Discrimination and Subsequent Mental Health, Substance Use, and Well-being in Young Adults

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abstract

OBJECTIVES: Discrimination has been shown to have profound negative effects on mental and behavioral health and may influence these outcomes early in adulthood. We aimed to examine short-term, long-term, and cumulative associations between different types of interpersonal discrimination (eg, racism, sexism, ageism, and physical appearance discrimination) and mental health, substance use, and well-being for young adults in a longitudinal nationally representative US sample.

METHODS: We used data from 6 waves of the Transition to Adulthood Supplement (2007–2017, 1834 participants) of the Panel Study of Income Dynamics. Outcome variables included self-reported health, drug use, binge drinking, mental illness diagnosis, Languishing and Flourishing score, and Kessler Psychological Distress Scale score. We used logistic regression with cluster-robust variance estimation to test cross-sectional and longitudinal associations between discrimination frequency (overall, cumulative, and by different reason) and outcomes, controlling for sociodemographics.

RESULTS: Increased discrimination frequency was associated with higher prevalence of languishing (relative risk [RR] 1.34 [95% CI 1.2–1.4]), psychological distress (RR 2.03 [95% CI 1.7–2.4]), mental illness diagnosis (RR 1.26 [95% CI 1.1–1.4]), drug use (RR 1.24 [95% CI 1.2–1.3]), and poor self-reported health (RR 1.26 [95% CI 1.1–1.4]) in the same wave. Associations persisted 2 to 6 years after exposure to discrimination. Similar associations were found with cumulative high-frequency discrimination and with each discrimination subcategory in cross-sectional and longitudinal analyses.

CONCLUSIONS: In this nationally representative longitudinal sample, current and past discrimination had pervasive adverse associations with mental health, substance use, and well-being in young adults.

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Ms Lei conceptualized and designed the study, analyzed and interpreted the data, drafted the initial manuscript and figures, and reviewed and revised the manuscript; Mr Shah and Dr Schickedanz conceptualized and designed the study, analyzed and interpreted the data, and reviewed and revised the manuscript; Mr Biely and Dr Jackson analyzed and interpreted the data and reviewed and revised the manuscript; Drs Dudovitz, Barnert, Hotez, Guerrero, Bui, and Sastry critically reviewed and revised the manuscript for important intellectual content; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

WHAT'S KNOWN ON THIS SUBJECT: Although the adverse impact of discrimination on health outcomes is well established, there remain substantial gaps in evidence on the impact of different types of discrimination over time and at sensitive developmental periods, such as the transition to adulthood.

WHAT THIS STUDY ADDS: In this study, we found that increased discrimination (including racism, sexism, ageism, and physical appearance discrimination) has short-term, long-term, and cumulative associations with adverse mental health, substance use, and well-being outcomes in young adults.

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Discrimination is widespread (with most American adults reporting having experienced discrimination of some kind) and has been exacerbated by the recent COVID-19 pandemic and concurrent sociopolitical events.[1,2] Although the adverse impact of discrimination on health outcomes is well established, there remain substantial gaps in evidence on the impact of discrimination over time and at specific developmental periods, such as the transition to adulthood (ie, ages 18–28), a sensitive developmental window that sets the stage for health trajectories over the life course.[3,4]

Herein, we use the term "discrimination" to refer to interpersonal discrimination, in contrast to institutional or structural discrimination, which were not directly measured in our study. Interpersonal discrimination refers to the behavior of individual members of one group that is intended to have a harmful effect on the members of another group.[5] Institutional and structural discrimination refer to policies of the dominant institutions that have harmful effects on minority groups.[5] For our study, we focus on interpersonal discrimination of various types (ie, racism, sexism, ageism, appearance discrimination) but recognize that institutional and structural discrimination shape and reinforce interpersonal discrimination.

Numerous studies have found negative impacts of discrimination on behavioral health and well-being (defined as mental and substance use disorders and the promotion of mental health, resilience, and thriving) during childhood and later adulthood.[4,6–9] Experiencing discrimination (particularly racism and sexism) is associated with higher reported stress, poorer reported health, psychological distress, psychiatric diagnoses, and increased substance use.[1,7,10–12] A few studies have also revealed that discrimination is cumulative over the life course in older adults and young women.[13,14] However, these previous studies are cross-sectional or are focused on specific subpopulations and specific types of discrimination, which does not allow for investigation of the cumulative and longitudinal effects of different types of discrimination on health in the general population.[8,12,15–17] In particular, differential associations between different types of discrimination and mental health and well-being outcomes are not well understood and could elucidate important leverage points for intervention.

The transition to adulthood is a critical time for development and manifestation of mental health disorders and an opportunity for health-promoting interventions, with 75% of all lifetime mental health disorders presenting by age 24 years.[18] However, the risk factors for mental illness in this age group are poorly understood. Although the negative impact of discrimination on behavioral health has been extensively studied in children and older adults, there are no national longitudinal studies examining the cumulative impact of different types of discrimination on behavioral health and well-being in young adults.

In this study, we examined short-term, long-term, and cumulative associations between experiences of interpersonal discrimination and mental health and behavioral health in a national population-based sample of young adults over a decade. We also investigated how these short- and long-term associations differed on the basis of the type of discrimination experienced. We hypothesized that discrimination of various types would be associated with adverse mental health and well-being outcomes. If certain types of discrimination were more strongly associated with health risks, our approach could detect that as well.

METHODS

Sample and Data Sources

We used the Panel Study of Income Dynamics (PSID), the longest-running American panel survey, and its Transition to Adulthood Supplement (TAS).[19,20] Our study examined 6 waves of the TAS (2007, 2009, 2011, 2013, 2015, and 2017) conducted via telephone interview. The TAS includes information on discrimination, mental health outcomes, self-reported health, and sociodemographic characteristics for all participants. Through 2015, PSID participants were eligible for the TAS if they were born into PSID households, were cohort members in the 1997 PSID Child Development Supplement, and had reached 18 years old; beginning in 2017, all PSID sample members aged 18 to 28 years were eligible for the TAS. To ensure our sample could be followed through all 6 waves, our analytic sample was restricted to include only individuals who participated in the 2017 TAS and were members of the 1997 Child Development Supplement cohort ($N = 1834$).

Discrimination Measure

Experiences of interpersonal discrimination were measured by using the Everyday Discrimination Scale, a well-validated and widely used discrimination scale, in each of the 6 TAS waves.[21–23] Participants were asked how often they experienced the following in day-to-day life: "How often … " (1) " … were you treated with less courtesy," (2) " … did you receive poorer service," (3) " … did others treat you as stupid," (4) " … did others act afraid

of you," (5) " … did others treat you as dishonest," and (6) " … did others act superior to you?" The response options were on a 6-point scale ranging from "never" (score of 1) to "almost every day" (score of 6), specified as a continuous variable. To assess cumulative associations of discrimination over time, we constructed a discrimination wave count variable indicating the number of the past consecutive 3 waves a participant had experienced high levels of everyday discrimination (a few times a month or more).

As part of the Everyday Discrimination Scale, participants experiencing discrimination were asked whether they attributed the main reason for their experiences to their ancestry or national origin, sex, racial and ethnic identity, age, height and/or weight, other physical appearance, or another reason, per the approach used in previous studies.[21–23] For our analyses, we combined ancestry or national origin with racial and ethnic identity discrimination, as well as height and/or weight with physical appearance; our final composite categories for reason for discrimination were as follows: (1) racial and ethnic identity or ancestry, (2) sex, (3) age, (4) physical appearance, and (5) other. We recognize that race is a social construct conceptually distinct from ancestry. We chose to combine the race and ancestry categories because our empirical work found they were overlapping in our respondents and because of the conflation of the 2 concepts in public discourse, which would likely lead many respondents to use the 2 concepts somewhat interchangeably.

Outcome Measures

Mental health and well-being were evaluated with 3 different outcomes: mental illness diagnosis, the Kessler Psychological Distress Scale (K6) score, and the Languishing and Flourishing (L/F) score.[24,25] Mental illness diagnosis was assessed by a single binary response item in which participants were asked whether a health professional had diagnosed them with an "emotional, nervous, or psychiatric problem." The diagnosis measure was intended to capture clinically diagnosed mental illness (which may be subject to health care and access disparities), whereas the K6 score measured mental illness symptom burden and the L/F score captured impact on mental well-being, with both of the latter relying on self-report and not requiring clinical diagnosis because not all participants may have had access to mental health care for diagnosis.

The K6 is a widely used and well-validated scale examining self-reported emotional distress in the past 30 days and is extensively used to identify individuals at high risk for severe mental illness without a clinical diagnosis.[24,26–28] The responses to the 6 K6 assessment items were on a 5-point scale ranging from "none of the time" (score of 0) to "all of the time" (score of 4).[24] The scores were then summed (range of 0–24). We dichotomized the K6 score into low or medium distress (score = 0–12) or high distress (score = 13–24) because a score of ≥13 indicates a clinically significant degree of emotional distress and is an established cut point for the K6.[24,26–28]

The L/F is a well-validated scale evaluating self-reported well-being measures and has been used to understand mental health as a syndrome of symptoms of positive feelings and positive functioning in life.[25,29,30] The L/F score is calculated as the sum of 3 subscales: emotional well-being, social well-being, and psychological well-being.[25] The response options for the assessment items were on a 6-point scale ranging from "never" (score of 1) to "every day" (score of 6). The average scores from the 3 subscales were then summed (range of 1–18), with a higher score indicating higher levels of flourishing. We then dichotomized L/F into languishing and not languishing according to Keyes' original distinction: a score of 1 to 2 on at least 1 of 3 emotional well-being questions and a score of 1 to 2 on at least 6 of 11 psychological and social well-being questions is considered languishing.[25,29,30]

We dichotomized the substance use responses according to the Substance Abuse and Mental Health Services Administration (SAMHSA) and National Institute on Alcohol Abuse and Alcoholism (NIAAA) criteria, which are widely used in previously published literature.[31–33] Binge drinking was assessed in a binary fashion as intake of >4 (for women) or >5 (for men) drinks a day for >12 days in the last 365 days, as indicated by the SAMHSA and NIAAA criteria. Drug use was assessed in a binary fashion as use of amphetamines, marijuana, tranquilizers, barbiturates, or cocaine in the last 12 months without a prescription by a physician, which is also indicated by the SAMHSA and NIAAA criteria.

Self-reported health is a well-validated and extensively used measure associated with outcomes such as mortality, mental health, and health care use.[34–37] In our study, self-reported health was assessed by a single item in which participants rated their health as poor, fair, good, very good, or excellent, which we dichotomized into fair or poor versus good, very good, or excellent, a commonly used dichotomization of this measure.[35,36]

Covariates

Age, sex, race and/or ethnicity, marital status, educational attainment, parental educational attainment (less than high school, high school only, or any college or higher degree), family income level (<100% federal poverty level [FPL], 100%–199% FPL, 200%–400% FPL, and >400% FPL), health insurance status (insured versus uninsured), and health care use variables were included in all regression models. The health care use variable was used to assess whether the participant had an annual checkup in the last year. All covariates, except race and/or ethnicity and sex, were collected and allowed to vary at each wave in the model.

Statistical Analysis

We used a logistic regression with cluster-robust variance estimation to account for correlation within individuals. All analyses were conducted in 2020 by using Stata/SE version 16.1 (Stata Corp, College Station, TX). We first examined cross-sectional associations between frequency of discrimination (overall and by different reason) and our 6 outcomes of interest: (1) mental illness diagnosis, (2) severe psychological distress by K6 score, (3) languishing, (4) illicit drug use, (5) binge drinking, and (6) self-reported poor overall health. We then used logistic regression to test longitudinal associations between frequency of discrimination (overall and by different reason) and our 6 outcomes of interest lagged over 2, 4, and 6 years (ie, 1, 2, and 3 waves). In these models, participants with the outcome of interest (eg, extant mental illness) at baseline were excluded. To investigate the cumulative effects of high-frequency discrimination over time, we used logistic regression to test the association between the discrimination wave count variable and our 6 outcomes of interest. We adjusted all analyses with the 2017 TAS individual longitudinal weight to account for the complex survey design and nonresponse.[37] For each outcome, we report the relative risk (RR) and 95% confidence interval (CI) for those who experienced any frequency of discrimination (overall and by type) relative to those who did not experience any discrimination.

We also performed 3 sensitivity analyses. First, to test whether particular levels of discrimination frequency were associated with poorer mental health outcomes, we repeated the models with a 3-category specification of our discrimination measure to compare participants who experienced no discrimination with those who experienced discrimination a few times a year or less and those who experienced discrimination a few times a month or more. Second, we confirmed that the combined ancestry or nationality and racial and ethnic identity discrimination reason variable, as well as the combined height and/or weight and other physical appearance discrimination reason variable, did not yield regression model results substantially different from results of models with these discrimination reasons treated separately. Third, we confirmed that the findings were robust to alternate specifications of the K6 score, the L/F score, substance use, and self-reported health outcomes as continuous variables.

RESULTS

Our study sample included 1834 participants between the ages of 18 and 28, with an average participation of 3 waves and an average response rate of 90% over the 6 waves. An assessment of the longitudinal weights comparing demographic, geographic, and socioeconomic characteristics of the original cohort with the attrition-adjusted 2017 TAS sample revealed that the samples were similar (at least on the basis of observed characteristics), suggesting that attrition across waves was minimal and unlikely to influence results.[37] Just less than half of the sample was female, one-sixth identified as Black or African American, another sixth identified as Latinx or Hispanic, less than 5% of the sample identified as Asian or Native Hawaiian and Other Pacific Islander, and just over a third were enrolled in school in 2017 (Table 1). Approximately 93% of the sample reported experiencing some frequency of discrimination across the 6 waves, with 93% of white participants, 91% of Black participants, 94% of Hispanic/Latinx participants, and 93% of the remaining participants of other racial and ethnic identities (which include but are not limited to Asian, native Hawaiian and other Pacific Islander, American Indian, Alaskan native, and other Indigenous peoples) reporting experiencing some frequency of discrimination. The main reasons for discrimination, in order of prevalence and across all waves, were ageism (26%), physical appearance discrimination (19%), sexism (14%), and racism (13%).

Mental Health and Well-being

Increased frequency of overall discrimination was significantly associated with higher prevalence of languishing cross-sectionally (Table 2) and with higher prevalence of developing languishing longitudinally when there was a baseline of no languishing (Table 3). More cumulative waves in which a participant experienced high-frequency discrimination was also associated with higher prevalence of languishing (Table 4). Increased frequency of each type of discrimination was significantly

TABLE 1 Weighted Demographic Differences in Perceived Experiences of Discrimination Over 10 Years

	Overall (N = 1834)	Never Experienced Perceived Discrimination (n = 135)	Ever Experienced Any Perceived Discrimination (n = 1699)
Age, y, mean (SD)	22.7 (0.7)	19.9 (2.5)	22.9 (3.1)
Sex, *n* (%)			
Male	963 (53)	76 (8)	887 (92)
Female	871 (47)	59 (7)	812 (93)
Race or ethnic group, *n* (%)			
White	1230 (67)	114 (8)	983 (92)
Black	270 (15)	147 (10)	972 (90)
Hispanic	259 (14)	22 (7)	204 (93)
Asian American or Native Hawaiian and other Pacific Islander	43 (3)	3 (7)	40 (93)
Indigenous or other	26 (1)	2 (8)	24 (92)
Family income, *n* (%)			
<100% FPL	177 (10)	20 (11)	157 (89)
100%–199% FPL	248 (16)	15 (6)	233 (94)
200%–400% FPL	535 (31)	26 (5)	509 (95)
>400% FPL	874 (43)	75 (9)	799 (91)
Marital status, *n* (%)			
Married	215 (12)	8 (4)	207 (96)
Never married	1565 (85)	126 (8)	1439 (92)
Other	55 (3)	0 (0)	55 (100)
Educational attainment, *n* (%)			
Less than high school	278 (15)	46 (17)	232 (83)
High school only	386 (34)	26 (7)	360 (93)
Any college or higher degree	1170 (80)	63 (5)	1107 (95)
Parental educational attainment, *n* (%)			
Less than high school	197 (11)	8 (4)	189 (96)
High school only	350 (19)	29 (8)	321 (92)
Any college or higher degree	1248 (70)	96 (8)	1152 (92)
Health insurance status, *n* (%)			
Uninsured	259 (14)	19 (7)	240 (93)
Medicaid	264 (14)	26 (10)	238 (90)
Private	1155 (64)	68 (6)	1087 (94)
All other coverage types	139 (8)	20 (14)	119 (86)
Annual doctor checkup (in last year), *n* (%)			
Yes	1177 (64)	96 (8)	1081 (92)
No	652 (36)	39 (6)	613 (94)
Outcome measures, *n* (%)			
Languishing	454 (25)	33 (7)	421 (93)
High psychological distress	95 (5)	2 (2)	93 (98)
Mental illness diagnosis	343 (19)	21 (6)	322 (97)
Drug use	672 (39)	29 (4)	643 (96)
Binge drinking	187 (16)	8 (4)	179 (96)
Poor self-reported health	205 (11)	10 (5)	195 (95)

The demographic breakdown is based on the weighted 2017 TAS. The never experiencing discrimination versus ever experiencing discrimination breakdown is based on whether a participant experienced perceived discrimination in any of the 6 waves.

associated with higher prevalence of languishing cross-sectionally (Table 2); however, longitudinal associations were mostly only significant for the 2-year lagged outcomes (Table 3).

Increased discrimination (frequency and cumulative high-frequency exposure) was associated with higher prevalence of severe psychological distress by K6 score in cross-sectional analyses (Tables 2 and 4). Longitudinal analyses also revealed that discrimination was significantly associated with the development of severe psychological distress (Table 3).

Increased frequency of discrimination (Table 2) and increased cumulative waves of high-frequency discrimination (Table 4) were associated with higher prevalence of mental illness diagnosis cross-sectionally and with higher prevalence of mental illness diagnosis longitudinally (Table 3). These cross-sectional results were driven by all types of discrimination, except racism (Table 2). Longitudinally, only increased frequency of other discrimination was significantly associated with higher prevalence of being diagnosed with mental illness (Table 3).

TABLE 2 Pooled Cross-sectional Associations Between Frequency of Type of Discrimination Experienced and Behavioral Health and Well-being Outcomes

	RR (95% CI)					
	Languishing	High Psychological Distress	Mental Illness Diagnosis	Drug Use	Binge Drinking	Poor Self-reported Health
Overall discrimination frequency	1.34 (1.2–1.4)***	2.03 (1.7–2.4)***	1.26 (1.1–1.4)***	1.24 (1.2–1.3)***	1.08 (1.0–1.2)	1.26 (1.1–1.4)***
Racism frequency	1.44 (1.3–1.6)***	2.04 (1.5–2.6)***	1.15 (0.9–1.4)	1.28 (1.2–1.4)***	1.03 (0.9–1.2)	1.02 (0.8–1.2)
Sexism frequency	1.46 (1.3–1.7)***	2.07 (1.5–2.6)***	1.38 (1.1–1.6)***	1.31 (1.2–1.4)***	1.18 (1.0–1.4)	1.20 (1.0–1.4)
Ageism frequency	1.40 (1.2–1.6)***	2.61 (1.8–3.4)***	1.25 (1.0–1.5)*	1.27 (1.1–1.4)***	1.14 (1.0–1.3)*	1.15 (1.0–1.4)
Physical appearance discrimination frequency	1.45 (1.3–1.6)***	2.32 (1.8–2.8)***	1.29 (1.1–1.5)***	1.28 (1.2–1.4)***	1.09 (0.9–1.3)	1.31 (1.1–1.5)***
Other discrimination frequency	1.18 (1.1–1.3)*	1.58 (1.3–1.9)***	1.29 (1.1–1.5)**	1.30 (1.2–1.4)***	1.08 (0.9–1.2)	1.22 (1.0–1.4)*

Models were adjusted for age, sex, race, family income, marital status, educational attainment, parental educational attainment, health insurance status, and annual doctor checkup. The "other discrimination" category includes discrimination based on sexual orientation, religion, occupation, etc. Sample sizes for the 6 waves were as follows: 2007 TAS: $n = 90$; 2009 TAS: $n = 430$; 2011 TAS: $n = 735$; 2013 TAS: $n = 1031$; 2015 TAS: $n = 1267$; 2017 TAS: $n = 1834$; total: $N = 5377$.
* $P < .05$; ** $P < .01$; *** $P < .001$.

Substance Use

The aforementioned association was also seen with drug use: there was a higher prevalence of drug use cross-sectionally and longitudinally (Tables 2 and 3). More cumulative waves in which a participant experienced high-frequency discrimination was also associated with higher prevalence of drug use (Table 4). Longitudinally, only increased frequency of racism and ageism were significantly associated with higher prevalence of drug use (Table 3).

In terms of short-term, long-term, and cumulative associations, frequency of discrimination (overall and by type) was not significantly associated binge drinking outcomes (Tables 2–4).

Self-reported Health

Overall discrimination was both cross-sectionally and longitudinally associated with poor self-reported health (Tables 2 and 3). More cumulative waves in which a participant experienced high-frequency discrimination was associated with higher prevalence of poor health (Table 4). For discrimination type, only increased frequency of physical appearance discrimination and other discrimination was significantly associated with higher prevalence of poor health (Tables 2 and 3).

DISCUSSION

In this longitudinal study of a nationally representative sample of young adults, we found short-term, long-term, and cumulative associations between frequency of discrimination and adverse mental health, behavioral health, and well-being outcomes. Increased frequency of discrimination was positively associated with higher prevalence of languishing, psychological distress, mental illness diagnosis, poor self-reported health, and drug use cross-sectionally and in 2- to 6-year lagged models. Cumulative high-frequency discrimination was also associated with higher prevalence of languishing, psychological distress, mental illness diagnosis, poor self-reported health, and drug use.

Although there were some small differences among different types of discrimination, the overlap in CIs for each outcome indicated statistically indistinguishable differences regardless of the type of discrimination. The similar patterns seen across different types of discrimination provide evidence supporting a common pathway linking discrimination of various types with adverse mental health and well-being outcomes. In particular, our lagged models provide strong evidence that discrimination of all types has downstream associations with adverse mental health, substance use, and well-being outcomes.

Previous studies have conceptualized the neuroendocrine stress response and the allostatic load model of stress as the underlying mechanism of how discrimination affects health outcomes, which could also be a potential mechanism for our hypothesized central pathway.[7,38] The associations we found between different types of discrimination and adverse behavioral health and well-being outcomes are likely also intertwined with mental health service disparities (including care access, provider bias, and structural and institutional discrimination in

TABLE 3 Pooled Longitudinal Associations Between Frequency of Type of Discrimination Experienced and Behavioral Health and Well-being Outcomes With 2-, 4-, and 6-Year Lags

	RR (95% CI)																	
	Languishing			High Psychological Distress			Mental Illness Diagnosis			Drug Use			Binge Drinking			Poor Self-Reported Health		
	2 y	4 y	6 y	2 y	4 y	6 y	2 y	4 y	6 y	2 y	4 y	6 y	2 y	4 y	6 y	2 y	4 y	6 y
Overall discrimination frequency	1.19 (1.1–1.3)**	1.14 (1.0–1.3)*	1.13 (0.9–1.3)	1.55 (1.2–1.9)***	1.74 (1.3–2.2)***	1.75 (1.2–2.3)***	1.29 (1.1–1.6)*	1.24 (1.0–1.5)*	1.25 (1.0–1.6)	1.14 (1.0–1.3)*	1.19 (1.0–1.4)*	1.25 (1.0–1.5)*	1.07 (0.9–1.3)	0.98 (0.8–1.2)	0.88 (0.6–1.2)	1.14 (1.0–1.3)	1.30 (1.1–1.6)**	1.33 (1.0–1.7)*
Racism frequency	1.38 (1.1–1.7)**	1.12 (0.9–1.4)	1.1 (0.9–1.4)	2.00 (1.1–2.9)**	1.62 (0.8–2.4)*	—	0.90 (0.6–1.2)	0.69 (0.4–1.0)	1.44 (0.9–2.0)	1.31 (1.1–1.6)**	1.26 (0.9–1.6)	1.52 (1.1–2.0)**	1.05 (0.8–1.5)	0.66 (0.4–1.0)	1.02 (0.5–2.2)	1.08 (0.8–1.3)	1.22 (0.9–1.8)	1.00 (0.6–1.8)
Sexism frequency	1.20 (1.0–1.5)	1.01 (0.7–1.3)	1.14 (0.8–1.5)	2.01 (1.4–2.6)***	3.45 (1.4–5.4)***	2.66 (0.2–5.0)*	1.24 (0.9–1.6)	1.28 (0.8–1.7)	1.23 (0.5–1.9)	1.20 (0.9–1.5)	1.00 (0.7–1.3)	1.41 (0.9–1.9)	1.17 (0.9–1.5)	1.03 (0.7–1.4)	0.93 (0.5–1.3)	0.89 (0.6–1.2)	0.97 (0.7–1.3)	1.14 (0.6–1.6)
Ageism frequency	1.27 (1.1–1.5)**	1.06 (0.9–1.3)	1.40 (1.0–1.8)*	1.48 (1.1–1.9)**	2.10 (1.3–2.9)***	1.71 (0.9–2.50)*	1.19 (0.9–1.5)	1.15 (0.8–1.5)	1.67 (1.0–2.4)*	1.27 (1.0–1.5)*	1.35 (1.1–1.6)**	1.41 (1.0–1.8)*	1.27 (0.9–1.6)	0.93 (0.6–1.2)	0.97 (0.5–1.4)	1.10 (0.8–1.3)	1.46 (1.0–1.9)**	1.37 (0.9–1.9)
Physical appearance discrimination frequency	1.26 (1.0–1.5)**	1.19 (1.0–1.4)	1.16 (0.9–1.4)	2.14 (1.3–3.0)***	1.86 (1.2–2.6)**	1.44 (0.6–2.3)	1.24 (0.9–1.5)	1.34 (1.0–1.7)*	1.22 (0.8–1.6)	1.09 (0.9–1.3)	1.20 (1.0–1.5)	1.42 (1.0–1.9)*	1.09 (0.8–1.3)	0.97 (0.7–1.2)	0.97 (0.7–1.2)	1.27 (1.0–1.6)*	1.33 (1.0–1.6)**	1.57 (1.0–2.1)**
Other discrimination frequency	1.31 (1.1–1.5)**	1.20 (1.0–1.4)*	1.20 (0.9–1.5)	1.60 (1.3–1.9)**	1.59 (1.1–2.1)**	2.70 (1.1–4.3)***	1.42 (1.0–1.8)*	1.49 (1.0–2.0)*	1.33 (0.7–1.9)	1.17 (0.9–1.4)	1.19 (0.9–1.4)	1.37 (0.7–2.0)	0.85 (0.5–1.2)	0.83 (0.5–1.1)	0.77 (0.4–1.1)	1.07 (0.8–1.3)	1.37 (1.0–1.7)*	1.63 (1.0–2.2)**

Models were adjusted for age, sex, race, family income, marital status, educational attainment, parental educational attainment, health insurance status, and annual doctor checkup. The "other discrimination" category includes discrimination based on sexual orientation, religion, occupation, etc. Sample sizes for the 6 waves were as follows: 2007 TAS: $n = 90$; 2009 TAS: $n = 430$; 2011 TAS: $n = 735$; 2013 TAS: $n = 1031$; 2015 TAS: $n = 1267$; 2017 TAS: $n = 1834$; total: $N = 5377$. —, insufficient data.

* $P < .05$; ** $P < .01$; *** $P < .001$.

health care), leading to inequities in diagnoses, treatment, and outcomes.[39,40]

Our study helps shed light on the multidimensional impact of discrimination on behavioral health and well-being and provides evidence supporting the recent shift in health care to address the effects of discrimination on mental health, substance use, and well-being.[41] Our findings provide insight into specific types of discrimination linked to mental health and into a critical window during adulthood in which to intervene to impact health outcomes. As the COVID-19 pandemic has brought on new mental health challenges, particularly for those in vulnerable populations, we have an opportunity to rethink and improve our mental health services to better address discrimination and provide more equitable delivery.[42]

Our study had several limitations. First, perceived discrimination and the main reason for those experiences are established by self-report and subject to recall bias and variation in perceptions of what constitutes discrimination. Second, we examined different types of discrimination separately, but many individuals experience multiple types of discrimination simultaneously and may not respond to discrimination measures differently. Third, we did not address whether structural and/or institutional discrimination contributed to our outcomes. Fourth, despite the longitudinal nature of our data and analyses, we cannot determine causality.

CONCLUSIONS

This is the first study to find short-term, long-term, and cumulative associations between various types of interpersonal

TABLE 4 Associations Between Number of Waves in Which High-Frequency Discrimination Was Experienced and Behavioral Health and Well-being Outcomes

	RR (95% CI)					
	Languishing	High Psychological Distress	Mental Illness Diagnosis	Drug Use	Binge Drinking	Poor Self-Reported Health
1 wave of high-frequency overall discrimination	1.33 (0.9–1.8)	3.00 (0.9–5.1)**	1.19 (0.7–1.7)	1.42 (1.1–1.7)**	1.15 (0.6–1.7)	1.34 (0.7–2.0)
2 waves of high-frequency overall discrimination	1.70 (1.1–2.3)**	5.3 (1.4–9.1)***	1.67 (0.9–2.4)*	1.62 (1.1–2.1)**	1.12 (0.5–1.7)	2.30 (1.1–3.5)**
3 waves of high-frequency overall discrimination	2.06 (1.4–2.8)***	7.3 (2.0–12.6)***	1.89 (0.9–2.8)*	1.00 (0.5–1.5)	0.92 (0.2–1.7)	2.00 (0.7–3.3)*

Models were adjusted for age, sex, race, family income, marital status, educational attainment, parental educational attainment, health insurance status, and annual doctor checkup. Sample sizes for the 6 waves were as follows: 2007 TAS: $n = 90$; 2009 TAS: $n = 430$; 2011 TAS: $n = 735$; 2013 TAS: $n = 1031$; 2015 TAS: $n = 1267$; 2017 TAS: $n = 1834$; total: $N = 5377$.

* $P < .05$; ** $P < .01$; *** $P < .001$.

discrimination and adverse mental health and substance use outcomes in a nationally representative young adult population. Our longitudinal findings suggest that discrimination has downstream long-term and cumulative associations with mental and behavioral health that contribute to health inequity. With the shifting conceptualization of mental health and the growing recognition of disparities in mental health care and treatment, preventive approaches reducing discrimination upstream could play a critical role in decreasing these inequities and minimizing their health impact, particularly during the transition to adulthood.

ABBREVIATIONS

CI: confidence interval
FPL: Federal Poverty Level
K6: Kessler Psychological Distress Scale
L/F: Languishing and Flourishing
NIAAA: National Institute on Alcohol Abuse and Alcoholism
PSID: Panel Study of Income Dynamics
RR: relative risk
SAMHSA: Substance Abuse and Mental Health Services Administration
TAS: Transition to Adulthood Supplement

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