AMERICAN PSYCHOLOGICAL ASSOCIATION

Psychology of Addictive Behaviors

ISSN: 0893-164X

2023, Vol. 37, No. 6, 734–745
https://doi.org/10.1037/adb0000953

Contact Reduces Substance Use Stigma Through Bad Character Attributions, Especially for U.S. Health Care Professionals

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Objective: People with substance use disorders (SUDs) are faced with pervasive stigma. Education-based interventions tend to emphasize biological causes of dependency; however, health care professionals still stigmatize people who use substances despite being more knowledgeable about biological causes. There may be an important moderating role of personal contact since health care professionals may treat people in the throes of dependency. ***Method:*** We tested how substance use stigma may be explained by causal attributions, working in health care, and personal contact. A nationally representative sample of the U.S. general population ($N = 6{,}812$) was collected with targeted oversampling of health care professionals ($N = 788$). Using a vignette paradigm, desire for social distance was measured along with causal attributions and contact. ***Results:*** Health care professionals were no less stigmatizing than the general population. However, attributing substance dependency to bad character was robustly associated with stigma, but these beliefs were moderated by the interaction between working in health care and contact. Mediation decomposition confirmed that contact transmitted its effect by lowering bad character attributions, and this mediation was significantly stronger for health care professionals. ***Conclusions:*** Health care professionals and the general population may hold similar levels of stigma when accounting for attributions, and personal contact plays an important role. We discuss the implications of these results for stigma-reduction campaigns and emphasize deconstructing personal culpability narratives surrounding substance use disorders.

Public Health Significance Statement
Attributing substance dependency to bad character is related to higher stigma, but personal contact can help circumvent these effects, especially in health care professionals.

Keywords: stigma, health knowledge, substance dependency

Supplemental materials: https://doi.org/10.1037/adb0000953.supp

Drug-related overdose deaths have steadily increased since 1999 (Hedegaard et al., 2020), surpassing 100,000 deaths from May 2020 to April 2021 (Ahmad et al., 2021). Despite numerous effective evidence-based treatments for substance dependency (Ali et al., 2017; Chiesa & Serretti, 2014; Steinka-Fry et al., 2017), as few as 10% of individuals who met criteria for a substance use disorder (SUD) report receiving treatment (Substance Abuse and Mental Health Services Administration, 2022). When in health care settings, people with SUDs often face negativity (see Avery, 2019, for a review), and report receiving lower quality care that deters them from seeking treatment in the future (e.g., Biancarelli et al., 2019; Cockroft et al., 2019). Thus, stigma remains a key barrier to treating SUDs (K. A. Crapanzano et al., 2018; Hammarlund et al., 2018; Luoma, 2010) and often undermines treatment efforts (Kennedy-Hendricks et al., 2017; Wakeman & Rich, 2018). Desire for social distance, a key indicator of stigma (Perry et al., 2020; Pescosolido et al., 2021), remains prevalent among health care workers even if they are willing to perform

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This project was conducted in collaboration with the not-for-profit organization, Shatterproof, and with support from The Hartford. The authors would like to thank Brea L. Perry who contributed to the construction of the survey. Anne C. Krendl was paid by Shatterproof as a consultant.

All data and analyses presented in this article have not been published elsewhere. All data can be made available upon request and with appropriate permissions.

Lucas J. Hamilton played a lead role in conceptualization, formal analysis, visualization, and writing–original draft and an equal role in writing–review and editing. Max E. Coleman played an equal role in formal analysis, visualization, and writing–review and editing. Anne C. Krendl played a lead role in methodology, resources, and supervision and an equal role in writing–review and editing.

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standard levels of care (Werremeyer et al., 2021). Studies have shown that substance use treatment staff view patients as dangerous, untrustworthy, and responsible for their disorder, culminating in lower quality of care (Scott et al., 2021; van Boekel et al., 2013).

There remain several important gaps in our understanding of substance use stigma among health care professionals. First, it remains poorly understood whether stigma differs in magnitude between health care professionals and the general population. Even if health care professionals hold potentially less stigma than the general population, its pernicious consequences still pervade as seen through their care provision and reported patient experiences (e.g., Scott et al., 2021; van Boekel et al., 2013; Werremeyer et al., 2021). Second, irrespective of similarities or differences in the magnitude of stigma between health care professionals and the general population, it is unknown why stigma toward people who use substances remains so robust in health care settings. Simply put, is stigma toward substance dependence among health care providers driven by the same factors as it is for nonhealth care providers in the general population?

These questions are important in light of an overall failure to reduce substance use stigma. While education-based interventions work well for a variety of physical health conditions (see Cook et al., 2014) and also are recommended for mental health stigma (National Academies of Sciences, Engineering, and Medicine, 2016), these interventions show either short term or no change in substance use stigma for health care professionals (e.g., K. Crapanzano et al., 2014; Eukel et al., 2019; Komaromy et al., 2016; Scott et al., 2021). Moreover, stigma in health care populations can be exacerbated by an overexposure to severe cases combined with poor mentorship and a lack of exposure to successful recovery (Avery, 2019). To address gaps in the literature, the current work explores differences between health care professionals and the general population in levels of substance use stigma, as well as key factors that may confer or counteract its emergence.

Knowing More? The Role of Causal Attributions

Stigma is underscored by beliefs about why someone acts in a certain way (Link & Phelan, 2001), and attribution theory suggests that people are motivated to understand the causes of behavior (i.e., using substances) by making attributions, which influence the formation of various beliefs and attitudes. Attributions toward people with substance use condtions have been generally examined on two levels: *personal attributions* (i.e., bad character) versus *biological attributions* (i.e., genetic, neurochemical disruption; N. L. Henderson & Dressler, 2017). While the latter typically reside in biogenetic or "brain disease" models (e.g., Haslam & Kvaale, 2015), personal attributions embody beliefs that behaviors naturally follow from established habits or patterns of mental conduct (i.e., modus operandi; Harman, 1999). Such beliefs are similar to concepts of genetic essentialism whereby SUD becomes representative of who the person is rather than what the person does (Harden, 2023; see also Dar-Nimrod & Heine, 2011; Haslam & Kvaale, 2015).

Indeed, bad character attributions are exceptionally strong enhancers of substance use stigma (Jacobi et al., 2022), above and beyond many well-documented predictors (e.g., age, gender, political affiliation; Ragsdale & Elliott, 2022). Moreover, other models have linked such attributions to robust negative emotions that also feed into stigmatization (e.g., Weiner, 1980) with evidence suggesting that personal attributions (i.e., bad character) predict greater anger and anxiety and less pity, support, or tolerance (e.g., Dijker & Koomen, 2003; Röhm et al., 2022). Compared to other mental health conditions (e.g., schizophrenia), people make greater bad character attributions and place more blame on someone with a SUD (see Yang et al., 2017). Thus, the persistence of substance use stigma in health care, and perhaps also in the general population, may stem from beliefs that bad character precipitates initial or sustained substance use over time.

To counteract these detrimental effects of personal attributions, education-based interventions often try to improve knowledge about the neurobiological etiology of the disorder, thereby increasing biological attributions (e.g., Volkow et al., 2016). Meta-analytic evidence shows that biological attributions may not reduce stigma (i.e., perceptions of dangerousness, social distance; Angermeyer et al., 2011; Kvaale et al., 2013) even though using terms such as "chronic relapsing brain disease" reduces blame (Kelly et al., 2021; Pennington et al., 2023; cf. Rundle et al., 2021; for a review, see Krendl & Perry, in press). In fact, knowledge about the biological causes of mental health conditions (e.g., schizophrenia, depression, alcohol use disorder) has increased over time but this has not co-occurred with reductions in stigma (e.g., Pescosolido, 2013). Even after a 3-hr educational intervention, medical students still hold stigma toward people with SUD (K. Crapanzano et al., 2014). Thus, increasing biological attributions may fall short in reducing stigma (see Corrigan & Nieweglowski, 2018, for a discussion), perhaps due to the power of bad character attributions.

Altogether, attributions are a key factor in the emergence and magnitude of substance use stigma, with bad character perhaps being the most notable. Given that health care professionals have specialized medical training, they may endorse more biological attributions; however, these may not necessarily replace bad character attributions. Therefore, bad character attributions may be endorsed by both the general population and health care professionals, possibly overwhelming any stigma reduction offered by increased knowledge about biological etiology.

Knowing Someone? The Role of Interpersonal Contact

Beyond education and attributions, interpersonal contact has been consistently shown to reduce mental health stigma (e.g., Corrigan et al., 2012; Morgan et al., 2018; Na et al., 2022). Drawing upon Allport's theory of intergroup contact (Allport et al., 1954) and a wealth of literature on the topic to date (e.g., Pettigrew & Tropp, 2006), contact can decrease stigma even when the contact is merely imagined (e.g., Na & Chasteen, 2016). A direct test of comparative effectiveness showed that contact-based interventions may be more effective in reducing mental health stigma for health care professionals than the general population (Maunder & White, 2019). However, meta-analytic evidence suggests that these effects may be small and short-lived (Morgan et al., 2018), with all the above claims being limited by the meager number of studies examining substance use stigma.

Regarding mechanisms, contact is generally thought to leverage human connection to promote positive regard, empathy, and reduced anxiety about unknown others (e.g., Corrigan et al., 2012; see Pettigrew & Tropp, 2006). In essence, contact aims to lessen stigma-enhancing effects of emotion-based drivers of stigma such as

fear or anger (e.g., Dijker & Koomen, 2003; Röhm et al., 2022) that are crucially tied to personal attributions (e.g., Weiner, 1980; for a review, see Krendl & Perry, in press). As a corollary, emerging evidence shows that contact with close family members who have a mental health condition drives down the likelihood that someone will endorse stigma altogether (Pullen et al., 2022). In fact, the authors also showed that contact reduced the likelihood that people endorse bad character as the root cause of mental health conditions. This identifies an important difference between contact-based interventions and true, personal contact. While the former is helpful in the short term (e.g., Morgan et al., 2018), personal contact may have robust and long-lasting effects on stigma, which simply is not captured through single-dose interventions.

Yet, it is unclear whether contact or its effects on stigma may differ between the general population and health care professionals. Health care professionals may encounter patients in the throes of SUD, which may translate to highly negative views (e.g., Scott et al., 2021; van Boekel et al., 2013). However, the above assertion does not account for the types of contact people may have. Nonwork contacts (i.e., family, friends) are likely to be more influential, as is the case with other mental health conditions (see C. Henderson et al., 2014). In fact, a representative survey of Indiana residents suggests that people who used substances included in someone's personal social network are more commonly identified as causing problems and being dangerous to themselves and others (Railey et al., 2023). Thus, health care professionals and the general population might be similarly affected, albeit for different reasons, by contact with people who use substances.

Consequently, causal attributions may be a good candidate pathway for explaining how the effects of contact may emerge between the general population and health care professionals. While other work has shown the importance of contact for increasing positive social judgments (e.g., Corrigan et al., 2012; see Pettigrew & Tropp, 2006), causal attributions have only recently been explored (e.g., Ragsdale & Elliott, 2022). The juxtaposition of personal and biological attributions as respectively enhancing or reducing unique aspects of stigma distinguishes potential intervention targets if one is perhaps more influential than the other. Thus, the relationship between personal contact and causal attributions may help reduce substance use stigma among health care professionals and the general population, whether in similar or different ways.

The Present Study

Using a nationally representative sample of adults in the United States with an oversample of health care professionals, perceptions of SUDs were tested through the lens of causal attributions, medical training, and contact. To evaluate the following hypotheses, a well-validated vignette approach (Perry et al., 2020) was used to activate perceptions of SUD (i.e., attributions, social distance; see Krendl & Perry, 2022, for details on specific vignettes). By encouraging respondents to think about a specific person, vignettes may activate latent stigmatizing beliefs more effectively than traditional survey instrument, thus becoming a relatively standard way for studying these constructs (e.g., Kelly et al., 2021; Krendl & Perry, 2022; Pennington et al., 2023; Perry et al., 2020; Ragsdale & Elliott, 2022; Röhm et al., 2022; Rundle et al., 2021). Guided by a mixture of attribution theory (Link & Phelan, 2001; see also Weiner, 1980), genetic essentialism (e.g., Harden, 2023), and existing evidence (i.e., Jacobi et al., 2022; Ragsdale & Elliott, 2022; Röhm et al., 2022; Yang et al., 2017), bad character attributions were postulated to be the main drivers of substance use stigma (i.e., social distance), even when controlling for biological attributions (Hypothesis 1a). Due to the novelty of the research questions, no a priori predictions were made regarding differences between health care professionals and the general population. However, because prior work has shown that personal contact plays a key role in reducing stigma (K. Crapanzano et al., 2014; C. Henderson et al., 2014; Scott et al., 2021; Werremeyer et al., 2021), contact was expected to be associated with lower stigma for both groups (Hypothesis 1b).

Next, we expected that health care professionals would endorse biological explanations (i.e., genetics, chemical imbalance) as the cause of SUDs more than the general population (Hypothesis 2). However, this could be moderated by contact with the strongest endorsement of biological causes coming from people who had medical training *and* personal contact, akin to mental health literature more broadly (e.g., Na et al., 2022). We also test an exploratory hypothesis: the effects of contact on substance use stigma would be mediated by causal attributions. However, the strength of mediation might differ between health care professionals and the general population (Hypothesis 3), reflecting key between-group variation in how stigma might be mitigated.

Method

Participants

The 2021 Shatterproof Addiction Stigma Index was a survey conducted by Ipsos Public Affairs from July 13, 2021, to July 27, 2021, administered to 11,661 adults over the age of 18. Responses were collected via KnowledgePanel, a web panel service designed to produce samples that are representative of the U.S. population (e.g., MacInnis et al., 2018; Yeager et al., 2011). Responses were garnered from 7,051 respondents out of 11,661 fielded surveys (60% completion rate). Importantly, there was an intentional oversampling of health care professionals, with 1,223 surveys fielded to only health care workers, which yielded 548 additional cases (55% completion rate) for a total of 788 total cases. There were an additional 126 people who worked in health care but held positions with minimal face-to-face contact with patients or positions entirely unrelated to substance use (i.e., technologists, transcriptionists) described in the Supplemental Materials. Thus, the final analytic sample had 7,600 people, including 788 health care professionals[1] and a representative sample of 6,812 people. Table 1 depicts demographic information for each group, prior to survey weighting.

[1] We tested for differences in social distance within our health care sample by groups of 280 registered nurses, 92 therapists, 87 health aides, 80 physicians or nurse practitioners, 79 assistants, 34 pharmacists, 23 emergency medical technicians, and 109 workers in other positions that interacted with patients. There were no differences across these groups in personal contact, $\chi^2(7, N = 738) = 7.22$, $p = .41$. However, evaluating the predicted means from the omnibus analyses, emergency medical technicians had significantly higher levels of desired social distance ($M = .12$, $SE = .08$, 95% CI [−.04, .27]) compared to the rest of the health care professionals ($M = -.08$, $SE = .01$, 95% CI [−.11, −.06]) as the confidence intervals between estimated means do not overlap. Importantly, excluding these 23 cases in the omnibus analyses does not change the direction, magnitude, or significance of the effect of working in health care.

Table 1
Demographic Information

Variable	General population (n = 6,812)	Health care professionals (n = 788)	Group comparison
Age	53.55 (16.9)	48.0 (13.4)	t = 8.56 p < .001
Gender			
Male	3,616 (50.8%)	160 (20.3%)	χ^2 = 260.4
Female	3,506 (49.2%)	628 (79.7%)	p < .001
Race and ethnicity			
White, non-Hispanic	5,194 (72.9%)	603 (76.5%)	χ^2 = 7.80
Black, non-Hispanic	631 (8.9%)	69 (8.8%)	p = .05
Hispanic	797 (11.2%)	66 (8.4%)	
Other/two or more	500 (7.0%)	50 (6.3%)	
Education level			
Master's degree or higher	1,154 (16.2%)	277 (37.4%)	χ^2 = 344.2
Bachelor's degree	1,490 (20.9%)	229 (29.1%)	p < .001
Some college/associate's degree	2,159 (30.3%)	241 (28.9%)	
High school graduate/GED	1,842 (25.9%)	33 (3.1%)	
No high school diploma or GED	477 (6.7%)	8 (1.5%)	
Household income			
$150,000 or more	1,416 (19.9%)	163 (20.7%)	χ^2 = 77.42
$100,000–$149,999	1,388 (19.5%)	215 (27.3%)	p < .001
$75,000–$99,999	1,010 (14.2%)	156 (19.8%)	
$50,000–$74,999	1,307 (18.4%)	131 (16.6%)	
$25,000–$49,999	1,176 (16.5%)	84 (10.7%)	
$10,000–$24,999	624 (8.8%)	26 (3.3%)	
Less than $10,000	201 (2.8%)	13 (1.6%)	
Know someone with SUD	3,486 (46.6%)	501 (63.6%)	χ^2 = 56.77 p < .001

Note. Frequencies are reported with percentage in parentheses except for age where means are reported with standard deviations in parentheses. GED = General Education Development test; SUD = substance use disorder.

Materials

Stigma was measured using a well-validated vignette strategy as in the 2018 General Social Survey, National Stigma Studies–Replication II (Perry et al., 2020). See the online Supplemental Materials. Using a 2 (Use: Active, Recovery) × 4 (Substance Type: Alcohol, Prescription Opioids, Heroin, Methamphetamine) between-subjects design, respondents were randomly assigned to one of eight conditions[2] akin to past work (e.g., Krendl & Perry, 2022; McGinty et al., 2015). After reading the vignette, people answered questions regarding personal experiences, slightly modified from the National Stigma Studies–Replication II. Participants indicated whether they knew anyone like the vignette character (*yes* = 1; *no* = 0). If yes, a follow-up item was asked: "Thinking about the person you've known best, how close were you?" on a scale of 1 (*an acquaintance*) to 10 (*as close as you could be*).

Perceptions of SUD were derived almost entirely from the National Stigma Studies–Replication II, a separate national representative study on mental health stigma. Aligned with this method, stigma was captured via behavioral predispositions (i.e., social distance; see Perry et al., 2020; Pescosolido et al., 2021). Social distance was measured using six items measuring willingness (1 = *definitely unwilling* to 4 = *definitely willing*) to interact with the vignette character in a variety of social roles, including as neighbors, coworkers, friends, and family members (Cronbach's α = .89). Social distance was a composite score, coded such that higher scores indicated more stigma. Causal attributions were measured using four statements assessing how likely the vignette character's condition was caused by (a) bad character, (b) the way they were raised, (c) a chemical imbalance in the brain, or (d) a genetic/inherited problem, from 1 (*least likely*) to 4 (*most likely*).

Transparency and Openness

This study was not preregistered, but all sample size determinations, data exclusions, and manipulations are described here with additional information in the online Supplemental Materials. Deidentified data and study materials can be shared upon request with requisite approvals. G*Power 3.1 (Faul et al., 2007) was used to determine power demands. Survey-weighted linear regression analyses were conducted in Stata SE 17.0 to test our main hypotheses. Using the smallest possible effect size (R_p^2 = .01, which gives an effect size f = .01) with power = .80 and α = .05, a total N of 614 was needed for sufficient power to detect a single significant coefficient in a set of 17 tested coefficients (i.e., all predictors and controls). Thus, the present sample greatly exceeds the necessary sample size for all main analyses.

Analytic Strategy

Survey weights were provided by Ipsos to adjust for sampling design (e.g., nonresponse error, stratified sampling for subgroups)

[2] General differences in stigma by vignette conditions have been published elsewhere (see Krendl & Perry, 2022); no significant changes emerged when interacting group (i.e., healthcare professionals vs. general population) with these vignette conditions.

with poststratification weights matching demographic characteristics from March 2021 U.S. Census data. Regression was used (as opposed to mean difference tests) to account for known sociodemographic moderators of stigma, notably age, race, gender, and education (see Perry et al., 2020). To accommodate for testing multiple models with the same predictors, family-wise error was controlled using adjusted p values generated through the Romano–Wolf multiple hypothesis correction algorithm with 1,000 bootstrapped replications (Clarke et al., 2020). Due to constraints in computing multiple adjustments simultaneously, corrections were applied separately, but identically, to all hypothesized effects. All scores were standardized (i.e., unit change is 1 *SD* increase). Variables were assessed for normality, and missingness was treated listwise on key variables. See the online Supplemental Materials for specific coding details for each variable.

Because we predicted that the effects of causal attributions would differ between health care professionals and the general population, we conducted stratified mediation analyses for each group. Using structural equation modeling to test the relationship between contact and social distance, we computed the *total indirect effect* of contact and then performed an effect decomposition to determine the relative importance (*individual indirect effect*) of each causal attribution (VanderWeele & Vansteelandt, 2014). To test whether differences emerged between groups (e.g., perhaps biological attributions had more explanatory power for health care professionals), we used seemingly unrelated estimation to combine stratified models, compute cross-model covariances, and test for statistical significance (Mize et al., 2019).

Results

Prior to testing our hypotheses, we evaluated whether contact differed between each group. The general population had 3,486 people (46.6%) who indicated knowing someone with a SUD, whereas the health care professionals had 501 people (63.6%). Although health care professionals had more contact, $\chi^2(1, N = 7{,}229) = 53.88$, $p < .001$, the level of closeness was significantly higher within the general population ($M = 6.79$; $SE = .05$) than health care professionals ($M = 5.95$; $SE = .14$); $t(3{,}977) = 6.05$, $p < .001$. Thus, health care professionals had more contact but were less close to those people when compared to the general population. Importantly, all tests were rerun to model the effects of closeness (i.e., only including those who reported contact). All results replicated the analyses reported here.

Hypothesis 1: Stigma Is Influenced by Personal Attributions and Contact (1a), but Not by Being a Health Care Professional (1b)

As displayed in Table 2, survey-weighted linear regression models were used to control sample-specific sociodemographic characteristics and vignette type (i.e., substance type and recovery status). We found that greater desire for social distance was associated with greater attributions of *bad character* ($\beta = .25$, $SE = .01$, adjusted $p < .001$, 95% CI [.23, .28]) and *way raised* ($\beta = .04$, $SE = .02$, adjusted $p = .022$, 95% CI [.01, .07]) attributions. Biological attributions were associated with less desire for social distance (*chemical imbalance*: $\beta = -.08$, $SE = .01$, adjusted $p = .01$, 95% CI [−.10, −.05]; *genetics*: $\beta = -.08$, $SE = .02$, adjusted $p = .01$, 95% CI [−.11, −.05]). Importantly, bad character attributions were significantly more predictive than all other attributions, $F(3, 6784) = 155.64$, $p < .001$. Altogether, we found support for our prediction (Hypothesis 1a) as bad character attributions were predictive of greater social distance and the strongest predictor overall. Contrary to expectations, biological attributions were associated with less stigma, although at much smaller magnitudes than bad character.

In line with Hypothesis 1b, health care professionals were not less stigmatizing than the general population ($\beta = -.05$, $SE = .03$, $p = .46$, 95% CI [−.19, .08]). In contrast, personal contact was significantly associated with stigma, predicting significantly lower desire for social distance ($\beta = -.10$, $SE = .02$, adjusted $p < .001$, 95% CI [−.13, −.06]). The two-way interaction between contact and group was significant, $F(2, 6875) = 4.55$, $p = .011$. Curiously, the effect of knowing someone was significant for the general population ($\beta = -.20$, 95% CI [−.25, −.15]) but not significant for health care professionals ($\beta = -.03$, 95% CI [−.19, .13]). Tracing this backward, the effect of knowing someone was significant for the

Table 2
Regression Model Predicting Desire for Social Distance

Predictors	Social distance β [95% CI]
Vignette substance type	
Alcohol	—
Prescription opioid	.09 [.02, .16]*
Heroin	.28 [.20, .36]***
Methamphetamine	.34 [.26, .42]***
Vignette use depiction	
In recovery	—
Active	.64 [.59, .69]***
Age	.00 [.00, .00]**
Gender	−.01 [−.06, .04]
Education level	.03 [.01, .06]*
Household income	.04 [.02, .05]***
Race and ethnicity	
White, non-Hispanic	—
Black, non-Hispanic	.03 [−.05, .12]
Hispanic	.02 [−.06, .10]
Other/two or more	.20 [.11, .30]***
Population × Contact	
GP, no contact	—
HCP, no contact	−.05 [−.18, .08]
GP, contact	−.20 [−.25, −.15]***
HCP, contact	−.08 [−.18, .02]
Bad character	.25 [.23, .28]***
Way raised	.04 [.01, .07]*
Genetics	−.08 [−.11, −.05]***
Chemical imbalance	−.08 [−.10, −.05]***
N	6,877
F	103.35***
p	<.001
R^2	.24

Note. For categorical predictors, "—" denotes the group used as a comparison condition. GP = general population; HCP = health care professional; CI = confidence interval. Using Romano–Wolf adjustments for family-wise error in multiple tests.
* $p < .05$. ** $p < .01$. *** $p < .001$.

general population prior to controlling for attributions (β = −.24, *SE* = .03, $p < .001$, 95% CI [−.30, −.19]) but had no significant effect, albeit in the same direction, for health care professionals (β = −.15, *SE* = .08, $p = .059$, 95% CI [−.31, .01]). Thus, working in health care was not associated with less stigma on its own, but contact within the general population was. Altogether, this suggests that effects of contact may be transmitted through attributions, which play a key role in predicting desire for social distance.

Hypothesis 2: Causal Attributions Are Predicted by Population and Contact

Survey-weighted linear regression models were used to predict each attribution, testing whether attributions systematically differed by population and contact. As shown in Table 3, health care professionals were more likely to endorse chemical imbalance attributions (β = .14, *SE* = .07, adjusted $p = .01$, 95% CI [.00, .28]) than the general population, but the two groups did not differ in their attributions to genetic causes (β = .12, *SE* = .07, adjusted $p = .06$, 95% CI [−.01, .26]). There were no group differences in attributions for the way he/she was raised (adjusted $p = .21$), but health care professionals were also more likely to endorse bad character attributions (β = .15, *SE* = .06, adjusted $p = .01$, 95% CI [.02, .28]). On its own, personal contact predicted higher endorsement of genetic attributions (β = .11, *SE* = .03, adjusted $p = .01$, 95% CI [.06, .17]) and lower bad character attributions (β = −.10, *SE* = .03, adjusted $p = .01$, 95% CI [−.16, −.05]) with no effect on chemical imbalance (adjusted $p = .20$) or way raised (adjusted $p = .24$).

However, there was a two-way interaction for bad character attributions, $F(2, 6912) = 15.76$, $p < .001$. The interaction showed that contact more strongly influenced health care professionals' bad character attributions than those of the general population, $F(1, 6913) = 229.1$, $p < .001$. No interaction was present for chemical imbalance ($p = .67$), genetics ($p = .98$), or way raised attributions ($p = .99$). Thus, aside from way raised, health care professionals made the strongest attributions, but contact was associated with more biological and less bad character attributions. See online Supplemental Materials for data visualization. The key takeaway is that health care professionals who had contact made the lowest bad character attributions with the general population showing similar, but less robust, effects.

Exploratory Hypothesis: Attributions Mediate Effects of Contact Differently by Group

We used structural equation modeling (see Figure 1, for β-weights and 95% confidence intervals for each pathway) to examine the mediating effects of causal attributions between contact and social distance, as well as between-group differences while controlling for covariates. As described above, contact was associated with less stigma. Among the general population, causal

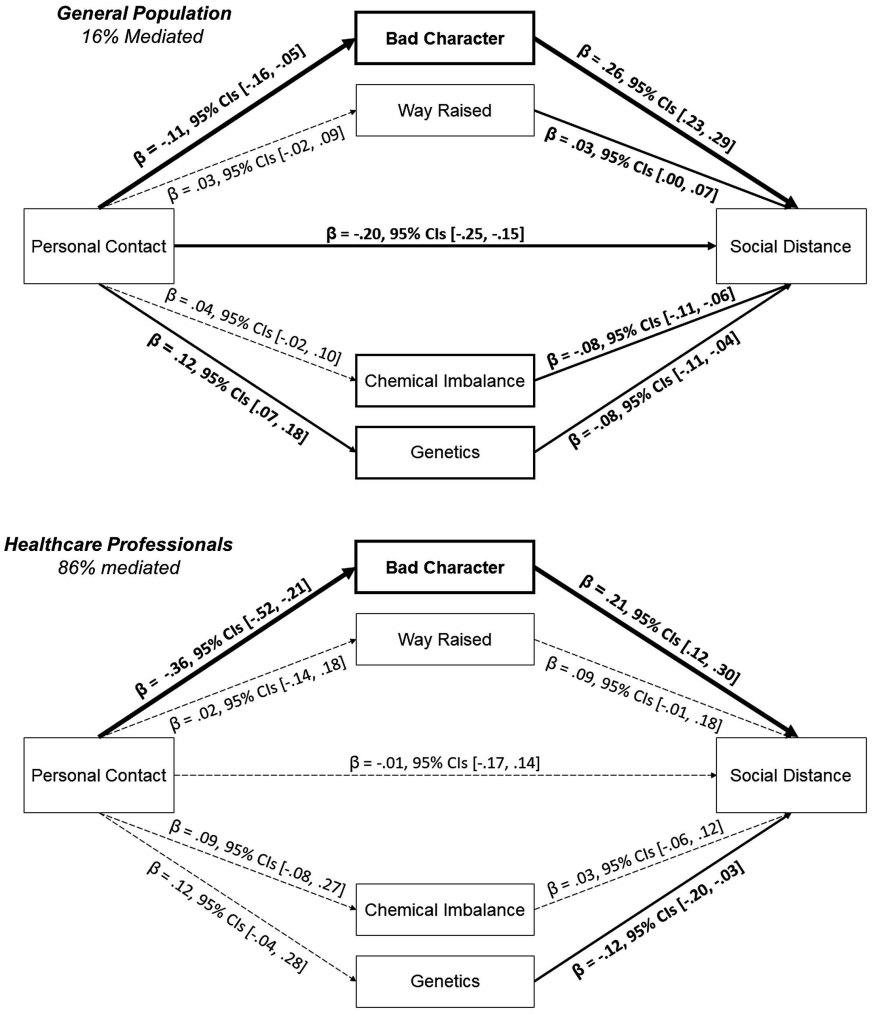
Table 3
Regression Models Predicting Endorsement of Causal Attributions

Predictors	Chemical imbalance β [95% CI]	Genetics β [95% CI]	Bad character β [95% CI]	Way raised β [95% CI]
Vignette type				
Alcohol	—	—	—	—
RX opioid	−.04 [−.11, .03]	−.54 [−.60, −.48]***	−.22 [−.29, −.15]***	−.75 [−.82, −.68]***
Heroin	−.10 [−.19, −.02]*	−.63 [−.69, −.56]***	.14 [.06, .22]***	−.51 [−.59, −.43]***
Methamphetamine	−.03 [−.11, .05]	−.58 [−.64, −.51]***	.14 [.06, .22]***	−.45 [−.53, −.37]***
Vignette use				
In recovery	—	—	—	—
Active	.20 [.15, .25]***	−.08 [−.13, −.04]***	.10 [.05, .15]***	−.09 [−.14, −.04]***
Age	−.01 [−.01, −.01]***	−.01 [−.01, −.01]***	.00 [−.00, .00]	−.01 [−.01, −.01]***
Gender	.06 [.01, .11]*	.13 [.08, .17]***	−.14 [−.19, −.09]***	−.11 [−.17, −.06]***
Education level	.06 [.04, .09]***	.07 [.05, .09]***	−.11 [−.14, −.09]***	.01 [−.02, .04]
Household income	−.02 [−.04, −.00]*	.01 [−.01, .02]	.00 [−.02, .02]	−.00 [−.02, .02]
Race/ethnicity				
White	—	—	—	—
Black	.07 [−.02, .16]	−.18 [−.26, −.10]***	.29 [.20, .38]***	−.17 [−.26, −.07]***
Hispanic	.09 [−.00, .21]	−.29 [−.37, −.21]***	−.03 [−.12, .06]	.03 [−.06, .12]
Other/two or more	.10 [−.00, .18]	−.13 [−.22, −.04]**	.09 [−.01, .18]	.11 [.00, 22]*
Population × Contact				
GP, no contact	—	—	—	—
HCP, no contact	.14 [.00, .28]	.12 [−.01, .25]	.15 [.02, .28]*	.03 [−.02, .09]
GP, contact	.04 [−.02, .09]	.11 [.06, .17]***	−.10 [−.16, −.05]***	.01 [−.14, .15]
HCP, contact	.21 [.10, .33]*	.24 [.13, .35]***	−.28 [−.39, −.18]***	.04 [−.07, .14]
N	6,921	6,921	6,914	6,916
F	18.71***	41.89***	29.98***	52.29***
p	<.001	<.001	<.001	<.001
R^2	.04	.09	.07	.12

Note. For categorical predictors, "—" denotes the group used as a comparison condition. RX = prescription; GP = general population; HCP = health care professional; CI = confidence interval. Using Romano–Wolf adjustments for family-wise error in multiple tests.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 1

Structural Equations Models for Health Care Professionals and the General Population With the Effect of Personal Contact on Social Distance Mediated by Each Causal Attribution



Note. Lines are formatted to represent strength (thickness) and significance (solid vs. dashed). CI = confidence interval.

attributions explained 16.0% of this relationship (*indirect effect*: $\beta = -.04$, $SE = .01$, 95% CI [−.06, −.02]), with the largest effects coming from bad character (70% of mediated effect) followed by genetics (24%) with chemical imbalance (9%) and way raised (−3%) attributions making no significant contribution. Among health care professionals, causal attributions explained 86% of this relationship (*indirect effect*: $\beta = -.09$, $SE = .02$, 95% CI [−.14, −.03]) with bad character attributions being the only contributor (89% of mediated effect) and all others not reaching significance (genetics: 16%; chemical imbalance: −3%; way raised: −2%). Even without a statistical test, it appears that causal attributions—driven by bad character—do a far better job of explaining the stigma-reducing effects of contact in health care professionals (86% mediated) than in the general population (16%).

To accurately observe statistical differences between models, we used seemingly unrelated estimation to compute cross-model covariances and compare path estimates. For the sake of parsimony, we did not compare every coefficient, but asked a simpler question using ordinary least squares regression: do bad character attributions explain a larger share of the association between contact and stigma among health care professionals than the general population? We answered this question by holding all other attributions constant and measuring the change in effect size once bad character was added to the model. After conditioning on bad character, the effect of personal contact on social distance dropped 12% among the general population and 84% among health care professionals, which is a statistically significant difference ($p < .05$). This suggests that bad character attributions mattered significantly more for health care

professionals than the general population in explaining the effects of contact.

Discussion

Although differences in attributions emerged, health care professionals did not differ from the general population in their endorsement of substance use stigma. While contact was associated with reduced stigma—and health care professionals had more contact than the general population—this did not reduce stigma held by health care professionals, in part because of the compensating role of bad character attributions. Our mediation analyses deconstructed the effect of contact through attributions and showed that bad character drives the relationship between contact and stigma for health care professionals. Among the general population, bad character attributions conferred the most explanatory power in this relationship, although biological attributions were also significant. Thus, interpersonal contact may mitigate substance use stigma through addressing prevailing assumptions about personal culpability (i.e., bad character) but also by helping people in the general population learn more about the biological etiology of SUDs.

Health care professionals may not be less stigmatizing than the general population because medical training and knowledge about substance dependency do not inherently remove stigma (e.g., K. Crapanzano et al., 2014). The group-stratified mediation analyses (see Figure 1) show that the effects of biological attributions mainly emerged in the general population. Thus, increasing biological knowledge may be somewhat helpful for the general population, but among health care professionals who already have medical training, targeting these beliefs may not produce meaningful change in stigma. Previous research suggests that though endorsing a biogenetic model may have reduce blame, it also has the ironic consequences of reducing perception that SUDs can be effectively treated (e.g., Kelly et al., 2021; Pennington et al., 2023). For example, when describing alcohol use disorder as either being genetic (i.e., uncontrollable) or not (i.e., personally controllable), the genetic explanations reduced blame but also reduced perceptions that treatment would be effective (Lebowitz & Appelbaum, 2017). While biogenetic explanations may reduce certain aspects of stigma (e.g., Kelly et al., 2021; Pennington et al., 2023), they do not remove all aspects of stigmatization (see Krendl & Perry, in press).

There remains another possibility, not mutually exclusive from the first, that is commensurate with past research and supported by our results: bad character attributions are a major driver in the emergence of substance use stigma even when people have biomedical knowledge. While health care professionals showed greater endorsement of biological attributions *and* bad character attributions, being a health care professional with no contact was associated with the highest level of bad character attributions. This may be why patients with SUDs tend to be viewed as difficult, dangerous, and unreliable relative to other patients (Andraka-Christou & Capone, 2018; Avery, 2019; Werremeyer et al., 2021). Attributing substance use to bad character may relate to assigning greater blame and personal agency for SUDs relative to other mental health conditions (e.g., Barry et al., 2014; Perry et al., 2020). Bad character attributions may shape perceptions of treatments and public policy initiatives (e.g., Ragsdale & Elliott, 2022), perhaps by "othering" of people who use substances as being either unable to change or not worth the resources to help, once again operating similar to ideas of genetic essentialism (Harden, 2023).

Clinical Implications

Therefore, interventions will need to dismantle identity-based beliefs and work against notions of genetic essentialism that collapse people who use substances into one homogeneous group: *bad people*. Unfortunately, common media portrayals of people with SUDs as violent or criminal (see McGinty et al., 2019, for a review) likely reinforce such beliefs. Compounding the issue, existing stigma-reduction methods may unintentionally overlook bad character attributions by overprioritizing psychoeducation on biogenetic etiologies. Our results show that substance use stigma may be more affected by bad character attributions (which are reduced by personal contact) than knowledge about the biological etiology of substance dependency, especially for health care professionals.

To address stigma at-large (i.e., the general population and health care professionals), arguments have been put forth for promoting nondichotomous and continuum-based beliefs about mental health conditions (i.e., symptoms range from none to severe). Meta-analytic evidence shows that this reframing reduces stigma, at least for conditions such as depression and schizophrenia (Peter et al., 2021). The presumption is that continuum beliefs reduce well-documented processes of "othering" (e.g., Link & Phelan, 2001) that seem to overlap with conceptualizations of genetic essentialism (Harden, 2023). Some education-based interventions may focus on reframing substance use as a behavior (e.g., Moore et al., 2020) that helps promote these continuum beliefs. However, reframing substance use in this way may be difficult, especially given the high amount of stigma that exists and even varies depending on the substance type (see Krendl & Perry, 2022).

Other options could be to emphasize recovery and treatment success (e.g., Lefebvre et al., 2020). While depictions of untreated and active substance use transmit the message that addiction is permanent and untreatable (see McGinty et al., 2019), studies using a similar vignette approach show that depictions of recovery beget significantly less stigma (e.g., Krendl & Perry, 2022; McGinty et al., 2015). However, deliberately counteracting negative beliefs that drive substance use stigma and promote perceptions of treatability will likely require multifaceted, society-wide changes. Psychoeducation or messaging campaigns alone are likely not effective in reducing substance use stigma across all groups.

An important contribution of this work is showing that bad character attributions are profoundly influenced by contact, particularly among health care professionals. Others have shown that, for the general population, experiencing the positive effects of treatment (whether first-hand or vicariously) is more effective for reducing stigma than messaging campaigns (Saloner et al., 2018). Crucially, meta-analytic evidence shows that contact more effectively reduces stigma than psychoeducation efforts alone for health care professionals (Bielenberg et al., 2021). While blended interventions (i.e., contact and education) are efficacious (Corrigan et al., 2012; Maunder & White, 2019; Morgan et al., 2018; Na et al., 2022), future work should look to leverage contact to reduce bad character attributions.

Limitations and Future Directions

There are several key limitations that must be addressed in future research. Although single-item measures are not uncommon in studies on contact (e.g., Pettigrew & Tropp, 2006), more refined measures will better model the nuances inherent in interpersonal contact. Our intention was to identify personal contacts such as family and friends (i.e., closeness measured as "thinking of the person you've known best"), but this did not explicitly cause respondents to exclude work-related contacts. This may have led to some participants identifying patients as people they knew. Health care professionals had more contact but were less close, perhaps hinting at such a response bias. However, all analyses replicated were controlling for actual reported closeness with all effects in the same direction. Another possibility is that the positivity or negativity associated with contact could alter the attributional tendences, and in turn, modify stigma. In essence, if one has more negative experiences with someone who has a substance use problem, this could galvanize stigmatizing beliefs such that high amounts of positive contact would be needed to supplant the negative associations made from prior contact. Future research will benefit from a more nuanced measure of contact (e.g., Pullen et al., 2022; Railey et al., 2023) that better accounts for heterogeneity inherent in interpersonal contact.

The cross-sectional nature of this study limits some of the conclusions that can be drawn. The implied directionality when predicting stigma from causal attributions could plausibly be inverted such that causal attributions are a reflection of stigma. While not necessarily in line with other work (e.g., Ragsdale & Elliott, 2022), this should be explicitly tested in follow-up studies. Causality could be better tested if statements such as "their substance use stemmed from biological vulnerabilities" or "their substance use started due to their bad character" were included in the vignette (akin to other work examining etiological labeling; Kelly et al., 2021; Pennington et al., 2023; Rundle et al., 2021).

Moreover, it is possible that individuals vary in how they conceptualize "bad character" in this paradigm. While we presume that a default response tendency would be in line with a genetic essentialist approach (i.e., Harden, 2023) whereby the vignette character was viewed as fundamentally flawed, we intentionally did not constrain people's perceptions. Thus, it is possible that individuals interpreted bad character in a different way, such as restricting this perception to the substance use only and not their overall person. In such a case, recovery could still be considered an achievable outcome. Though the open-endedness of our description aligned with previous work (e.g., Krendl & Perry, 2022; Perry et al., 2020), future work could clarify the ways in which bad character may be perceived and how, if it all, it affects their perceptions of SUD.

Finally, though it is possible that unbalanced group sizes (i.e., fewer health care providers than members of the general population) could have biased these results, the analyses are relatively robust against violations of equal group size assumptions. The smallest cell was health care professionals without contact (n = 236), which should be sufficient to detect significant effects; however, this is assuming a relative degree of homogeneity within each group. Confidence intervals for health care professionals reveal a high degree of heterogeneity, perhaps linked to the uniqueness of various jobs within health care (see Footnote 1). However, it is important to note that the effect sizes associating bad character attributions to stigma were large, suggesting that these effects are likely robust, despite the heterogeneity. Regardless, future work should explore whether the magnitude of these beliefs shifts based on specific exposures to people with SUDs within health care setting. Such studies would provide insight into the role of bad character attributions in promoting social distance and other discrete elements of stigma (e.g., blame, perceived danger, negative emotions).

Conclusion

Reducing substance use stigma has the potential to break down key psychological barriers to treatment seeking and recovery. Existing campaigns have often relied on the assumption that more knowledge about the biological processes associated with substance dependency is needed, yet our research suggests that this is insufficient. Especially in health care settings, attributing substance use to bad character appeared to be the primary catalyst for stigma. These effects were mitigated by contact; however, there is much to learn about leveraging personal contact for stigma reduction, particularly within medical communities that may be exposed to the most severe consequences of substance use (e.g., overdose deaths). Altogether, future work must examine how to combat the stigma-enhancing effect of believing that substance users are simply bad people.

References

Ahmad, F. B., Rossen, L. M., & Sutton, P. (2021). *Provisional drug overdose death counts*. National Center for Health Statistics. https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm

Ali, M. M., Teich, J. L., & Mutter, R. (2017). Reasons for not seeking substance use disorder treatment: Variations by health insurance coverage. *The Journal of Behavioral Health Services & Research*, *44*(1), 63–74. https://doi.org/10.1007/s11414-016-9538-3

Allport, G. W., Clark, K., & Pettigrew, T. (1954). *The nature of prejudice*. Addison-Wesley.

Andraka-Christou, B., & Capone, M. J. (2018). A qualitative study comparing physician-reported barriers to treating addiction using buprenorphine and extended-release naltrexone in U.S. office-based practices. *The International Journal on Drug Policy*, *54*, 9–17. https://doi.org/10.1016/j.drugpo.2017.11.021

Angermeyer, M. C., Holzinger, A., Carta, M. G., & Schomerus, G. (2011). Biogenetic explanations and public acceptance of mental illness: Systematic review of population studies. *The British Journal of Psychiatry*, *199*(5), 367–372. https://doi.org/10.1192/bjp.bp.110.085563

Avery, J. J. (2019). The stigma of addiction in the medical community. In J. D. Avery & J. J. Avery (Eds.), *The stigma of addiction: An essential guide* (pp. 81–92). Springer. https://doi.org/10.1007/978-3-030-02580-9_6

Barry, C. L., McGinty, E. E., Pescosolido, B. A., & Goldman, H. H. (2014). Stigma, discrimination, treatment effectiveness, and policy: Public views about drug addiction and mental illness. *Psychiatric Services*, *65*(10), 1269–1272. https://doi.org/10.1176/appi.ps.201400140

Biancarelli, D. L., Biello, K. B., Childs, E., Drainoni, M., Salhaney, P., Edeza, A., Mimiaga, M. J., Saitz, R., & Bazzi, A. R. (2019). Strategies used by people who inject drugs to avoid stigma in healthcare settings. *Drug and Alcohol Dependence*, *198*, 80–86. https://doi.org/10.1016/j.drugalcdep.2019.01.037

Bielenberg, J., Swisher, G., Lembke, A., & Haug, N. A. (2021). A systematic review of stigma interventions for providers who treat patients with substance use disorders. *Journal of Substance Abuse Treatment*, *131*, Article 108486. https://doi.org/10.1016/j.jsat.2021.108486

Chiesa, A., & Serretti, A. (2014). Are mindfulness-based interventions effective for substance use disorders? A systematic review of the evidence. *Substance Use & Misuse*, *49*(5), 492–512. https://doi.org/10.3109/10826084.2013.770027

Clarke, D., Romano, J. P., & Wolf, M. (2020). The Romano–Wolf multiple-hypothesis correction in Stata. *The Stata Journal*, *20*(4), 812–843. https://doi.org/10.1177/1536867X20976314

Cockroft, J. D., Adams, S. M., Bonnet, K., Matlock, D., McMillan, J., & Schlundt, D. (2019). "A scarlet letter": Stigma and other factors affecting trust in the health care system for women seeking substance abuse treatment in a community setting. *Substance Abuse*, *40*(2), 170–177. https://doi.org/10.1080/08897077.2018.1544184

Cook, J. E., Purdie-Vaughns, V., Meyer, I. H., & Busch, J. T. A. (2014). Intervening within and across levels: A multilevel approach to stigma and public health. *Social Science & Medicine*, *103*, 101–109. https://doi.org/10.1016/j.socscimed.2013.09.023

Corrigan, P. W., Morris, S. B., Michaels, P. J., Rafacz, J. D., & Rüsch, N. (2012). Challenging the public stigma of mental illness: A meta-analysis of outcome studies. *Psychiatric Services*, *63*(10), 963–973. https://doi.org/10.1176/appi.ps.201100529

Corrigan, P. W., & Nieweglowski, K. (2018). Stigma and the public health agenda for the opioid crisis in America. *The International Journal on Drug Policy*, *59*, 44–49. https://doi.org/10.1016/j.drugpo.2018.06.015

Crapanzano, K., Vath, R. J., & Fisher, D. (2014). Reducing stigma towards substance users through an educational intervention: Harder than it looks. *Academic Psychiatry*, *38*(4), 420–425. https://doi.org/10.1007/s40596-014-0067-1

Crapanzano, K. A., Hammarlund, R., Ahmad, B., Hunsinger, N., & Kullar, R. (2018). The association between perceived stigma and substance use disorder treatment outcomes: A review. *Substance Abuse and Rehabilitation*, *10*, 1–12. https://doi.org/10.2147/SAR.S183252

Dar-Nimrod, I., & Heine, S. J. (2011). Genetic essentialism: On the deceptive determinism of DNA. *Psychological Bulletin*, *137*(5), 800–818. https://doi.org/10.1037/a0021860

Dijker, A. J., & Koomen, W. (2003). Extending Weiner's attribution-emotion model of stigmatization of ill persons. *Basic and Applied Social Psychology*, *25*(1), 51–68. https://doi.org/10.1207/S15324834BASP2501_4

Eukel, H. N., Skoy, E., Werremeyer, A., Burck, S., & Strand, M. (2019). Changes in pharmacists' perceptions after a training in opioid misuse and accidental overdose prevention. *The Journal of Continuing Education in the Health Professions*, *39*(1), 7–12. https://doi.org/10.1097/CEH.0000000000000233

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Hammarlund, R., Crapanzano, K. A., Luce, L., Mulligan, L., & Ward, K. M. (2018). Review of the effects of self-stigma and perceived social stigma on the treatment-seeking decisions of individuals with drug- and alcohol-use disorders. *Substance Abuse and Rehabilitation*, *9*, 115–136. https://doi.org/10.2147/SAR.S183256

Harden, K. P. (2023). Genetic determinism, essentialism and reductionism: Semantic clarity for contested science. *Nature Reviews. Genetics*, *24*(3), 197–204. https://doi.org/10.1038/s41576-022-00537-x

Harman, G. (1999). Moral philosophy meets social psychology: Virtue ethics and the fundamental attribution error. *Proceedings of the Aristotelian Society*, *99*, 315–331. http://www.jstor.org/stable/4545312

Haslam, N., & Kvaale, E. P. (2015). Biogenetic explanations of mental disorder: The mixed-blessings model. *Current Directions in Psychological Science*, *24*(5), 399–404. https://doi.org/10.1177/0963721415588082

Hedegaard, H., Miniño, A. M., & Warner, M. (2020). *Drug overdose deaths in the United States, 1999–2018*. NCHS Data Brief, no. 356. National Center for Health Statistics.

Henderson, C., Noblett, J., Parke, H., Clement, S., Caffrey, A., Gale-Grant, O., Schulze, B., Druss, B., & Thornicroft, G. (2014). Mental health-related stigma in health care and mental health-care settings. *The Lancet Psychiatry*, *1*(6), 467–482. https://doi.org/10.1016/S2215-0366(14)00023-6

Henderson, N. L., & Dressler, W. W. (2017). Medical disease or moral defect? Stigma attribution and cultural models of addiction causality in a university population. *Culture, Medicine and Psychiatry*, *41*(4), 480–498. https://doi.org/10.1007/s11013-017-9531-1

Jacobi, C. J., Charles, J., Vaidyanathan, B., Frankham, E., & Haraburda, B. (2022). Stigma toward mental illness and substance use disorders in faith communities: The roles of familiarity and causal attributions. *Stigma and Health*, *7*(2), 234–246. https://doi.org/10.1037/sah0000373

Kelly, J. F., Greene, M. C., & Abry, A. (2021). A US national randomized study to guide how best to reduce stigma when describing drug-related impairment in practice and policy. *Addiction*, *116*(7), 1757–1767. https://doi.org/10.1111/add.15333

Kennedy-Hendricks, A., Barry, C. L., Gollust, S. E., Ensminger, M. E., Chisolm, M. S., & McGinty, E. E. (2017). Social stigma toward persons with prescription opioid use disorder: Associations with public support for punitive and public health–oriented policies. *Psychiatric Services*, *68*(5), 462–469. https://doi.org/10.1176/appi.ps.201600056

Komaromy, M., Duhigg, D., Metcalf, A., Carlson, C., Kalishman, S., Hayes, L., Burke, T., Thornton, K., & Arora, S. (2016). Project ECHO (Extension for Community Healthcare Outcomes): A new model for educating primary care providers about treatment of substance use disorders. *Substance Abuse*, *37*(1), 20–24. https://doi.org/10.1080/08897077.2015.1129388

Krendl, A. C., & Perry, B. L. (in press). An overview of stigma toward substance dependence: Causes, consequences and potential interventions. *Psychological Science in the Public Interest*.

Krendl, A. C., & Perry, B. L. (2022). Addiction onset and offset characteristics and public stigma toward people with common substance dependencies: A large national survey experiment. *Drug and Alcohol Dependence*, *237*, Article 109503. https://doi.org/10.1016/j.drugalcdep.2022.109503

Kvaale, E. P., Haslam, N., & Gottdiener, W. H. (2013). The 'side effects' of medicalization: A meta-analytic review of how biogenetic explanations affect stigma. *Clinical Psychology Review*, *33*(6), 782–794. https://doi.org/10.1016/j.cpr.2013.06.002

Lebowitz, M. S., & Appelbaum, P. S. (2017). Beneficial and detrimental effects of genetic explanations for addiction. *The International Journal of Social Psychiatry*, *63*(8), 717–723. https://doi.org/10.1177/0020764017737573

Lefebvre, R. C., Chandler, R. K., Helme, D. W., Kerner, R., Mann, S., Stein, M. D., Reynolds, J., Slater, M. D., Anakaraonye, A. R., Beard, D., Burrus, O., Frkovich, J., Hedrick, H., Lewis, N., & Rodgers, E. (2020). Health communication campaigns to drive demand for evidence-based practices and reduce stigma in the HEALing communities study. *Drug and Alcohol Dependence*, *217*, Article 108338. https://doi.org/10.1016/j.drugalcdep.2020.108338

Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology*, *27*(1), 363–385. https://doi.org/10.1146/annurev.soc.27.1.363

Luoma, J. B. (2010). Substance use stigma as a barrier to treatment and recovery. In B. Johnson (Ed.), *Addiction medicine* (pp. 1195–1215). Springer. https://doi.org/10.1007/978-1-4419-0338-9_59

MacInnis, B., Krosnick, J. A., Ho, A. S., & Cho, M. J. (2018). The accuracy of measurements with probability and nonprobability survey samples: Replication and extension. *Public Opinion Quarterly*, *82*(4), 707–744. https://doi.org/10.1093/poq/nfy038

Maunder, R. D., & White, F. A. (2019). Intergroup contact and mental health stigma: A comparative effectiveness meta-analysis. *Clinical Psychology Review*, *72*, Article 101749. https://doi.org/10.1016/j.cpr.2019.101749

McGinty, E. E., Goldman, H. H., Pescosolido, B., & Barry, C. L. (2015). Portraying mental illness and drug addiction as treatable health conditions: Effects of a randomized experiment on stigma and discrimination. *Social Science & Medicine*, *126*, 73–85. https://doi.org/10.1016/j.socscimed.2014.12.010

McGinty, E. E., Kennedy-Hendricks, A., & Barry, C. L. (2019). Stigma of addiction in the media. In J. D. Avery & J. J. Avery (Eds.), *The stigma of addiction: An essential guide* (pp. 201–214). Springer. https://doi.org/10.1007/978-3-030-02580-9_11

Mize, T. D., Doan, L., & Long, J. S. (2019). A general framework for comparing predictions and marginal effects across models. *Sociological Methodology*, *49*(1), 152–189. https://doi.org/10.1177/0081175019852763

Moore, M. D., Ali, S., Burnich-Line, D., Gonzales, W., & Stanton, M. V. (2020). Stigma, opioids, and public health messaging: The need to disentangle behavior from identity. *American Journal of Public Health*, *110*(6), 807–810. https://doi.org/10.2105/AJPH.2020.305628

Morgan, A. J., Ross, A., & Reavley, N. J. (2018). Systematic review and meta-analysis of Mental Health First Aid training: Effects on knowledge, stigma, and helping behaviour. *PLOS ONE*, *13*(5), Article e0197102. https://doi.org/10.1371/journal.pone.0197102

Na, J. J., & Chasteen, A. L. (2016). Does imagery reduce stigma against depression? Testing the efficacy of imagined contact and perspective-taking. *Journal of Applied Social Psychology*, *46*(5), 259–275. https://doi.org/10.1111/jasp.12360

Na, J. J., Park, J. L., LKhagva, T., & Mikami, A. Y. (2022). The efficacy of interventions on cognitive, behavioral, and affective public stigma around mental illness: A systematic meta-analytic review. *Stigma and Health*, *7*(2), 127–141. https://doi.org/10.1037/sah0000372

National Academies of Sciences, Engineering, and Medicine. (2016). *Ending discrimination against people with mental and substance use disorders: The evidence for stigma change*. The National Academies Press. https://doi.org/10.17226/23442

Pennington, C. R., Monk, R. L., Heim, D., Rose, A. K., Gough, T., Clarke, R., Knibb, G., Patel, R., Rai, P., Ravat, H., Ali, R., Anastasiou, G., Asgari, F., Bate, E., Bourke, T., Boyles, J., Campbell, A., Fowler, N., Hester, S., … Jones, A. (2023). The labels and models used to describe problematic substance use impact discrete elements of stigma: A registered report. *Psychology of Addictive Behaviors*, *37*(6), 723–733. https://doi.org/10.1037/adb0000919

Perry, B. L., Pescosolido, B. A., & Krendl, A. C. (2020). The unique nature of public stigma toward non-medical prescription opioid use and dependence: A national study. *Addiction*, *115*(12), 2317–2326. https://doi.org/10.1111/add.15069

Pescosolido, B. A. (2013). The public stigma of mental illness: What do we think; what do we know; what can we prove? *Journal of Health and Social Behavior*, *54*(1), 1–21. https://doi.org/10.1177/0022146512471197

Pescosolido, B. A., Halpern-Manners, A., Luo, L., & Perry, B. (2021). Trends in public stigma of mental illness in the US, 1996–2018. *JAMA Network Open*, *4*(12), Article e2140202. https://doi.org/10.1001/jamanetworkopen.2021.40202

Peter, L. J., Schindler, S., Sander, C., Schmidt, S., Muehlan, H., McLaren, T., Tomczyk, S., Speerforck, S., & Schomerus, G. (2021). Continuum beliefs and mental illness stigma: A systematic review and meta-analysis of correlation and intervention studies. *Psychological Medicine*, *51*(5), 716–726. https://doi.org/10.1017/S0033291721000854

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*(5), 751–783. https://doi.org/10.1037/0022-3514.90.5.751

Pullen, E., Ekl, E. A., Felix, E., Turner, C., Perry, B. L., & Pescosolido, B. A. (2022). Labeling, causal attributions, and social network ties to people with mental illness. *Social Science & Medicine*, *293*, Article 114646. https://doi.org/10.1016/j.socscimed.2021.114646

Ragsdale, J. M., & Elliott, M. (2022). Opioid addiction, attributions, and stigma: An online vignette experimental study. *Stigma and Health*, *7*(2), 205–213. https://doi.org/10.1037/sah0000374

Railey, A. F., Roth, A. R., Krendl, A. C., & Perry, B. L. (2023). Intergroup relationships with people who use drugs: A personal network approach. *Social Science & Medicine*, *317*, 115612. https://doi.org/10.1016/j.socscimed.2022.115612

Röhm, A., Möhring, M., Nellen, C., Finzi, J. A., & Hastall, M. R. (2022). The influence of moral values on news readers' attitudes toward persons with a substance addiction. *Stigma and Health*, *7*(1), 45–53. https://doi.org/10.1037/sah0000318

Rundle, S. M., Cunningham, J. A., & Hendershot, C. S. (2021). Implications of addiction diagnosis and addiction beliefs for public stigma: A cross-national experimental study. *Drug and Alcohol Review*, *40*(5), 842–846. https://doi.org/10.1111/dar.13244

Saloner, B., McGinty, E. E., Beletsky, L., Bluthenthal, R., Beyrer, C., Botticelli, M., & Sherman, S. G. (2018). A public health strategy for the opioid crisis. *Public Health Reports*, *133*(1_Suppl), 24S–34S. https://doi.org/10.1177/0033354918793627

Scott, K., Murphy, C. M., Yap, K., Moul, S., Hurley, L., & Becker, S. J. (2021). Health professional stigma as a barrier to contingency management implementation in opioid treatment programs. *Translational Issues in Psychological Science*, *7*(2), 166–176. https://doi.org/10.1037/tps0000245

Steinka-Fry, K. T., Tanner-Smith, E. E., Dakof, G. A., & Henderson, C. (2017). Culturally sensitive substance use treatment for racial/ethnic minority youth: A meta-analytic review. *Journal of Substance Abuse Treatment*, *75*, 22–37. https://doi.org/10.1016/j.jsat.2017.01.006

Substance Abuse and Mental Health Services Administration. (2022). *Key substance use and mental health indicators in the United States: Results from the 2021 National Survey on Drug Use and Health* (HHS Publication No. PEP22-07-01-005, NSDUH Series H-57). Center for Behavioral Health Statistics and Quality. https://www.samhsa.gov/data/report/2021-nsduh-annual-national-report

van Boekel, L. C., Brouwers, E. P., van Weeghel, J., & Garretsen, H. F. (2013). Stigma among health professionals towards patients with substance use disorders and its consequences for healthcare delivery: Systematic review. *Drug and Alcohol Dependence*, *131*(1–2), 23–35. https://doi.org/10.1016/j.drugalcdep.2013.02.018

VanderWeele, T. J., & Vansteelandt, S. (2014). Mediation analysis with multiple mediators. *Epidemiologic Methods*, *2*(1), 95–115. https://doi.org/10.1515/em-2012-0010

Volkow, N. D., Koob, G. F., & McLellan, A. T. (2016). Neurobiologic advances from the brain disease model of addiction. *The New England Journal of Medicine*, *374*(4), 363–371. https://doi.org/10.1056/NEJMra1511480

Wakeman, S. E., & Rich, J. D. (2018). Barriers to medications for addiction treatment: How stigma kills. *Substance Use & Misuse*, *53*(2), 330–333. https://doi.org/10.1080/10826084.2017.1363238

Weiner, B. (1980). A cognitive (attribution)-emotion-action model of motivated behavior: An analysis of judgments of help-giving. *Journal of Personality and Social Psychology*, *39*(2), 186–200. https://doi.org/10.1037/0022-3514.39.2.186

Werremeyer, A., Mosher, S., Eukel, H., Skoy, E., Steig, J., Frenzel, O., & Strand, M. A. (2021). Pharmacists' stigma toward patients engaged in opioid misuse: When "social distance" does not mean disease prevention. *Substance Abuse*, *42*(4), 919–926. https://doi.org/10.1080/08897077.2021.1900988

Yang, L. H., Wong, L. Y., Grivel, M. M., & Hasin, D. S. (2017). Stigma and substance use disorders: An international phenomenon. *Current Opinion in Psychiatry*, *30*(5), 378–388. https://doi.org/10.1097/YCO.0000000000000351

Yeager, D. S., Krosnick, J. A., Chang, L., Javitz, H. S., Levendusky, M. S., Simpser, A., & Wang, R. (2011). Comparing the accuracy of RDD telephone surveys and internet surveys conducted with probability and non-probability samples. *Public Opinion Quarterly*, *75*(4), 709–747. https://doi.org/10.1093/poq/nfr020

Received May 9, 2023
Revision received July 10, 2023
Accepted July 10, 2023 ■