Integrating time into stigma and health research

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Abstract | Stigma changes over time: it waxes and wanes through history, is manifested within humans who develop over time and is tied to statuses (such as attributes, illnesses and identities) that have varying courses. Despite the inherent fluidity of stigma, theories, research and interventions typically treat associations between stigma and health as stagnant. Consequently, the literature provides little insight into when experiences of stigma are most harmful to health and when stigma interventions should be implemented. In this Perspective, we argue that integrating time into stigma research can accelerate progress towards understanding and intervening in associations between stigma and health inequities. We situate time in relation to key concepts in stigma research, identify three timescales that are relevant for understanding stigma (historical context, human development and status course), and outline a time-based research agenda to improve scientists' ability to understand and address stigma to improve health.

Stigma is a social process that involves distinguishing people based on social statuses (such as attributes, illnesses and identities) and socially devaluing, discrediting and excluding individuals with those statuses[1]. Many statuses are stigmatized today, including those associated with oppressed groups, such as women and minoritized ethnic groups; physical and mental illnesses, such as HIV and schizophrenia; and social norm violations, such as drug use and sexual and gender diverse identities[1–3]. Stigma undermines health by preventing access to critical health-promoting resources (such as healthcare and employment) and acting as a pernicious stressor that leads to harmful affective, cognitive, behavioural and physiological responses among individuals[1]. Thus, stigma is a fundamental cause of health inequities[4], that is, health differences in which stigmatized groups experience worse health or greater health risks than non-stigmatized groups[5].

Stigma changes over time. At the societal level, the magnitude of stigma associated with various statuses has waxed and waned over the course of history. For example, sexism and homophobia have generally decreased in the United States over the past century[6–8]. By contrast, xenophobia towards Latinx, Muslim and Asian individuals has resurged during the recent political climate[9] and the COVID-19 pandemic[10], and HIV and COVID-19 have ushered in fresh waves of health-related stigma[11–14]. At the individual level, the impact of stigma changes across human development, such that people are more vulnerable or more resilient to stigma at different stages of their lives. For example, there is evidence that sexual and gender diversity stigma might improve as sexually and gender diverse individuals transition from youth into adulthood[15,16].

In addition to changes in the experience and outcomes of stigma, stigmatized statuses themselves evolve over time. Some of these statuses change in ways that place individuals at risk for more frequent or pronounced experiences of stigma, such as when an individual's symptoms of muscular dystrophy worsen and become visible[17]. Other stigmatized statuses might change in ways that lead to less frequent or pronounced experiences of stigma, such as when an individual loses weight[18]. Despite the inherent fluidity of stigma, and recent calls from theorists working on racism[19] and health disparities[20] to better account for time in these areas of research, stigma scientists often do not consider the temporal context of their work.

In this Perspective, we argue that integrating time into stigma research can accelerate progress towards understanding and intervening in associations between stigma and health inequities. We situate time in relation to key questions in stigma research, identify three timescales that are particularly important for understanding stigma (historical context, human development and status course) and outline a time-based research agenda to understand and address stigma to improve health. Accounting for time in stigma research can yield key insights into how experiences of stigma evolve, how pathways linking stigma with health change and when individuals are most vulnerable or resilient to the effects of stigma. Moreover, accounting for time in stigma interventions can help psychologists determine when stigma interventions are most needed, identify appropriate intervention targets for specific times and consider which stigma reduction tools will be most effective at which times.

Key questions about stigma

Scientists researching stigma have been asking key questions that have yielded important insights into associations between stigma and health. In this section, we outline these questions and situate the concept of time within this literature.

What is stigma and why does stigma exist?

Stigma is a social process that emerges at the co-occurrence of labelling, stereotyping, separation, status loss and discrimination within a power context[21]. This social process is theorized to exist, in part, because it serves societal functions, including to perpetuate exploitation and domination of some groups of people (such as minoritized ethnic groups, or women), enforce conformity to social norms by shaming or questioning the morality of other groups (such as people who use drugs or those with diverse sexual and gender identities) and encourage avoidance of people impacted by illness (such as

people living with HIV or schizophrenia)[2]. Intersectionality suggests that various forms of stigma intersect and interact (for example, Black women living with HIV experience unique forms of stigma shaped by their race, gender and HIV status)[22,23].

Who enacts and experiences stigma? At the individual level, stigma is enacted and experienced by both people without stigmatized statuses (who are sometimes called 'stigmatizers', actors or perpetrators) and people with stigmatized statuses (who are sometimes called the 'stigmatized' or targets). Stigma is perpetuated via prejudice (negative emotions and feelings towards a person based on group membership), stereotypes (group-based beliefs applied to individuals) and discrimination (unfair or unjust treatment of group members)[24,25]. These stigma manifestations can be experienced with intention and awareness as explicit bias or without intention and awareness as implicit bias[26–28]. Moreover, individuals can perceive stigma, or hold perceptions of the extent to which others in their community engage in prejudice, stereotypes and discrimination towards people with stigmatized statuses[29]. Perceived stigma can influence the extent to which individuals (especially children) endorse stigma towards people with stigmatized statuses[30], as well as the extent to which individuals with stigmatized statuses internalize stigma[31,32] — that is, the extent to which they endorse prejudice and stereotypes associated with their stigmatized status and apply them to the self (also known as self-stigma)[29,33–35].

Individuals living with stigmatized statuses are exposed to both experienced stigma (discrimination from others in the past or present) and anticipated stigma (expectations of discrimination in the future)[29,33]. These experiences range from chronic and everyday stressors (microaggressions) to acute and significant events (macroaggressions)[36–39]. The impact of experienced and anticipated stigma depends on the source of these experiences, such that stigma from family, healthcare providers, employers and others plays different roles in health outcomes[40–42]. For example, stigma from family members can undermine health outcomes by leading to psychological distress whereas stigma from healthcare providers can undermine health outcomes by leading people to avoid accessing needed medical treatment[40,43].

Where does stigma occur? Social-structural contexts shape individuals' experiences and outcomes of stigma. Structural stigma spans conditions, cultural norms and policies at the societal and institutional levels that constrain the opportunities and resources of individuals living with stigmatized statuses[44]. At a macro level, culture fundamentally shapes stigma processes given that values and priorities shape the ways and extent to which statuses are stigmatized[45,46]. Societal-level examples of structural stigma include racial residential segregation[47,48], same-sex marriage bans[49,50], HIV criminalization policies[51] and the war on drugs[52–54]. Institutional-level examples include HIV disclosure policies within employment settings[55], zero-tolerance drug use policies in workplace settings and housing agencies[56], and the lack of gender-neutral bathrooms and locker rooms in schools[57]. At more micro levels, stigma is shaped by social networks (individuals report more stigma when their interaction partners also report more stigma)[58] and manifests uniquely in various spaces, places and/or locations. For example, theorists working on spatial stigma note that racism manifests in high-poverty, urban areas characterized by racial residential segregation[59]. Given that stigma is socially constructed within specific contexts, individuals may experience more or less pronounced stigma as they move between contexts. For example, an individual might be racialized, or considered to be a member of a minoritized ethnic group, in one country but not in another[60] and a pregnant person may experience stigma in the workplace but not at home[61].

How does stigma impact health? Stigma plays a role in the risk for, development of and/or worsening of many diseases including mental health conditions (such as depression[36,62,63] and anxiety[36]), behavioural health conditions (such as substance use disorders (SUDs)[63,64]), infectious diseases (such as HIV[63,65] and tuberculosis[63]) and non-communicable diseases (such as cardiovascular disease[66,67] and epilepsy[63]). Longitudinal and population-based studies further suggest that greater stigma is associated with greater risk of mortality[68–71].

Stigma erodes the health of people with stigmatized statuses via two primary mediating pathways[33]. First, stigma at the individual and structural levels limits access to health-promoting resources, such as housing, healthcare, education, income and food[4]. For example, anticipated stigma among people with mental and physical health conditions undermines healthcare initiation and access[35,72–75], stereotypes endorsed by food retailers lead to decisions to not stock or promote healthy foods in low-income neighbourhoods[76] and racial residential segregation is associated with racial disparities in education and housing quality, employment opportunities and healthcare access[47]. Second, stigma leads to affective, cognitive, behavioural and physiological responses that undermine health[33,46,77]. For example, experienced and anticipated stigma leads to stress, which has a pronounced impact on mental and physical health[4,78,79]. Moreover, behavioural responses to stigma include maladaptive health behaviours, such as substance use[80] and increased food consumption[67,81].

Several characteristics of stigmatized statuses may shape individuals' experiences of stigma and the ways in which stigma impacts health[33,82,83]. For example, individuals with statuses that are concealable (or can be hidden from others, such as HIV status) sometimes delay help-seeking to avoid discovery[84]. Stigma associated with statuses that are controllable (or perceived to be under the influence of the individual, such as weight status) is perceived by members of the general public to be more justified than stigma associated with statuses that are not controllable (such as a genetic health condition), and thus stigma associated with controllable statuses is sometimes stronger and more harmful[33]. Additionally, individuals with statuses reflective of a collective identity (or a larger group with shared identity, such as the Deaf community) might have access to social support and other health-promoting resources that enhance their resilience to stigma[33].

When does stigma occur? Despite tackling the important questions related to stigma and health outlined above, research has focused less on the question of when stigma occurs. Asking when stigma occurs might lead to a more complete understanding of associations between stigma and health, including when experiences of stigma are most harmful to health and how pathways linking stigma with health change over time. Asking when stigma occurs might, additionally, lead to more effective solutions to intervene in stigma by informing when to deliver stigma intervention strategies, ultimately bringing society closer to health equity. Until a more complete understanding of stigma and health is developed and more effective strategies to eliminate stigma are developed, stigma will remain an intractable social problem extracting a costly toll on human health.

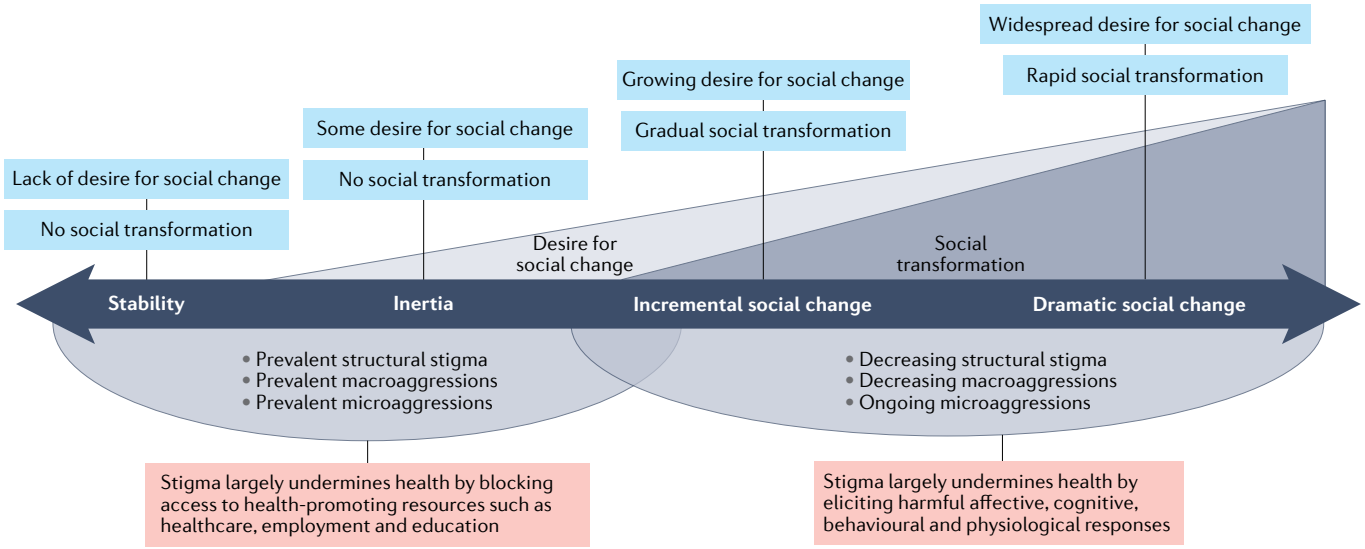

Fig. 1 | **Stigma and historical context.** Societies move forwards and backwards through contexts of social change, represented by bidirectional arrow. Characteristics of each historical context described above timeline (blue). Ways in which individuals experience stigma and how stigma impacts health across historical contexts described below timeline (red). Figure assumes that stigma decreases over time, with times of stability associated with most stigma and times of dramatic social change associated with least stigma.

Time, stigma and health

Three timescales might be particularly relevant for understanding stigma and health: historical context, human development and stigma course. The choice of these timescales is inspired by bioecological systems theory, which emphasizes the interplay between proximal processes, context and historical time in human development[85–87]. In this section, we introduce each timescale and relevant theoretical frameworks.

Historical context. According to life course theory, human lives must be understood in relation to historical time because differences in birth year expose individuals to different historical contexts[88]. Individuals' experiences of stigma are therefore fundamentally shaped by the historical context into which they are born. For example, a woman living in the United States in the nineteenth century likely experienced substantial structural-level sexism and overt macroaggressions: she could not own property, vote or work outside her home. She could be legally raped by her husband (or by her white slave owner if she was Black). A woman living in the United States in the twenty-first century experiences arguably less pronounced structural-level sexism given policy changes since the nineteenth century. However, she continues to experience harmful forms of structural sexism: she could earn lower wages at work than men, live in states with fewer women than men representatives in her legislature and lack access to abortion[89]. She could also continue to experience macroaggressions, such as sexual harassment, and microaggressions, such as not getting hired or receiving poor healthcare on the basis of her sex[90].

We hypothesize that stigma is continually being dismantled, maintained and/or created over time through social change processes. There are four contexts for social change that might shape experiences of stigma and individual-level outcomes, including health[91] (FIG. 1). The contexts of stability and inertia are characterized by a lack of social change. In times of stability, there is a general lack of desire for social change and people are generally happy with the status quo. For example, few people currently call for an end to stigma towards sex offenders. In times of inertia, some members of society desire social change but not enough members desire change to initiate structural and/or individual-level transformation. For example, although Amnesty International has called for full decriminalization of consensual sex work[92], widespread transformation of policies surrounding sex work and attitudes towards sex workers has arguably yet to occur.

By contrast, contexts of incremental and dramatic social change are characterized by social transformation. In times of incremental social change, society evolves slowly and steadily in ways that do not threaten cultural identity. For example, there is currently slow evolution towards perceiving people with SUDs as people living with chronic health conditions rather than as criminals[93], and stigmatizing policies such as the war on drugs are being increasingly critiqued as forms of stigmatization[94,95]. In times of dramatic social change, society evolves quickly and profoundly in ways that threaten cultural identity. For example, the Black Lives Matter movement is calling for dramatic systemic change to address racism and, in some places, ushering in structural changes[96]. Notably, contexts for social change are specific to individual stigmatized statuses. At one point in time within one society, there may be different contexts for social change related to sex offenders, sex workers, people with SUDs, Black people and people with other stigmatized statuses.

Research spanning generational statuses provides evidence that the historical context and the context of social change shape experiences and outcomes of stigma. For example, younger generations of Black Americans report experiencing a different form of racism, described as less overt yet still harsh, than older generations did[97]. Similarly, reductions in stigma associated with alcohol use disorders has resulted in younger generations initiating services for alcohol use disorders earlier than older generations[98].

The pathways linking stigma with health outcomes might also evolve over time[4]. For example, as anti-discrimination laws that prohibit discrimination on the basis of stigmatized statuses are enacted, the primary mediating mechanism linking stigma with health might shift from overt discrimination preventing access to health-promoting resources, such as employment, housing and healthcare, to

more subtle interpersonal experiences that result in stress[4]. Importantly, this change might be slow: even after anti-discrimination laws are enacted, more subtle and covert forms of interpersonal discrimination might continue to prevent access to health-promoting resources for some time.

The ways in which and extent to which stigma harms health are shaped by social change processes. Thus, differentiating between contexts for social change, including stability, inertia, and incremental and dramatic social change, is important for stigma and health research.

Human development. In addition to historical time, life course theory suggests that human lives must also be understood in relation to developmental processes and contexts[88] (FIG. 2). As individuals age and transition between life stages and social environments, such as from school to work, sources of stigma and contexts in which stigma is experienced shift[39,99]. Life course theory suggests that properties of each life stage confer differential susceptibilities and resiliencies to stressors such as stigma[20]. Among children, stigma can take the form of bullying from peers on playgrounds[100]. As children age into adolescence, many begin experiencing more stigma from adults[101], including discrimination from teachers and other adults in school settings[102], shopkeepers and police[103]. Yet adolescents can be buffered from stigma by strong relationships with other adults such as parents and teachers[104,105]. Emerging adults experience significant transitions in social environments related to education, employment and interpersonal relationships[106]. These transitions might expose emerging adults to new forms of stigma from new sources, such as from college professors, employers and co-workers, and romantic partners. Yet emerging adults might also have greater ability to change where they live and work, and who they spend time with, than children and adolescents, allowing them to reduce their exposure to stigma in these contexts. Adults might experience more stigma from healthcare providers as they develop chronic diseases, bringing them into healthcare contexts more frequently[107,108]. As they age, older adults report increasing age discrimination[109]. Yet older adults have better emotion regulation abilities that protect them from the negative impacts of stigma[110].

Evidence from developmental science indicates that the temporal context of adverse experiences during the life course has implications for both immediate and lasting health. Sensitive periods are developmental stages when social or environmental exposures can have especially pronounced effects on human development, and can be critical drivers of population-level health disparities[20]. We hypothesize that childhood and adolescence might be sensitive periods for stigma: although children and adolescents gain awareness of stigma as they develop metacognitive skills, or awareness of others' thoughts and perceptions[111], they have not fully developed coping capacity and skills, self-efficacy or social power[112,113]. They might therefore be more vulnerable to stigma than adults because they are less able to respond to stigma with resilience and resistance strategies. Moreover, adolescents undergoing identity versus role confusion, a stage when individuals grapple with questions of who they are and how they are similar to versus unique from others, might be more vulnerable to stigma[114,115]. Indeed, exposure to stigma early in life is associated with worse health outcomes than exposure later in life[116].

Older age might be another sensitive period for stigma. According to the strength and vulnerability integration model[110], older adults have accumulated psychological strengths such as emotion regulation abilities that are protective of their well-being. Yet older adults might also be more vulnerable to situations that elicit high levels of emotional arousal, and

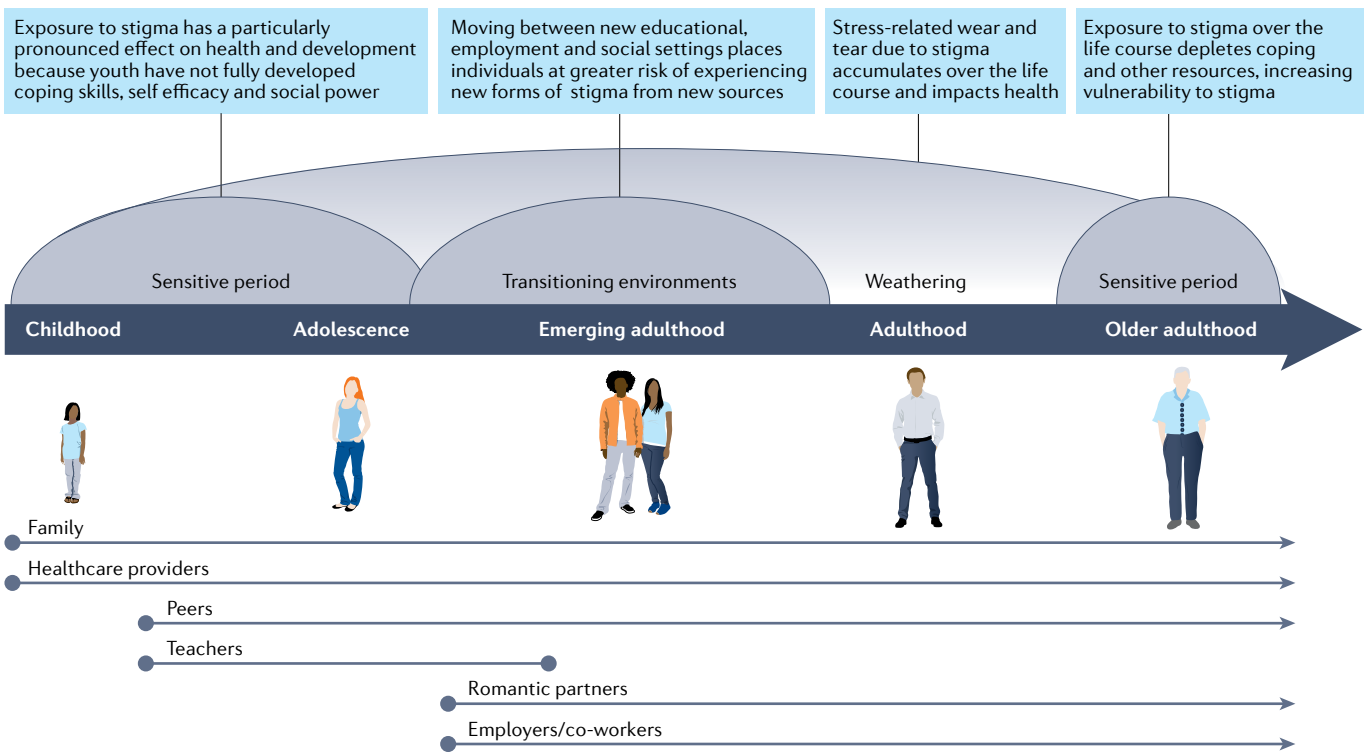

Fig. 2 | **Stigma and human development.** Vulnerabilities to stigma at each developmental period depicted above timeline (blue). Examples of sources of stigma across developmental stages depicted below timeline.

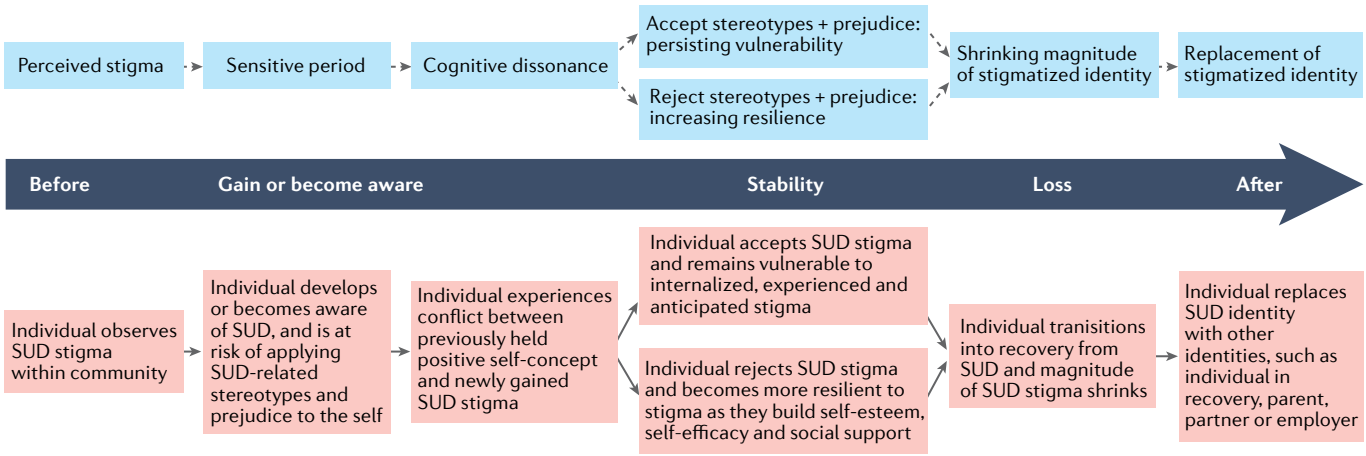

Fig. 3 | **Stigma and status course.** Vulnerabilities to stigma across status course described above timeline (blue). Example of substance use disorder (SUD) stigma changing with status course described below timeline (red). Some individuals might not progress to next stage (dotted arrows).

repeated exposure to stigma over the life course might deplete their coping resources over time, rendering them more vulnerable to stigma[109]. Additionally, older adults might be particularly vulnerable to several of the pathways whereby stigma undermines health, such as social isolation and less access to resources, as their social networks shrink and they become more dependent on others and social welfare systems[110,117].

Finally, the weathering hypothesis suggests that stress-related wear and tear accumulates over the life course and results in substantial health inequities among stigmatized populations[118,119]. Thus, at the timescale of human development, associations between stigma and health might be influenced both by specific sensitive periods and by processes that unfold over the lifespan.

Status course. The sections above describe how experiences and outcomes of stigma can change over historical and developmental timescales. The status course timescale describes the extent to which stigmatized statuses can themselves change and evolve over time[82]. For example, individuals can develop or gain stigmatized statuses such as sexual and gender diverse identities, HIV, mental illnesses, weight and old age during their lifetime. Individuals can also lose stigmatized statuses, such as when they resolve a SUD, lose weight or transition from unemployed to employed. Additionally, associations between individuals' identities and their stigmatized status can change over time, such as when individuals become aware that an aspect of the self, such as their gender or race, is stigmatized within society[120].

Experiences of stigma change alongside changes in stigmatized statuses[31,32] and identities[120,121] (FIG. 3). Modified labelling theory[31] and the stage model of self-stigma[32] suggest that individuals first develop perceived stigma, or an awareness that a particular status is stigmatized within society. Individuals who gain or become aware of a stigmatized status then begin the process of identity formation, involving self-discovery and exploration of their new identity[122]. They then enter a sensitive period during which they are at risk of applying the negative stereotypes and prejudice associated with the status to the self, thereby potentially rendering them vulnerable to internalized, experienced and anticipated stigma[32]. For example, longitudinal work suggests that internalized HIV and sexually transmitted infection stigma are particularly high immediately after an HIV or sexually transmitted infection diagnosis[123,124]. Individuals then move through a period of cognitive dissonance, during which conflict arises between their previously held positive self-concept and new internalized stigma[125]. For example, the self-perception of an individual who has gained weight that they are motivated and hard-working conflicts with the stereotype that people with obesity are lazy or weak-willed[126].

Increasing dissonance might lead to existential crisis, which can be resolved by accepting or rejecting previously held stereotypes and prejudice[125]. If individuals accept stereotypes and prejudice, they remain vulnerable to internalized, experienced and anticipated stigma. If individuals reject stereotypes and prejudice, their internalized stigma decreases over time[125]. As internalized stigma decreases, individuals are able to accept their stigmatized status, integrate their new identity into their sense of self, and build self-esteem and self-efficacy[120–122,127]. These individuals can develop pride in their stigmatized status as they form social connections with others who share their status, and their identity associated with the status can become less central to their self-definition or balance with other identities[121]. Individuals can also become more resilient to stigma as they build self-esteem, self-efficacy and social support networks. For example, people in recovery from SUDs accumulate self-esteem[128] and social support[129] over time. This may explain why people in later stages of recovery report less psychological distress associated with experienced stigma than people in earlier stages[130].

There has been less work on the process of losing a stigmatized status, perhaps because many stigmatized statuses (such as HIV) cannot be lost over time. Nevertheless, some common intrapersonal and interpersonal processes have been identified that facilitate transitions from a stigmatized status to a non-stigmatized status when stigmatized statuses are lost.

First, the identity theory of desistance[131] and the Social Identity Model of Cessation Maintenance[132] suggest that individuals begin to identify new 'possible selves', or ideas of what future versions of themselves might be, at the intrapersonal level as they lose stigmatized statuses. For example, people with SUDs begin to replace an existing stigmatized identity, such as 'addict', with a valued identity, such as 'person in recovery'[132]. For some individuals, high levels of identification with the new possible selves or valued identities facilitates the process of evolving past the stigmatized identity[132].

Second, engaging in behaviours that move them away from a stigmatized status might lead to less interpersonal reinforcement of that status[18]. For example,

individuals experience less stigma from others as they lose weight, which provides social feedback that they are no longer viewed as members of a stigmatized group[18].

Third, individuals' identities as members of stigmatized groups become less salient (that is, thought about less frequently), and less central or important to self-definition, at the intrapersonal level as stigmatized statuses are reinforced less by others at the interpersonal level. Thus, the strength of identities associated with the stigmatized status might decrease[133]. The intrapersonal process of losing a stigmatized status might last years after the status is lost. Indeed, people continue to identify with a stigmatized status long after the status ceases to mark social interactions[18]. For example, some individuals who have lost weight continue to experience weight-related stigma[18] and some individuals who have resolved a SUD continue to self-identify as 'addicts'[132].

Intersection of timescales. Changing stigmatized statuses are nested within developing humans, which are nested within evolving historical contexts. There is some precedence for studying intersecting timescales within stigma research, especially within the context of age–period–cohort effects which consider the intersections between historical context and human development[99]. However, to best understand how an individual will experience and be impacted by stigma, it is important to consider when they are experiencing stigma in relation to all three timescales.

For example, consider sexually diverse adolescents living in the United States in 2022 (FIG. 4). Regarding the historical context, there is evidence that sexual diversity stigma is undergoing dramatic change in the United States. At the structural level, state Supreme Courts began finding bans on same-sex marriages unconstitutional in 2003 and the US Supreme Court ruled that all states must recognize same-sex marriage in 2015, thereby removing a pernicious form of structural stigma. The policy landscape surrounding sexual diversity rights continues to evolve[8,134]. Reflecting parallel changes at the individual level, the percentage of respondents to the General Social Survey who agreed that "homosexuals should have a right to marry" increased from 11% in 1990 to 68% in 2018 and that a "homosexual should be allowed to teach" rose from 65% to 88% during the same time period[135]. Considering only historical context, one might expect that sexually diverse adolescents are less harmed by stigma in the 2020s than they were in the 1990s.

However, despite benefiting from a historical context of decreasing stigma, sexually diverse adolescents continue to experience persistent health inequities[111]. This might be because their stage of development and status course continue to render adolescents vulnerable to stigma. Regarding human development, adolescence is a sensitive period for stigma because individuals are gaining awareness that others might hold prejudice towards and stereotypes about them, but have fewer coping and resilience resources to buffer them from experienced and anticipated stigma[111]. In addition, sexually diverse adolescents are often financially, legally and emotionally dependent on their families and have little control over their environments, such as which school they attend. It is possible that the same experiences of stigma that could be managed by changing a residence, friend group or workplace among adults cannot be addressed among adolescents who do not have full control of these aspects of their lives, thus making sexually diverse adolescents more vulnerable to stigma than sexually diverse adults.

Regarding the stigma course timescale, evidence suggests that youth first experience same-sex attraction around age 12 years, and realize and disclose their sexually diverse status around age 14 years (both of which are considerably younger ages than in older generations)[111,136]. Adolescents are, therefore, arguably in the early phases of stigmatized identity development, and might be experiencing identity conflict and confusion. This confers an additional layer of vulnerability to experiences of stigma. By contrast, sexually diverse adults might be more resilient to experiences of stigma given that they have had more time to reject stereotypes and prejudice associated with their stigmatized status[32], as well as achieve self-acceptance, develop pride and form social connections with sexually diverse peers[15].

Considering the example of sexually diverse adolescents illustrates the importance of integrating multiple timescales into stigma and health research. Although they live in a historical context characterized by dramatic social change, which should confer some protections from stigma, today's sexually diverse adolescents remain vulnerable to stigma because of their stage of human development and status course (that is, their early stage of stigmatized identity development). Taking all three timescales into account is important for both understanding and intervening in associations between stigma and health among sexually diverse adolescents.

A time-based research agenda

Psychologists and other social scientists have achieved remarkable innovations over the past several decades in research methods for studying time[137,138]. Yet, according to meta-analyses, only a minority of studies focused on associations between stigma and health use longitudinal methods[34,73,139,140]. Moreover, decades of research have yielded a toolbox of evidence-based strategies to intervene and reduce stigma, such as through education, contact between people with and without stigmatized statuses, and policy change[141–145]. However, there has been little research on when these stigma reduction tools should be implemented to maximize their efficacy. In this section, we outline research questions that might lead to a better understanding of the role of time in associations between stigma and health inequities, and ways to leverage time to better intervene to reduce these associations (see TABLE 1).

Questions and methods. We propose three cross-cutting research questions that can be asked in relation to each timescale. First, research should investigate how experiences of stigma evolve over time. We hypothesize that the ways in which stigma manifests at the structural and individual levels might differ depending on the time period. For example, individuals might experience more macroaggressions during historical contexts of stability and more microaggressions during contexts of dramatic social change; they might experience stigma-based bullying from peers during childhood and hiring discrimination from employers during adulthood. Time-specific measures of stigma are available (for example, the Perceptions of Racism in Children and Youth scale is designed to measure race-based stigma among children and youth[146]), but more are needed to best capture unique experiences of stigma occurring at specific times. Additionally, the extent to which individuals experience stigma might change over time. For example, individuals might experience more stigma as they develop a SUD and less stigma as they enter into recovery. Growth curve modelling could be used to chart stigma manifestations prospectively over time.

Second, research should examine how the pathways linking stigma with health change over time. For example, we hypothesize that during younger developmental stages

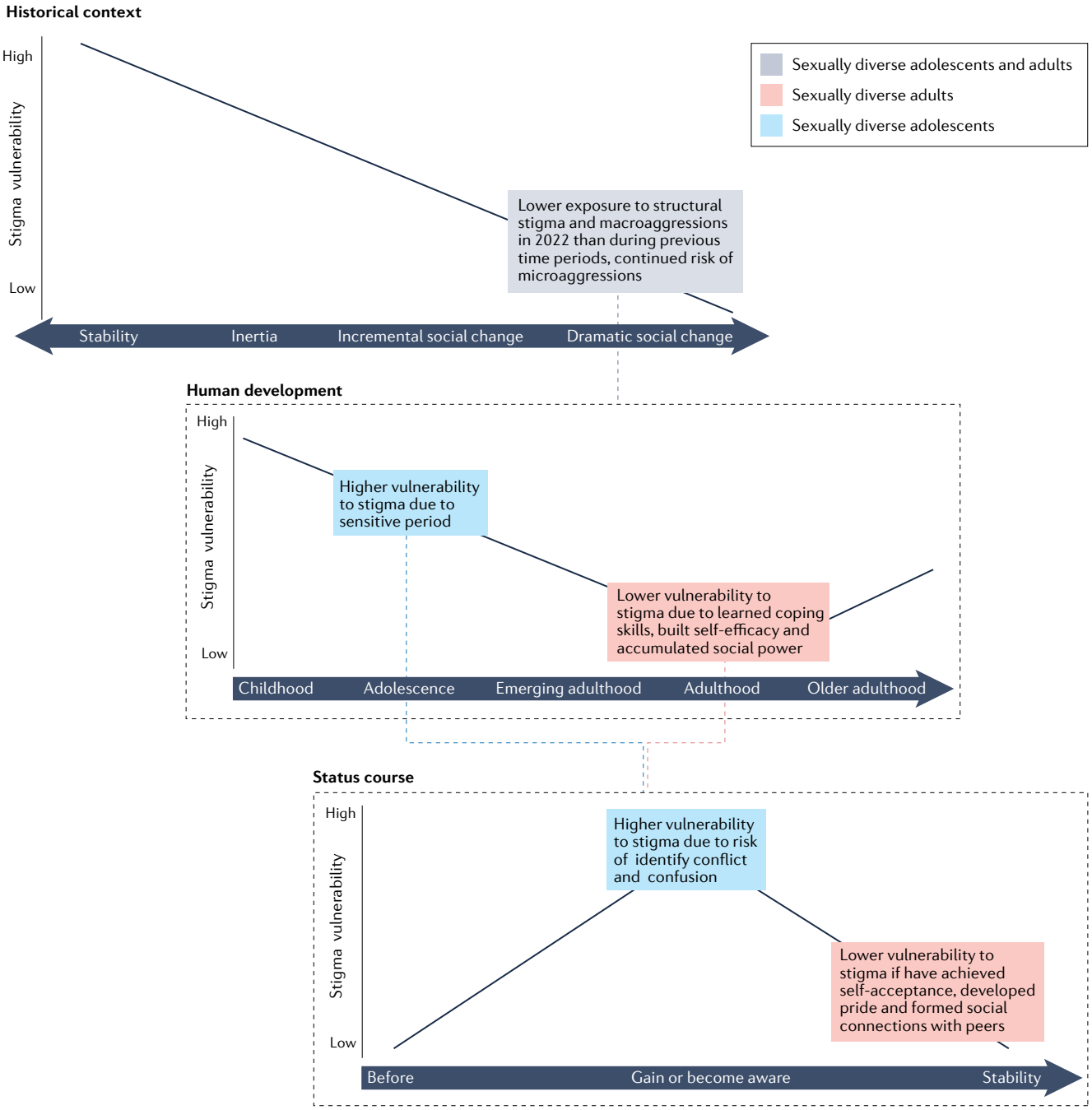

Fig. 4 | **Intersecting timescales for sexually diverse adolescents and adults in 2022.** Status course timescale nested within developmental timescale, nested within historical context timescale. Stigma vulnerabilities among sexually diverse adolescents and adults (grey box), sexually diverse adolescents (blue boxes) and sexually diverse adults (red boxes). Magnitude of stigma vulnerabilities indicated at various time points (black lines).

when individuals' capacity for coping is still growing, experiences of stigma might have a strong impact on health via stress and maladaptive behavioural and psychological responses. At later developmental stages, stigma might have a more profound impact on health by undermining access to resources such as income and health insurance. Longitudinal studies that span the full life course are rare and challenging to conduct, particularly with hard-to-reach populations. Cohort sequential design[147] and integrative data analysis[148] offer methodological approaches for pooling data across multiple, independent samples to study individual development over time. Longitudinal mediation analyses can be used to explore pathways linking stigma with health during different time periods.

Last, scientists should determine when individuals are most vulnerable to the effects of stigma, and when they are most resilient. For example, the hopelessness theory of depression suggests that stressors are more likely to generate symptoms of hopelessness and depression when they are viewed as highly stable and global[149]. Thus, it is possible that experiences of stigma are more distressing during historical contexts of stability. To determine when experiences of stigma are most harmful in relation to the historical context, research methods that can characterize evolving historical contexts are needed. Longitudinal methods that quantify the rate of change at the structural level, such as via policy

Table 1 | **Summary and comparison of timescales for stigma and health research**

	Historical context	Human development	Stigma course
Concept	The extent to which and ways in which statuses are stigmatized change over time; thus, the impact of stigma on health and processes linking stigma with health change over time	The ways in which individuals experience stigma and the extent to which stigma impacts health change across the lifespan	The ways in which individuals experience stigma and the extent to which stigma impacts health change in relation to the course of stigmatized statuses
Examples	Declines in sexual diversity stigma in the second half of the twentieth century and beginning of the twenty-first century	Childhood and adolescence are sensitive periods, when experiences of stigma have particularly profound effects on health and development	People living with HIV experience higher internalized stigma immediately following HIV diagnosis
	Emergence of HIV-related stigma in the 1980s and COVID-19 stigma in the 2020s	According to the weathering hypothesis, older adults are vulnerable to the effects of accumulated stress due to stigma	Individuals who enter recovery from substance use disorders (SUDs) replace a stigmatized identity ('addict') with a valued identity ('person in recovery')
Research questions	How do experiences of stigma differ within various historical contexts?	How do experiences of stigma evolve across the life course?	How do experiences of stigma change alongside the course of stigmatized statuses, including status gains and losses?
	During which social change contexts is stigma most harmful to health?	At which developmental stages are individuals most vulnerable to the harmful effects of stigma on health?	As individuals gain and lose stigmatized statuses, when are they most vulnerable to the impacts of stigma?
	When and how do pathways linking stigma with health change over time?	For how long do experiences of stigma impact health?	
Research methods	Multilevel methods	Life course histories	Mixture modelling
	Longitudinal policy analysis	Longitudinal studies	Moderation analyses
		Integrative data analysis	
Implications for interventions	During times when stigma is not changing at structural or individual levels, interventions that promote resilience to stigma among individuals with stigmatized statuses might be most effective	Deliver stigma interventions during stages of human development when individuals are most vulnerable to stigma	Address internalized stigma in the weeks and months following the development of a new stigmatized status
	During times when stigma is changing at structural and/or individual levels, stigma reduction might be most effective	Stigma interventions delivered early in life might promote well-being later in life	Individuals might continue to be impacted by stigma even after they have lost a stigmatized status
		Intervention strategies should be leveraged to address the cumulative effects of experienced and anticipated stigma among people who have lived with stigmatized statuses for long periods of time	

change, and the individual level, such as via attitude change, could help classify historical contexts. Multilevel models allow for the modelling of piecewise growth, which can allow scientists to estimate periods of both stability and social change. Moreover, novel methods that explore trends in people's digital footprints, such as Google search terms and social media posts, could offer innovative strategies for characterizing current and changing historical contexts[150–152]. Multilevel methods can be used to study individual-level experiences of stigma in varying historical contexts. For example, research on age–period–cohort effects using multilevel modelling demonstrates that the health of Black Americans improved with the abolition of Jim Crow (state and local laws that enforced racial segregation in the Southern United States)[153]. We additionally hypothesize that individuals might be more vulnerable to stigma during sensitive periods, such as during childhood, adolescence and older adulthood as well as when they first gain a new stigmatized status. Longitudinal methods can be used to more precisely identify sensitive periods across human development and stigma course.

Implications for interventions. We additionally propose three cross-cutting implications for interventions in relation to each timescale. First, scientists conducting interventions should determine when stigma interventions are most needed. Although it is arguably always appropriate to attempt to intervene to reduce stigma and improve health, there might be times when stigma interventions are particularly needed because the impacts of stigma are especially harmful. For example, as noted above, childhood and adolescence might be sensitive periods during which stigma could have a particularly pronounced impact on health. Moreover, early exposures to stressors including stigma can have long-term impacts on health[16,99]. Thus, it might be particularly important to intervene at early ages to promote lifetime well-being. Stigma interventions for youth are becoming more numerous, yet remain small in number and unevenly distributed across stigmatized statuses, locations and social contexts[100,154]. Thus, there are sizeable gaps in existing interventions to address stigma during childhood and adolescence.

Second, scientists should consider appropriate intervention targets for specific times. It is possible that some

intervention targets are more or less feasible during certain time periods. For example, resilience interventions are designed to reduce internalized stigma and inoculate individuals against the negative effects of stigma on health[65,78]. These interventions might be more effective than interventions that challenge dominant narratives during historical contexts of stability and inertia because they do not require change within structures or individuals without stigmatized statuses. By contrast, interventions that challenge dominant narratives that support stigma processes might be more feasible during contexts of incremental and dramatic social change when individuals might be more receptive to strategies that call stereotypes into question and promote social change[155].

Last, we recommend evaluating which stigma reduction tools will be most effective at which times. For example, cognitive behavioural therapy and acceptance and commitment therapy, which have been shown to reduce internalized stigma and shame[141,156], might be particularly important in the weeks and months following the gain of new stigmatized status when internalized stigma might be particularly high. Similarly, values affirmation interventions, which increase the salience and centrality of valued identities[141], might accelerate progress towards identity synthesis and pride, and so might be most effective after individuals gain a new stigmatized status. Intervention strategies that bolster coping, reduce social isolation and/or facilitate access to resources might become increasingly important over the lifespan to buffer individuals from the cumulative effects of experienced and/or anticipated stigma from others. As individuals lose stigmatized statuses, values affirmation interventions could help individuals recognize new valued identities, such as person in recovery from a SUD, or focus on existing valued identities, such as mother, friend or volunteer, enabling lost stigmatized identities to decrease in importance. Interventions might additionally be needed to address the mental, physical, economic and other sequalae of stigma after stigmatized statuses are lost.

Conclusion

As a social process that waxes and wanes throughout history, is manifested within individuals who develop over time and is tied to statuses that have varying courses, stigma is constantly changing. However, theories, empirical approaches and intervention strategies generally treat stigma as static. We propose that better integrating time into stigma research will provide a more complete understanding of associations between stigma and health, and improve the ability to intervene to reduce stigma to promote health equity. Previous theorists have called on scientists to consider the three timescales of historical context[91], human development[19,99] or stigma course[31,32,82,131]. However, attending to timescales independently could yield incomplete understanding of individuals' experiences and outcomes of stigma[111]. We therefore suggest considering these timescales simultaneously.

Longitudinal methods such as growth curve modelling, cohort sequential design and integrative data analysis are needed to best answer questions of how experiences of stigma and pathways linking stigma to health evolve over time, and when individuals are most vulnerable and resilient to the effects of stigma. New methods might be needed to study the intersection of all three timescales to enable insight into how changing stigmatized statuses within developing humans and evolving historical contexts shape experiences and outcomes of stigma.

Integrating time into stigma research and answering the questions outlined above have implications for interventions. Specifically, it will be important to determine when stigma interventions are most needed, consider appropriate intervention targets for specific times and evaluate which stigma reduction tools will be most effective at which times. Determining when to use which tools and when to replace tools that are no longer effective due to a changing temporal context are critical next steps in collective efforts to address stigma and promote health equity.

There are certainly additional timescales to be considered beyond those we have identified and discussed here. For example, research utilizing ecological momentary assessment and daily diaries has yielded important insights into stigma processes on a more granular temporal scale than the timescales we focused on here[157,158]. Moreover, we discussed stigma processes generally, across a wide range of stigmatized statuses and social-structural contexts. However, there are important ways in which stigmatized statuses are unique that might limit the generalizability of findings across stigmatized groups[82,83]. For example, the stigma-related processes involved in gaining and losing weight versus developing and resolving a SUD likely differ[18,132]. Similarly, associations between timescales, stigma processes and health outcomes likely differ across social-structural contexts given that stigma is socially constructed. Finally, we primarily focused on stigma processes experienced by individuals living with stigmatized statuses. This focus is guided by the goal of understanding when stigma will be most harmful to the health of individuals with stigmatized statuses, and when to intervene to protect and improve the health of individuals with stigmatized statuses. However, developmental intergroup theory[30] and other theoretical and empirical work[4,91] provide important insights into the interactions between time and stigma processes among individuals without stigmatized statuses. Considering time in various ways, and across a range of individuals and socio-cultural contexts, will accelerate the field's ability to understand stigma and intervene to promote health equity.

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