between groups that are known to differ. Comparisons were based on ethnoracial group (white versus racialized and/or Indigenous) and sexual or gender minority status (SGM versus non-SGM) considering robust evidence that racialized persons and SGM report higher levels of discrimination than their white or non-SGM peers. Cross-stratified intersectional groupings were not used for these analyses because of limited extant data to inform hypotheses. However, to verify that the measures displayed variation by intersectional group membership, we conducted exploratory descriptive analyses cross-stratified by ethnoracial group and SGM status (12 categories) for anticipated, past-year day-to-day, and lifetime major discrimination.

Accounting for the non-normal distribution of scores, medians on each InDI component were calculated and Wilcoxon rank-sum tests were used to identify statistically significant differences in medians at $p < 0.05$.

Next, to determine if InDI scores were associated with psychological distress, logistic regression models were fit separately for the InDI-D and InDI-M (over the lifetime and past year). Models were adjusted for age, childhood abuse, and income quartile. Models were fit for the full sample, as well as stratified by ethnoracial group (racialized and/or Indigenous versus white) and SGM status. Only complete cases were included (n = 2256).

Finally, for the follow-up survey subgroup ($n = 150$), InDI-D and InDI-M frequency scores were compared to the EDS and MDS, respectively. Moderate-to-strong correlation was expected, as the InDI was designed to capture a wider range of discrimination manifestations. Spearman correlations and their 95% confidence intervals were calculated.

**Test-retest reliability.** Among the follow-up subgroup, intraclass correlation coefficients (ICCs) and their 95% confidence intervals estimated re-test reliability of InDI-A scores and frequencies of InDI-D and InDI-M (lifetime). ICCs were adjusted for the number of days between baseline and follow-up, using mixed models via the ICC9 SAS Macro (Hertzmark and Spiegelman, 2010).

**InDI-D: post-hoc analyses.** Post-hoc analyses were conducted to determine whether the magnitude of known-groups differences differed between the first half of InDI-D items regarding being treated "poorly or unfairly" in a range of settings (original items 1–9; see Supplementary Materials), and the second half including specific manifestations of discrimination (Fig. 2). As the "poor or unfair" treatment items demonstrated less variation across sociodemographic groups (results available upon request), we repeated all analyses using only the second half of the items and compared the results to those for the original measure. When using the modified measure, the magnitude of between-group differences and associations with psychological distress either increased or were unchanged from the original measure. Considering these findings and the preference for a shorter measure, results are presented for the modified 9-item InDI-D.

## 3. Results

### 3.1. Sample characteristics

The final sample included 2583 respondents, 58.8% ($n = 1518$) in the United States. Of 150 follow-up participants, 44.7% ($n = 67$) were U.S. residents. Demographic characteristics are described in Table 1.

### 3.2. Structure of the InDI-A

In an initial EFA among Canadian respondents ($n = 1063$), two positively framed items ("I am confident that I will be treated with as much respect as my peers" and "I feel safe in my neighborhood") were found to have weak loadings (0.337 and 0.277, respectively; results not shown). As these items assess conceptually distinct expectations of positive treatment, they were excluded from further analyses.

Results of subsequent EFA including the remaining 9 items are presented in Supplementary Table 1. Examination of eigenvalues (5.175 for Factor 1 and 0.741 for Factor 2), the scree plot, and parallel analysis (Supplementary Fig. 2) supported a one-factor solution. To validate a one-factor solution, U.S. data ($n = 1518$) were subjected to CFA (Table 2). The model fit the data well, with all indices showing acceptable-to-ideal fit (RMSEA = 0.069; CFI = 0.961; SMSR = 0.026). Cronbach's alpha for the InDI-A was 0.93, and item-total correlations ranged from 0.69 to 0.81. Taken together, these results provide support for unidimensionality of the InDI-A.

### 3.3. Discrimination frequencies and data quality

As shown in Table 3, on average, respondents slightly disagreed that they anticipated discrimination (median score = 1.4 in Canada; 1.2 in the United States). Most reported lifetime enacted discrimination, with frequencies ranging from 61.5% for any major discrimination in the U.S. to 84.2% or any day-to-day discrimination in Canada. Over the past year, approximately half in each country reported any day-to-day discrimination while up to one-third reported any major discrimination. Individual InDI-D and InDI-M item frequencies are displayed in Supplementary Tables 2–7. All items took the full range of possible values in both countries. Less than 1.0% of data were missing for all items except for past-year major events (range from 0.4% to 1.6%), which were measured with a follow-up question after respondents endorsed a lifetime major discrimination event. Total InDI-A, past-year InDI-D, and lifetime InDI-M scores across ethnoracial and sexual/

**Table 1**
Demographic characteristics of survey participants, stratified by country.

| | Baseline | | Follow-up | |
|---|---|---|---|---|
| | Canada ($n$ = 1065) $n$ (%) | United States ($n$ = 1518) $n$ (%) | Canada ($n$ = 83) $n$ (%) | United States ($n$ = 67) $n$ (%) |
| Age (median, Interquartile range) | 36 (27–48) | 45 (33–58) | 30 (25–41) | 49 (36–61) |
| Lived gender | | | | |
| Cisgender man | 466 (43.8) | 690 (45.5) | 38 (45.8) | 30 (44.8) |
| Cisgender woman | 559 (52.5) | 764 (50.3) | 45 (54.2) | 36 (53.7) |
| Transmasculine | 20 (1.9) | 31 (2.0) | 0 (0.0) | 1 (1.5) |
| Transfeminine | 19 (1.8) | 31 (2.0) | 0 (0.0) | 0 (0.0) |
| *Missing* | 1 (0.1) | 2 (0.1) | 0 (0.0) | 0 (0.0) |
| Sexual orientation | | | | |
| Straight or heterosexual | 865 (81.2) | 1263 (83.2) | 71 (85.5) | 53 (79.1) |
| Bisexual | 99 (9.3) | 65 (4.3) | 6 (7.2) | 5 (7.5) |
| Gay or lesbian | 50 (4.7) | 161 (10.6) | 4 (4.8) | 9 (13.4) |
| Not sure | 35 (3.3) | 15 (1.0) | 2 (2.4) | 0 (0.0) |
| Asexual | 10 (0.9) | 10 (0.7) | 0 (0.0) | 0 (0.0) |
| *Missing* | 6 (0.6) | 4 (0.3) | 0 (0.0) | 0 (0.0) |
| Sexual and/or gender minority | 174 (16.3) | 255 (16.8) | 10 (12.1) | 14 (20.9) |
| Ethnoracial group | | | | |
| Asian | 245 (23.0) | 374 (24.6) | 41 (49.4) | 24 (35.8) |
| Black | 245 (23.0) | 246 (16.2) | 15 (18.1) | 12 (17.9) |
| Indigenous | 162 (15.2) | 251 (16.5) | 7 (8.4) | 18 (26.9) |
| Latin American | 114 (10.7) | 261 (17.2) | 4 (4.8) | 4 (6.0) |
| Middle Eastern | 112 (10.5) | 188 (12.4) | 5 (6.0) | 1 (1.5) |
| White | 187 (17.6) | 198 (13.0) | 11 (13.3) | 8 (11.9) |
| Born in Canada/United States | | | | |
| Yes | 581 (54.6) | 1081 (71.2) | 40 (48.2) | 52 (77.6) |
| No | 484 (45.4) | 437 (28.8) | 43 (51.8) | 15 (22.4) |
| Educational attainment | | | | |
| High school or less | 186 (17.5) | 209 (13.8) | 15 (18.1) | 9 (13.4) |
| Community college/trade school | 343 (32.2) | 367 (24.2) | 22 (26.5) | 18 (26.9) |
| Some university | 96 (9.0) | 179 (11.8) | 7 (8.4) | 5 (7.5) |
| Bachelor's degree | 302 (28.4) | 465 (30.6) | 27 (32.5) | 21 (31.3) |
| Graduate degree | 136 (12.8) | 296 (19.5) | 11 (13.3) | 14 (20.9) |
| *Missing* | 2 (0.2) | 2 (0.1) | 1 (1.2) | 0 (0.0) |
| Income-to-needs ratio[a] | | | | |
| Less than $10k | 185 (17.4) | 199 (13.1) | 14 (16.9) | 12 (17.9) |
| $10-19.9k | 258 (24.2) | 321 (21.2) | 18 (21.7) | 11 (16.4) |
| $20-29.9k | 168 (15.8) | 257 (16.9) | 17 (20.5) | 15 (22.4) |
| $30-49.9k | 211 (19.8) | 379 (25.0) | 21 (25.3) | 14 (20.9) |
| $50k or more | 123 (11.6) | 245 (16.1) | 8 (9.6) | 11 (16.4) |
| *Missing* | 120 (11.3) | 117 (7.7) | 5 (6.0) | 4 (6.0) |

[a] Household income divided by number of persons supported, in Canadian and United States dollars, respectively.

gender minority intersectional groups are shown in Table 4. Middle Eastern, Indigenous, and Black SGM participants reported the highest frequencies of all three discrimination types. Individual item frequencies for these intersectional groups are shown in Supplementary Tables 8–10. The prevalence or frequency of each item varied significantly across intersectional groups ($p < 0.001$).

### 3.4. Attributions

Among those reporting any enacted discrimination (n = 2134), ethnicity (59.1%), race (55.6%), and gender (48.4%) were the most common attributions (Supplementary Table 8). Write-in attributions included those related to appearance or dress, speech style, family structure, veteran status, criminal record, or having an interracial family. Fifty-two respondents (2.4%) wrote in attributions that we did not consider discrimination based on social identity or position, including political or moral views, "just because", or the respondent's superior intelligence or attractiveness. However, only eight of these respondents (0.4%) did not also indicate one or more of the pre-specified attributions.

### 3.5. Known-groups comparisons

Medians for all InDI measures were significantly higher among Indigenous or racialized (versus white) individuals, including InDI-A (1.4 vs. 1.0, $p < 0.001$), InDI-D past-year (1.0 vs. 0, $p < 0.001$) and lifetime (5.0 vs. 3.0, $p < 0.001$), and InDI-M past-year (0 [Interquartile range; $IQR$ = 0–1] vs. 0 [$IQR$ = 0-0], $p = 0.010$), and lifetime (2.0 vs. 1.0, $p = 0.033$). Similarly, SGM individuals had significantly higher medians for all measures as compared to cisgender heterosexual individuals (all $p < 0.001$), including InDI-A (1.9 vs. 1.2), InDI-D past-year (3.0 vs. 0.0) and lifetime (6.5 vs. 4.0), and InDI-M past-year (0 [$IQR$ = 0–2] vs. 0 [$IQR$ = 0–1]) and lifetime (4.0 vs. 2.0). When comparing Indigenous or racialized to white respondents, Hedge's $g$ effect sizes was moderate for the InDI-A (0.42), small-to-moderate for the InDI-D (0.24–0.33), and very small for the InDI-M (0.06–0.13). For SGM versus cisgender heterosexual individuals, all effect sizes were moderate (InDI-A = 0.46; InDI-D = 0.48–0.49; InDI-M = 0.37).

### 3.6. Associations with psychological distress

Of 2256 participants with complete data, 16.3% ($n$ = 367) were classified as psychologically distressed. As shown in Table 5, each InDI component was significantly positively associated with psychological distress in bivariable and adjusted analyses (all $p < 0.001$). Results of models stratified by ethnoracial and SGM statuses did not differ appreciably (results not shown).

**Table 2**
Confirmatory Factor Analysis of InDI-A among United States respondents (n = 1518).

| Item | Unstandardized (*SE*) | Standardized |
|---|---|---|
| 1. Health care provider might treat me poorly. | 1.00 (–) | 0.79 |
| 2. Might have trouble finding or keeping a job. | 1.08* (.03) | 0.79 |
| 3. Might have trouble getting an apartment or house | 1.11* (.03) | 0.84 |
| 4. Worry about being treated unfairly by a teacher, supervisor, or employer. | 1.04* (.03) | 0.77 |
| 5. May be denied a bank account, loan, or mortgage. | 0.98* (.03) | 0.77 |
| 6. Worry about being harassed or stopped by police or security. | 0.99* (.03) | 0.72 |
| 7. People might try to attack me physically. | 1.05* (0.03) | 0.80 |
| 8. Expect to be pointed at, called names, or harassed when in public. | 1.07* (0.03) | 0.81 |
| 9. Fear that I will have a hard time finding friendship or romance. | 1.04* (0.03) | 0.76 |
| Root Mean Square Error of Approximation (90% CI) | 0.069 (0.060, 0.077) | |
| Comparative Fit Index | 0.961 | |
| Standardized Mean Square Residual | 0.026 | |

[a] See Fig. 1 for full item wording.
Note: Models fit with Maximum Likelihood Estimator with robust standard errors. Coefficients statistically significant at $p < 0.001$ are indicated with an asterisk.

**Table 3**
Enacted and anticipated discrimination reported on the InDI.

| | Canada (n = 1065) | | United States (n = 1518) | |
|---|---|---|---|---|
| | Frequency score Median (*IQR*[a]) [Min, Max] | Proportion reporting any *n* (%) | Frequency score Median (*IQR*[a]) [Min, Max] | Proportion reporting any *n* (%) |
| InDI-D, lifetime (range = 0–9) | 5 (2–8) [0, 9] | 897 (84.2) | 4 (0–8) [0, 9] | 1105 (72.8) |
| InDI-D, past-year (range = 0–18) | 1 (0–5) [0, 18] | 576 (54.1) | 0 (0–4) [0, 18] | 706 (46.5) |
| InDI-M, lifetime (range = 0–26) | 2 (0–6) [0, 26] | 754 (70.8) | 1 (0–5) [0, 26] | 934 (61.5) |
| InDI-M, past-year (range = 0–13) | 0 (0–1) [0, 13] | 350 (32.9) | 0 (0–1) [0, 13] | 395 (26.0) |
| InDI-A, current (range = 0–4) | 1.44 (0.89, 2.11) [0, 4] | – | 1.22 (0.44, 2.00) [0, 4] | – |

[a] *IQR* = interquartile range.

**Table 4**
Frequencies of anticipated, past-year day-to-day, and lifetime major discrimination, stratified by ethnoracial group and SGM status.

| Intersectional group | *n* | Anticipated discrimination | | Past-year day-to-day discrimination | | Lifetime major discrimination | |
|---|---|---|---|---|---|---|---|
| | | Median (*IQR*) | Mean (*SD*) | Median (*IQR*) | Mean (*SD*) | Median (*IQR*) | Mean (*SD*) |
| White non-SGM | 320 | 0.83 (0.11–1.44) | 0.97 (0.95) | 0.0 (0.0–1.0) | 1.50 (3.20) | 1.0 (0.0–4.0) | 2.77 (4.00) |
| White SGM | 62 | 1.55 (0.56–2.44) | 1.55 (1.06) | 3.0 (0.0–9.0) | 4.50 (4.94) | 5.0 (1.0–7.0) | 5.32 (4.52) |
| Asian non-SGM | 461 | 1.22 (0.56–2.00) | 1.30 (0.91) | 0.0 (0.0–3.0) | 2.08 (3.61) | 0.0 (0.0–3.0) | 2.35 (3.95) |
| Asian SGM | 155 | 1.88 (0.78–2.67) | 1.83 (1.16) | 1.0 (0.0–6.0) | 3.58 (4.75) | 2.0 (0.0–5.0) | 3.48 (4.87) |
| Black non-SGM | 440 | 1.56 (0.78–2.11) | 1.50 (0.93) | 1.0 (0.0–4.0) | 2.79 (4.09) | 3.0 (0.0–6.0) | 4.03 (4.42) |
| Black SGM | 50 | 1.89 (0.78–2.67) | 1.82 (1.16) | 2.5 (0.0–10.0) | 5.26 (5.84) | 4.5 (1.0–9.0) | 6.34 (6.32) |
| Indigenous non-SGM | 336 | 1.22 (0.67–2.00) | 1.33 (0.91) | 0.0 (0.0–4.0) | 2.56 (3.80) | 3.0 (0.0–7.0) | 4.73 (5.33) |
| Indigenous SGM | 74 | 2.11 (1.22–2.67) | 1.92 (0.91) | 5.0 (0.0–8.0) | 5.19 (4.81) | 6.0 (3.0–11.0) | 7.35 (5.52) |
| Latin American non-SGM | 319 | 1.11 (0.44–1.89) | 1.23 (0.94) | 0.0 (0.0–3.0) | 2.38 (4.09) | 1.0 (0.0–4.0) | 2.75 (4.10) |
| Latin American SGM | 56 | 1.83 (0.83–2.72) | 1.74 (1.16) | 3.0 (0.0–8.5) | 4.70 (5.27) | 4.5 (1.0–9.5) | 5.84 (5.82) |
| Middle Eastern non-SGM | 267 | 1.67 (1.00–2.33) | 1.67 (0.89) | 3.0 (0.0–8.0) | 4.22 (4.50) | 2.0 (0.0–7.0) | 4.18 (5.10) |
| Middle Eastern SGM | 32 | 2.06 (1.28–2.83) | 2.08 (0.98) | 5.5 (1.5–9.0) | 5.81 (5.11) | 3.0 (2.0–7.0) | 5.00 (5.46) |

**Table 5**
Logistic regression of psychological distress on InDI measures (n = 2256).

| | OR[a] for 1-unit change (95% CI) | AOR[b] for 1-unit change (95% CI) |
|---|---|---|
| InDI-A (range = 0–4) | 2.60 (2.28, 2.96)[c] | 2.09 (1.82, 2.40)[c] |
| InDI-D, lifetime (range = 0–9) | 1.34 (1.28, 1.39)[c] | 1.25 (1.20, 1.31)[c] |
| InDI-D, past-year (range = 0–18) | 1.21 (1.18, 1.24)[c] | 1.16 (1.13, 1.19)[c] |
| InDI-M, lifetime (range = 0–26) | 1.17 (1.14, 1.19)[c] | 1.13 (1.10, 1.16)[c] |
| InDI-M, past-year (range = 0–13) | 1.46 (1.39, 1.55)[c] | 1.32 (1.26, 1.40)[c] |

[a] OR = odds ratio.
[b] AOR = adjusted odds ratio; adjusted for age, income quartile, and childhood physical or sexual abuse.
[c] $p < 0.0001$.

### 3.7. Correlation and agreement with Williams EDS and MDS

Frequency scores on the follow-up InDI-D and Williams EDS measures were strongly positively correlated (Spearman's $r = 0.80$, 95% CI: 0.73, 0.85). For major discrimination, correlation between the InDI-M and the MDS was also high (Spearman's $r = 0.76$, 95% CI: 0.69, 0.82).

### 3.8. Test-retest reliability

The adjusted ICC for test-retest reliability of the InDI-A ($n = 150$) was 0.72 (95% CI: 0.63, 0.79). ICCs for lifetime InDI-D and InDI-M frequencies were 0.70 (95% CI: 0.62, 0.78) and 0.72 (0.63, 0.79) respectively.

## 4. Discussion

### 4.1. Prevalence of discrimination

We found that most respondents in both Canada and the U.S. reported ever experiencing day-to-day discrimination (84.2 and 72.8%, respectively) as well as major discrimination (70.8% and 61.5%). Prevalences should not be misinterpreted as population estimates, considering oversampling of racialized, Indigenous, and and SGM persons. That Canadian residents reported higher levels of discrimination warrants further investigation; this may be an artifact of the younger age distribution of Canadian respondents.

### 4.2. InDI measures

We found the InDI-A to be unidimensional, with a similar structure in both Canada and the United States. We also found evidence of construct validity. As hypothesized, InDI-A scores were higher among ethnoracial and SGM groups. The InDI-A was associated with psychological distress within the full sample, and among racialized, Indigenous, and SGM persons.

Known-groups comparisons and associations with psychological distress provided evidence of construct validity for the InDI-D and InDI-M. Consistent with expectations, both forms of discrimination were more often reported by ethnoracialized and SGM groups and were associated with poorer mental health. Notably, a set of items initially included in the InDI-D, pertaining to “poor or unfair” treatment from a range of actors, demonstrated less sociodemographic variation than the more specific items we retained. Despite careful wording of the “because of who you are” stem, these items may be more susceptible to reporting of generic unfair treatment. Frequencies of discrimination also varied across intersectional groups defined by ethnoracial identity and SGM status, with particularly high frequencies among groups that have historically been under-represented in the literature on intersectional discrimination (e.g., Indigenous and Middle Eastern SGM).

Test-retest reliabilities for the InDI component measures (ICC = 0.70–0.72) were acceptable (Terwee et al., 2007), and similar to or higher than test-retest coefficients reported for original (Krieger et al., 2005) and modified (Ruan et al., 2008) versions of the EOD measure.

### 4.3. Strengths and limitations

The development and validation of the InDI measures had notable strengths and limitations. This evaluation benefited from a large binational sample of neighboring countries that share important similarities as well as differences (e.g., immigration patterns; Siddiqi and Nguyen, 2009) that may impact the nature and measurement of discrimination.

To our knowledge, the InDI comprises the first set of discrimination measures developed with the explicit intention of assessing the phenomenon across a full range of intersections. When taking this approach, it is infeasible to include manifestations of discrimination that are highly specific to particular intersections, such as some of those included in discrimination measures designed for intracategorical analyses. Thus, the InDI is specifically intended for intercategorical analyses. Nevertheless, there is a trade-off between intersectional specificity and broad applicability for intercategorical analyses, and we note that this may account for the high correlation observed with the measures of racism by Williams et al. (1997). The high correlation may also reflect the makeup of the follow-up study sample, of whom 87% were Indigenous and/or racialized. To clarify the differences between these measures, future studies of divergent validity in large, heterogenous samples are warranted.

Establishing construct validity requires a theoretical and empirical basis for hypotheses. The patterning of discrimination across intersectional groups is an open empirical question that the InDI was developed to help answer. Thus, these analyses were structured to evaluate the performance of the measures across groups where differences in discrimination have been well-documented. In addition to cross-validation of the InDI in new samples, future research should investigate its measurement properties across additional axes of social identity and position.

While event responses were comparable over both time frames for the InDI-D and InDI-M, frequency response options for the two measures were not aligned. Due to concerns about recall of day-to-day discrimination over the long-term, the approximate number of discrimination events was measured over the past year. Based on the expected low frequencies of past-year major discrimination, event frequency was measured over the lifetime. Nevertheless, examination of the item frequencies for lifetime versus past-year day-to-day discrimination suggests some degree of telescoping, with high proportions of those indicating lifetime discrimination also indicating past-year discrimination. This may also reflect the chronic nature of day-to-day discrimination. An optimal timeframe for measuring discrimination cannot be identified from existing research, as most measures include a single or unspecified timeframe, and because the relevant timeframe will vary by type of discrimination and health outcome (e.g., cumulative, lagged, or immediate effects). The InDI could be used to further investigate the temporal relationships between discrimination and health, and investigators using it may opt to adapt the response scales to fit their research questions and study designs.

Finally, the InDI-D and InDI-M measures and these analyses are subject to similar limitations as all research on self-reported, perceived discrimination. Reporting of discrimination may be influenced by personality traits or current mental health status. Nevertheless, evidence to date indicates that associations between perceived discrimination and health outcomes persist after control for personality traits, longitudinally when discrimination is measured prior to health outcomes, and when discrimination is experimentally manipulated (Lewis et al., 2015; Schmitt et al., 2014).

### 4.4. Conclusion and next steps

In this binational validity and reliability study, the InDI measures of anticipated, day-to-day, and major discrimination demonstrated strong construct validity and test-retest reliability. We have recommended three revised measures (Figs. 1–3) for research use. We note that while the measures of enacted discrimination (InDI-D and InDI-M) have different response scales for methodologic reasons outlined above, investigators can standardize and sum the scores if appropriate for a given analysis. While this study included validation across two countries, independent validation studies in different populations would be an asset, as would analyses of measurement properties and the distribution of discrimination across diverse intersectional groups.

The InDI measures are substantively novel in several respects, including a wider range of manifestations of discrimination than extant measures developed from models of racism, and using the stem "because of who you are" in lieu of attributions to specific bases of discrimination. Our results demonstrate that the vast majority of respondents (97.6% of those reporting discrimination) correctly interpreted this phrase as referring to social discrimination based on social identity or position. A companion paper (Bauer and Scheim, in press) provides guidance on using the InDI measures, in combination with cross-stratified sociodemographic variables, to investigate intersectional discrimination as a mediator of health inequalities. The InDI can also be applied to studies of the effects of discrimination on health, as modified by individual or intersectional social groups and to social science research on intersectional discrimination, such as longitudinal monitoring of trends in discrimination. It is our hope the InDI contributes to generating a more robust evidence base on the patterning and consequences of intersectional discrimination, thereby informing interventions and social change efforts to promote the well-being of populations at the intersection of multiple axes of social difference.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2018.12.016.

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