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Review

Indigenous adaptation of a model for understanding the determinants of ethnic health inequities

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Abstract
Examining the pathways and causes of ethnic inequities in health is integral to devising effective interventions. Explanations set the scope for solutions. Understandings of ethnic health inequities are often situated in victim blaming and cultural deficit explanations, rather than in the root causes. For Indigenous populations, colonisation and racism are fundemental determinants of health inequities. Using a conceptual framework can support understanding of the fundamental causes of Indigenous health inequities. This article presents an Indigenous adaptation of the 'Williams model' for understanding the causes of racial/ethnic disparities in health. The Te Kupenga Hauora Māori modified model foregrounds colonisation as a critical determinant of health inequities, underpinning all levels from basic to surface causes. The modified model also attempts to reflect the dynamic interplay between causes at different levels, rather than a simple unidirectional relationship. We include the influence of worldviews/positioning as a cause and emphasise that privilege alongside racism plays a causative role in Indigenous health inequities. We also critique some of the limitations of this framework in reflecting the complex pathways of causation for ethnic health inequities, and indicate areas for further strengthening.

Keywords Indigenous · Health inequities · Colonisation · Racism · Privilege · Determinants of health

Abbreviations

NZ	Aotearoa New Zealand
SES	Socioeconomic status
TKHM	Te Kupenga Hauora Māori
NZDep	New Zealand Deprivation Index

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1 Introduction

There are multiple and complex factors that drive Indigenous and ethnic health inequities including colonisation, historical and contemporary power imbalances, differential exposure to the social determinants of health [1, 2] and inequities in access to and quality of health care. Understandings of health inequities expressed by the media, politicians, health professionals, academia, and the public are often situated in victim blaming, cultural deficit explanations, or are narrowly viewed as driven predominantly by genetic, cultural or biological differences [3, 4]. When a connection between colonisation and the contemporary disadvantage of Indigenous peoples is acknowledged, it is usually spoken about as a "legacy" rather than an ongoing presence [5]. Teaching and learning insitutions such as universities have an important opportunity and responsibility to change these societal "myth-takes" [5] and support a more nuanced understanding of the causal pathways for Indigenous health inequities.

As for many Indigenous groups around the world, Māori experience significant inequities in health compared to the non-Indigenous population. In 2017–19, Māori life expectancy at birth was 7.5 years shorter for males and 7.3 years for females, compared to non-Māori [6] and Māori have on average the poorest health status of any ethnic group in Aotearoa New Zealand (NZ) [7–9]. Although Māori experience a high level of health challenges, Māori receive less access to, and poorer care throughout, the full spectrum of health care services from preventative to tertiary care [10, 11]. Māori experience a higher burden of socioeconomic deprivation [8], yet health inequities remain for Māori even after adjusting for socio-economic deprivation or position [12]. Eliminating Indigenous and ethnic health inequities requires an understanding of the complex pathways through which colonisation, racism and socioeconomic factors interact with the more downstream causes, including health behaviours and health services. Explanations define solutions. Using a conceptual framework can support the understanding of fundamental causes of Indigenous health inequities.

Te Kupenga Hauora Māori (TKHM) is an-Indigenous led university department which coordinates teaching in Māori (the Indigenous people of NZ) health across foundation, undergraduate and postgraduate education levels at the University of Auckland, NZ. The department focuses on building capacity and developing appropriate, evidence-based teaching practices in Māori health across the Faculty of Medical and Health Sciences for both clinical and non-clinical students. TKHM strives to encourage a critical and deeper understanding of health inequities between Māori and non-Māori and the determinants of these disparities. To achieve these obejctives, TKHM have used a number of frameworks and models to explain ethnic health inequities. These have included: Williams' 1997 framework [13] for understanding racism and health (further refined by Williams and Mohammed in 2013 [14]), Reid et al.'s lens [12] of distribution gaps, outcome gaps and gradient gaps analysis, the NZ Ministry of Health's 2002 reducing inequalities framework [15] and Nancy Krieger's ecosocial theory [16]. It is unreasonable to expect a single model to reflect the complexity of the real world generation and perpetuation of Indigenous health inequities, so these different models offer complementary perspectives to increase understanding of causal pathways. In the context of TKHM's undergraduate teaching, the Williams model was being used as it offered the advantage of simplicity but lacked some contextual grounding to explain health inequities for Māori in NZ. In order to address this, Indigenous TKHM academic staff (predominantly Māori public health physicians and researchers) formally reviewed the 2013 Williams and Mohammed model [14] in 2015, and adapted the framework to better reflect the context for Māori in NZ, informed by an Indigenous worldview. This process included individual and group review, critique and brainstorming amongst the Indigenous academic team, and an iterative process of model refinement alongside testing in teaching. This paper prescribes the TKHM modified model, as it may offer elements helpful to advancing the understanding of Indigenous and ethnic health inequities more broadly. It is hoped that this modified framework may be useful to other anti-racism educators and researchers.

1.1 The Williams model for understanding racial/ethnic health inequities

Professor David Williams first described in 1997 [13] a framework for how racism and upstream causes interact with socioeconomic factors to create downstream responses influencing health outcomes, and this model was further refined by Williams and Mohammed in 2013 [14]. This work has been pivotal in drawing attention to the causative role racism plays in creating and maintaining ethnic health inequities. The model outlines the multiple pathways by which racism can affect health, and presents racism as one of several fundamental or basic determinants of

health. The model emphasizes the importance of distinguishing basic causes (e.g. racism) from surface or intervening causes (e.g. socioeconomic status, stress). Interventions in the intermediate or proximal pathways, without corresponding changes in fundamental causes, are unlikely to produce long-term improvements in health outcomes or reduce health inequtiies [14]. Williams and Mohammed argue that racism and other fundamental causes operate through multiple mechanisms to affect health. For example, institutional and cultural racism can adversely affect health through stigma, stereotypes, prejudice, and racial discrimination. These in turn can lead to differential access to socioeconomic resources and opportunities, and ultimately impact on physiological/psychological/behavioural responses and health outcomes.

1.2 Key differences between the TKHM modified model and the Williams model

The TKHM modified model (Fig. 1) outlines a framework to understand the causes of Indigneous health inequities within a NZ context. Like Williams and Mohammed, the TKHM modified model emphasises the importance of distinguishing *basic causes* from *surface (or intervening causes)*. The TKHM modified model foregrounds colonisation as a key determinant of health inequities underpinning all levels from basic to surface causes. In doing so, the model acknowledges the historical insult (and trauma) of colonisation whilst also foregrounding the ongoing contempory effects of colonisation in today's society. The TKHM modified model also attempts to reflect that there is not simply a unidirectional relationship between causes at different levels—although the inclusion of bidirectional arrows does not fully reflect the truly dynamic interplay between causes and multicausal pathways. The model includes the influence of worldviews/positioning as a basic cause and emphasises that privilege alongside racism plays a causative role in health inequities.

1.3 Colonisation as a fundamental driver for indigenous health inequities

It is impossible to understand Māori health inequities or intervene effectively without understanding the influence of past and ongoing colonisation:

> *"Central to colonisation is creating a 'new history'. In this 'new history' indigenous knowledge and beliefs are relabelled as myths, legends and superstition. The land gets 'discovered' by colonisers and the landscape is renamed.*

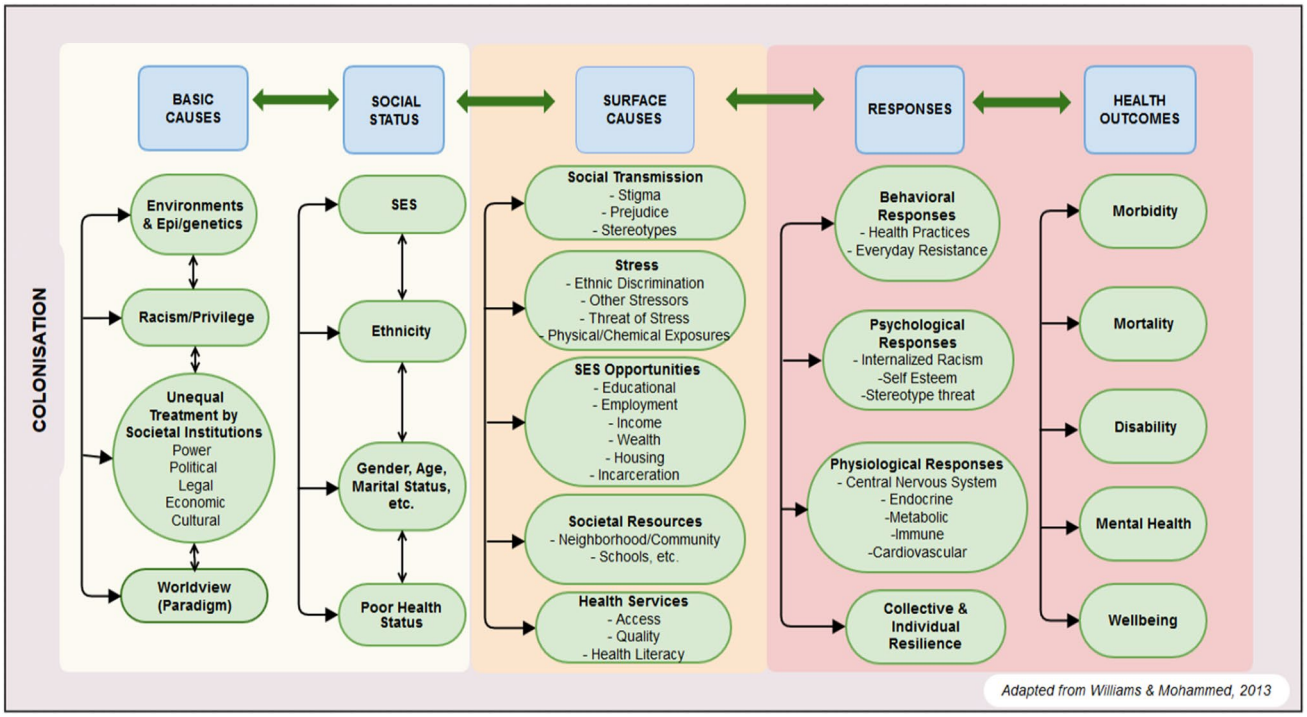

Fig. 1 TKHM modified Williams & Mohammed model for explaining Indigenous/ethnic determinants of health

…. Colonisation permits the (mis)appropriation and transfer of power and resources from indigenous peoples to the [colonising settlers]. This process of transfer is enabled by layer upon layer of new systems established to determine how resources will be obtained and how they are to be redistributed and to whom. These systems, therefore, construct who will benefit and who will be privileged…..” Reid & Robson [17]

Colonisation is an ongoing process of oppression, and Indigenous health inequities in NZ and internationally [18, 19], cannot be fully understood nor remedied without examining the colonial operating system which maintains them. Indigenous people experience the ongoing impacts of colonisation's genocides (the systematic eradication of peoples), ethnocides (the systematic eradication of ways of being including languages, traditional practices and the social structures necessary for their transmission) and epistemicides (the systematic eradication of traditional ways of knowing and knowledge creation) [20, 21]. In NZ, colonisation exerts a detrimental impact on Māori health through a number of mechanisms, including, but not only, through land appropriation, social deprivation, cultural subjugation, and loss of political power [22]. At the time of British colonisation, Māori societies were thriving and enjoyed a life expectancy higher than those in Britain [23]. Land in NZ went from being completely under Māori control pre-1840, to only 6% Māori owned in 2004 [24]. In contrast to Māori understandings of land, colonisers imposed exploitative relationships with land as a possession and resource for humans, leading not only to alienation of Māori land, but rapid environmental destruction and development activities, which disrupted its critical role in health and wellbeing [22].

The appropriation of Indigenous resources to colonisers and discrimination through the new imposed economic, educational and political institutions has led to severe socioeconomic and inter-generational deprivation of the Māori population. In 2013, over 40% of Māori lived in the 20% most deprived neighbourhoods (Fig. 2), and this pattern has remained unchanged since first measured in 1991. The cultural subjugation of Māori was formalised through legislation and policies which prohibited the use of Māori language and cultural practices [25]. In 1840, Māori chiefs and the British Crown signed the Treaty of Waitangi, which promised Māori the right to self-determination and equitable outcomes, in exchange for the British right to govern. Despite these promises of the Treaty of Waitangi, the Crown's misinterpretation and repeated Treaty breaches has failed to facilitate appropriate levels of political power for Māori and Māori have been left to express discontent—often as a minority activist group.

Given these issues, the TKHM modified model frames colonisation as a primary factor influencing all determinants, cycling through basic, surface and intervening causes, leading to differential health outcomes for Māori in NZ. Moana Jackson emphasised the importance of naming and defining colonisation as an expression of Indigenous power, and also noted that the language of “complexity” is often used as a tool by the colonisers to deflect from the direct and urgent causative role that colonisation plays [26]. This added further impetus for why we needed a tool that named colonisation as the basic cause, and whilst there are many other frameworks and models that exist, the “simplicity” of this model plays an important role in changing how students think about Māori health inequities.

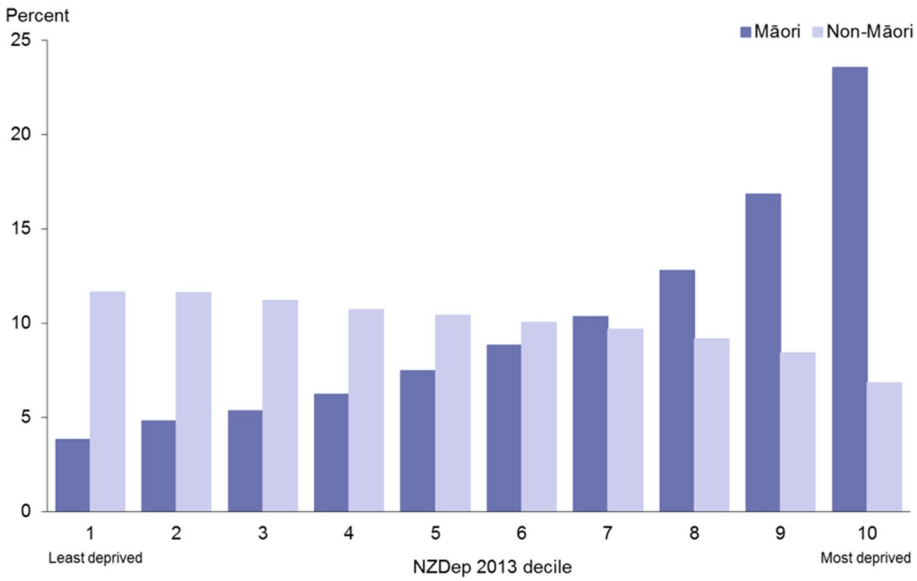

Fig. 2 Distribution by neighbourhood socioeconomic deprivation score (NZDep), Māori and non-Māori, 2013. Source: Ministry of Health, 2015 [8]

1.4 Dynamic interplay between causes at different levels

Williams and Mohammed [14] present a unidirectional model, whereby basic causes influence proximal pathways and lead to individual responses. The TKHM modified model includes bidirectional arrows between the causes and responses, to reflect that feedback loops exist between causes in more than one direction. More downstream causes such as behavioural, psychological or physiological responses can exacerbate or improve more upstream surface causes, or social status. For example, an individual's behavioural response to use illicit drugs in response to the upstream causes of racism, trauma, poverty and educational exclusion, may in turn lead to further marginalisation and stress. In reality, the dynamic interplay between causes at different levels is far more complex, multi-directional and intergenerational than is described by bidirectional arrows, and we explore this further in the discussion.

1.5 Basic causes

In the TKHM modified model, as with Williams & Mohammed [14], basic causes are the factors responsible for generating a particular outcome, although in our model all basic causes are created within the context of colonisation. Changes in basic causes create important changes in health outcomes. The TKHM model includes several additions to the Williams and Mohammed framework, based on what we consider to be key determinants of Māori health inequities.

1.5.1 Environment and epigenetics

We include environment and epigenetics as a linked basic cause, in recognition that biology does not operate in isolation but is significantly influenced by the physical and social environments in which populations live. Environments can influence biology through a range of factors, including sunlight exposure, climate, altitude as well as socio-political environments and social customs. Environments also influence biology through complex genetic and epigenetic processes, which can influence the expression of genetic information within populations, and over generations, that can directly influence their health. Environmental factors such as psychological stress, nutritional stress and environmental toxicants influence epigenetic profiles through DNA methylation or histone modification that can change expression of genetic characteristics through regulation (activation and/or repression) of these traits [27]. Intergenerational racial trauma can also result in epigenetic changes which are detrimental to physical, psychological, emotional and socio-economic well being [28, 29].

1.5.2 Considering privilege as well as racism

The TKHM modified model explicitly includes racism *and* privilege as important aspects of the structure of society that shapes how ethnicity is linked to health outcomes. Racism can be institutionalized (i.e. differential access to the goods, services and opportunities of society by race or ethnicity), personally mediated, and internalised [30]. We present racism as a basic cause of health status that shapes and reshapes other basic causes or social structures (e.g. unequal treatment). The flipside of racism is privilege. Privilege refers to the myriad of everyday actions and processes that operate through organisations in domains such as commerce, law, government, media, education, health services, and religion that overwhelmingly reflect and constitute white settler culture, values and norms [31]. Any discussion of Indigenous health inequities must be informed by acknowledging this preferential benefit accrued by colonisers/settlers from the systems they introduced and built, and continue to refine and control [17].

1.5.3 Unequal treatment by societal institutions

Like Williams and Mohammed, the TKHM model positions the unequal treatment of ethnic groups observed within societal institutions as having a basic and fundamental influence on health outcomes. Societal institutions include: political, criminal justice, economic and cultural environments in which ethnic groups must compete for power and desirable resources in society. Historically, systematic inequalities in power and influence regarding important societal decisions within these societal institutions have benefitted colonisers/settlers over Indigenous communities. In NZ, examples include the 1865 establishment of a Native Land Court, which insisted that land could have no more than ten individual

owners, effectively dispossessing all other tribal members, making it easier for settlers to purchase Māori land [32]. By 1892, two thirds of the land in NZ had transferred from Māori to settler ownership [32]. Racial bias in the child protection system, including prejudice against Māori seeking to adopt children, and magistrates who viewed white settler upbringing as far superior to that of Māori families, has led to the historical and present over-representation of Māori children in state care [33]. Government and legal codes have enforced ethnic-based inequities in a broad range of societal outcomes.

1.5.4 The importance of worldviews/positionings

All understandings are theoretically located—although this is often not acknowledged. We wanted to specifically acknowledge the importance of reflecting on this positioning, and its influence on how we view the world around us, what we value and consider important, and how we decide to allocate power and resources as a society [34]. Colonisation was and is made possible by a worldview built upon a colonial worldview of supposed white supremacy and Indigenous inferiority, and this ideology has been replicated within NZ institutions, policies, practices as well as into the values, norms and beliefs of people [21]. There are differences between Māori worldviews and the worldviews of the colonisers with Māori values often including collective responsibility (versus individual), spirituality (versus biomedical) and interconnectedness with the environment (versus control over resources) for example [35]. The TKHM modified model explicitly acknowledges the impact that worldview has as a basic determinant of Indigenous inequities in health. Further to this, the need to understand that the dominant coloniser culture, assumptions, stereotyping and bias against Māori are likely to be part of the problem and that this needs to be addressed is foregrounded.

1.6 Social status

Social status categories are created, and reinforced, by basic causes. Social status categories considered to have particular relevance to Māori health outcomes include: ethnicity, socioeconomic status, gender, age, and poor health status. Socioeconomic status (SES), based on factors such as income, employment status, housing and education, can have both direct and indirect impacts on health and have cumulative effects over lifetimes [36]. Indigenous and ethnic health inequities persist even after controlling for SES [12], so the association between ethnicity and health is related to, but not fully explained by ethnic differences in SES [14]. The concept of ethnicity reflects a social construct of group affiliation and identity. In general, ethnicity is the ethnic group or groups that people identify with or feel they belong to. Thus, ethnicity is self-perceived and people can belong to more than one ethnic group [37]. Ethnicity is one of several social status categories that are created by large scale societal forces and institutions. It is important to note that ethnicity itself is a socially contructed variable, and only exists because of a racist idea that groups can be categorised and ranked. Ethnicity influences health and health inequities because racialised societies believe in these claims and organise social systems accordingly. In addition to the other social categories of gender, age and marital status included by Williams and Mohammed, we considered it important to add poor health status, as an important social category that can facilitate or restrict exposure to risk factors for worsening or additional disease (thereby perpetuating poor health status). These various categories of social status do not operate in isolation in terms of their impact on health—biases can accumulate to create complex and intersecting stereotypes that compound oppression for some populations whose positions in society are underprivileged by their ethnicity, gender, age and matial status which is why impacts of worldviews need to be understood in relation to the social position or social status of populations.

1.7 Surface causes

In the TKHM modified model, *surface causes* represent a number of intervening mechanisms that link *social status* categories such as *ethnicity*, to *health outcomes*. Important intervening mechanisms include: *stress*, *socio-economic opportunities*, *societal resources*, *health services* and *social transmission*. Williams and Mohammed referred to these as proximal pathways—in the TKHM modified model, we use the term surface causes to point out the mistaken tendancy of health professionals and researchers to focus on these causes as the beginning of the causative pathway, rather than probe deeper to the underlying basic causes. The modification of *surface causes* alone is likely to be only minimally effective in eliminating inequities in *health status* if *basic causes* remain operative.

Social transmission represents surface causes including stigma, prejudice and stereotypes. These factors are often associated with multiple social status categories (e.g. ethnicity, SES, gender, age, marital status and poor health status)

and are also linked to other surface causes (e.g. stress, SES opportunities, access to societal resources and health services) associated with ethnic inequities in health outcomes.

Stress has been linked to health via a number of mechanisms including through damaging physiological processes, triggering of health-damaging behaviours, and mental health harm [38]. Research on "weathering" indicates that the stress of living in a racialised society can cause disproportionate physiological deterioration across multiple biological systems for disadvantaged groups, resulting in morbidity and mortality at an earlier age [39]. The threat of stress is explored by Williams & Mohammed [14] and refers to the activation of negative stereotypes among stigmatised groups that creates expectations, anxieties, and reactions that can adversely affect social and psychological functioning.

Socioeconomic status opportunities refer to those surface causes of health outcomes including education, employment, income, wealth, housing and incarceration. For example, nearly one in five Māori children (19.5%) live in material hardship, double the rate of all NZ children and in 2019/2020, 30% of Māori children were living in income poverty [40]. Additionally, 8.7 percent of Māori had moved home five or more times in the last five years [41]. In the 2018 census, 40% of Māori lived in damp or mouldy homes (twice the national average) [42]. In our model, we consider societal resources as being surface causes of health outcomes within the context of neighbourhoods, communities and schools.

The TKHM modified model highlights health services as an important category of surface causes. This includes issues of differential access to and through healthcare, differential quality of healthcare received and the importance of health literacy and health communication (required to navigate health services). The health system has a strong role in creating and perpetuating ethnic health inequities. In 2006, inequality in health care accounted for approximately 62% (for males) and 54% (for females) of the total Māori–non-Māori mortality inequality (adjusted for age) [43]. Māori are more likely to experience racism from health professionals [8], receive less preventive care such as immunisations [44], antenatal care [7], and cancer screening [45], report unmet need for primary care and medicines [8], and are less likely than non-Māori to receive appropriate monitoring for chronic conditions such as diabetes [7]. Māori also experience poorer mental health care—they are less likely to receive pharmaceutical treatment in relation to need [19], and are more likely to be placed in seclusion [20].

1.8 Responses

There are a number of responses to the surface causes of Māori inequities in health. We have kept the categories articulated by Wiliams and Mohammed [14], as behavioural responses, psychological responses, physiological responses and collective/individual resilience, as these reflect well the range of responses in the context of Indigenous health inequities in NZ. These responses represent where a large amount of health research is undertaken to understand differences in health outcomes. However, the model reminds us that these responses should be understood and contextualised in light of the upstream basic causes. In other words, the basic causes initiate and sustain the conditions that are driving the need for these types of responses. When applying this model, it also must be emphasised that the responses refer exclusively to the responses of the marginalised person or group. There are important responses made by other actors, as discussed later in this paper (for example decisions made by health care professionals), which are not in view within the TKHM or Williams models, and which play an important role in the causal pathway of ethnic health inequities.

Behavioural responses include health practices and everyday resistance. Psychological responses include internalised racism; ethnic identity; self-esteem; and stereotype threat. Similar to the threat of stress, stereotype threat refers to the activation of negative stereotypes among stigmatised groups that creates expectations, anxieties, and reactions that adversely affect social and psychological functioning [14]. Physiological responses especially relevant to inequities in outcomes include central nervous system, endocrine, metabolic, immune and cardiovascular responses. These biological systems interact with psychological and behavioural responses and are also influenced by surface, social status and basic causes. Resilience is a response which can operate at both collective and individual levels to inflence health outcomes.

1.9 Health outcomes

Health outcomes reflect the mechanisms by which differences in health status and therefore health inequities are observed or measured. For example, health can vary with respect to morbidity (ill health), mortality (death rates), presence or absence of disability, mental health and generalised wellbeing. Wellbeing, as opposed to Wiliiams and Mohammed's "positive health", is chosen in this framework to better reflect the holistic Indigenous understandings of health and wellness. In this respect, Indigenous health inequities in NZ have been well studied and are repeatedly documented [7, 8]. Māori have twice the proportion of potentially avoidable deaths compared with the non-Māori/non-Pacific population

[46]. Infant mortality and maternal mortality are both higher for Māori than non-Māori [47]. Māori have a lower healthy life expectancy [48], are more likely to live with a disability and experience higher rates of disabilities at younger ages than non-Māori [8]. There are persisting disparities in cancer incidence, mortality and survival between Māori and non-Māori, and Māori diagnosed with cancer are more likely to be diagnosed at a later stage, die (and to die sooner) than non-Māori with cancer [49]. A significantly higher proportion of Māori than non-Māori experience stress and difficulty in daily life, and experience social isolation, loneliness and exclusion [50] and Māori are more likely to experience anxiety and depression [8].

1.10 Limitations of TKHM model in explaining causes of ethnic health inequities

Despite offering a helpful model to communicate the causal pathway of health inequities for Māori, there are still several key aspects of the pathway that the TKHM model is unable to convey. The origin, maintenance and exacerbation of Indigenous health inequities is more complex than a simple linear model. In our teaching of health inequities, we have found there is a tradeoff between a model which is simple enough to use a tool to grow students' understanding, with a model which is true to the complex web of causation and interplay between factors at various levels, compounding over the lifecourse and across generations. We have found the TKHM model offers value as a tool to build the basic scaffolding for students to understand and critique ethnic health inequities, but also as a framework which enables more complex layers to be intergrated for a more sophisticated analysis later in the curriculum. In our teaching, the complex interplay between causes is an issue that is revisited at other points in the curriculum and reinforced.

The TKHM model does not capture the life course accumulation of advantage and disadvantage, and the intergenerational transmission and effects of trauma experienced by Indigenous people [19]. Building upon Brave Heart's [51] conceptualization of historical trauma and its cross-generational impact on colonised peoples and Sotero's [52] framework Reid et al. [23] offer a template to understand how the trauma of colonisation operates across generations for Māori, from the first impacts upon primary generations through to the reverberating impacts on contemporary Māori. The Williams model and the TKHM modified model both focus on the impacts of causes on an individual—influences of historical trauma, colonisation and racism also operate through a family/tribal level which in turn influence how the individual is exposed to risk/protective factors (and this feeds back into the family wellbeing).

The TKHM modified model also focuses on the responses of the marginalised individual or group—downstream institutional responses also matter. For example, racist policing and justice systems mean that Māori are more likely than non-Māori to be arrested, convicted and incarcerated for the same offences [53], which means that the same "individual response" incurs a very different response from the State based on ethnicity, which in turn causes differential impacts on more upstream social determinants. Similarly, evidence of differential treatment by health professionals [54, 55] indicate that the "responses" of others to Māori are influenced on the basis of ethnicity.

Despite explicitly naming privilege alongside racism as a basic cause, the TKHM model still focuses mostly on ethnic disadvantage/negative outcomes. While the pathways for how white settler ethnicity positively impacts on health may be similar, the TKHM model in its current form does not fully elucidate all mechanisms of ethnic advantage/favouritism. Exposing the pathways of privilege and how the current system favours non-Māori, to produce health benefits for this group, is an area which needs to be more widely understood to develop anti-racist approaches which deconstruct unequal health and social systems. The health outcomes the model focuses on are very biomedical, which fails to capture the multidimensional nature of wellbeing from an Indigenous perspective. We do not think it is possible to resolve these limitations and still preserve the simplicity offered by the modified Williams model, and we believe that a simplified framework has an important role in anti-racism teaching and research.

2 Conclusion

Building upon the work of Williams and Mohammed, the TKHM modified model is a simple and versatile framework for understanding the relationship between colonisation, ethnicity and health, specifically focused on the experiences of Māori in NZ but with relevance to the understanding of Indigenous and ethnic health inequities more broadly. Whilst is certainly a simplification of a very complex issue, as a teaching tool it can be utilised in a more superficial/simplistic or more complex way—depending on the level of understanding of the students at that time. The model conceptualises key determinants of health, and how they interact with each other, to create and maintain inequities in health outcomes.

This model foregrounds colonisation as a key determinant of health for Indigneous people and highlights structural factors as important drivers that offer potential solutions for where intervention should be focussed.

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