Embedding Health Literacy in Health Classes in Aotearoa New Zealand

A Mixed Methods Study

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Abstract

Aims:

Health literacy knowledge and competencies foster adolescents to become healthy and engaged citizens. This thesis explores, examines, and proposes school-based strategies to improve the health literacy of senior high school students in Aotearoa New Zealand.

Methods:

This mixed methods research had four components. Study 1 mapped, through a scoping review, details of international school-based interventions that aimed to improve the health literacy of senior high school students. Study 2 used classroom observations to identify pedagogical strategies that New Zealand health teachers applied in senior classes. Study 3 explored, through interviews, narratives of New Zealand teachers and students about how health is taught, and how students perceived their health literacy skills. Study 4 presented the first cross-sectional study in Aotearoa New Zealand to measure the generic health literacy levels of adolescents using an age-appropriate validated tool and asking them how they would like to learn these skills.

Results:

Study 1 included 35 primary studies of programmes implemented by teachers or health experts through active and interactive learning, technology, and interdisciplinarity. Study 2 demonstrated that the strategies teachers used in the observed classes aligned with principles of effective learning and education for health literacy. Study 3 revealed health teachers, in their endeavour to promote health literacy, valued relationship-building with students and the national school framework but posed concerns on the excessive focus on summative assessments and time constraints. Study 3 also found that students considered health classes and the support from their teachers valuable but lacked skills to assess the reliability of health information. Study 4 demonstrated the sampled senior high school students had unsatisfactory generic health literacy but would like to improve these skills through engaging in health classes.

Conclusion:

Health-related knowledge and critical thinking skills of New Zealand adolescents could be areas of concern. Schools need to support teachers in continuing professional development, building cross-curricular projects, and implementing student-centred educational programmes. Health classes should follow active and interactive learning, address topics relevant from students' perspectives, use technology, and explore different settings. Schools can collaborate with health professionals, universities, communities, and students' whānau (family) to facilitate these strategies.

Dedication

Kia ora tātou	Greetings to all
Ko Pico do Jaraguá te maunga	Pico do Jaraguá is the mountain
Ko rio Tietê te awa	Rio Tietê is the river
Nō São Paulo ahau	I am from São Paulo
Ko Vajda de Albuquerque	Vajda de Albuquerque is
tōku whānau	my family
Ko Julia tōku ingoa	My name is Julia

I dedicate this thesis to all adolescents in Aotearoa New Zealand – may you have strong health literacy knowledge and competencies to enjoy life to the fullest, achieve your dreams, and build a fair and healthy society. I chose the Karakia below to introduce my thesis.

Manawa mai te mauri nuku	Embrace the life force of the earth
manawa mai te mauri rangi	Embrace the life force of the sky
kia mahara ki te whakaaro	Reflect on the primordial energy of thought (TAKE NOTICE)
kia mahara ki te aroha	Reflect on the primordial energy of compassion (GIVE)
kia mātau	To grow in knowledge (KEEP LEARNING)
kia pakari	To build character (BE ACTIVE)
kia aroha tētahi ki tētahi	To have compassion for one another (CONNECT)
Hei oranga wairua	For the wellbeing of the spirit (Te Whare Tapa Whā)
Hei oranga hinengaro	Mind
Hei oranga tinana	Body
Hei oranga whānau	And those we hold dearest
kia mauri tū, kia mauri ora	For the purpose of good health and wellbeing
Haumi e, hui e, taiki e	Unified, connected, and blessed

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Ki te kotahi te kākaho ka whati, ki te kāpuia, e kore e whati – When we stand alone, we are vulnerable, but together we are unbreakable – *Ngā mihi nui*, Thank you!

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1 Introduction

"They (health classes) have some very valid things that you need to be learning for the rest of your life. (…) in case you get to that point where you're stuck in a situation, and you have no idea what to do. (…) (health classes teach you) how you can deal with that, how you can help others to deal with that." Amy, 16 years old, Year 12

The above quote was provided by one of my participants. To develop a sense of authenticity and personalisation, I have started each chapter using an exemplar quote.

This thesis presents the first in-depth exploration into the health literacy of senior high school students in Aotearoa New Zealand. It is envisaged the findings from this study will assist schools and health teachers in improving the health literacy skills of senior high school students. This introductory chapter covers the structural framework of the thesis. It presents the key terms and concepts, rationale for this work, the underlying theory and conceptual framework guiding my methods, an outline of the thesis structure, and my research questions.

1.1 Key Terms and Concepts

Domain-specific health literacy: Health literacy encompasses several subject areas. Domain-specific models refer to health literacy skills applied in a particular area, e.g., mental health literacy, nutrition literacy, and diabetes literacy.

Hauora: Māori philosophy of health and well-being, with four dimensions that influence and support each other: taha wairua (physical wellbeing), taha hinengaro (mental wellbeing), taha tinana (spiritual wellbeing), and taha whānau (family wellbeing) (1). The Te Whare Tapa Wha model visually represents this concept through a four-sided whare (house) (2). All walls have equal importance in maintaining the integrity of the house. Similarly, the holistic health and wellbeing of an individual and their whānau (extended family) depends on a balance between these four dimensions of health and wellbeing (3).

Health consumer: Individuals who have experienced any type of health issue.

Health literacy: "A broad range of knowledge and competencies that people seek to encompass, evaluate, construct and use. Through health literacy competencies people become able to understand themselves, others and the world in a way that will enable them to make

sound health decisions, and to work on and change the factors that constitute their own and others' health chance" (4, p.136).

Secondary school: Education for adolescents usually between 13 and 19 years old: Years 9 to 13 in Aotearoa New Zealand/the United Kingdom (UK); grades 8 to 12 in the United States of America (USA).

Senior high school: The final school years: Years 11, 12, and 13 in Aotearoa New Zealand/UK; grades 10, 11, and 12 in the USA.

Whānau: a term from te reo Māori (the Māori language) that refers to a person's nucleus and extended family (relatives and friends).

1.2 Rationale for the Thesis

This section explains the conceptual framework of health literacy and adolescent health literacy. It justifies the focus on senior high school education as a pathway to promote strong health literacy skills of students that are envisaged to engender the development of engaged citizens. Lastly, I explain the school health education system in Aotearoa New Zealand and the significance of this research.

1.2.1 Background

1.2.1.1 Health Literacy

The term health literacy was introduced in the 1970s when lack of functional ability to comply with prescribed treatments was discerned amongst patients in the USA and this caused concern from a health care services perspective (5). The concept also emerged from a perspective of empowerment for community development in Latin America, through the 'critical consciousness' adult learning model proposed by the Brazilian educator, Paulo Freire (6). However, it was not until 1998 that this term was defined in the literature and regarded as a key outcome of health promotion and health education (7). Nutbeam (7) framed health literacy as the cognitive and social skills that motivate and enable an individual to access, understand and use information to promote and maintain good health.

Nutbeam (8) also proposed three levels of health literacy: functional, interactive, and critical. At the functional level, one understands health information (e.g., health risks and use of health

services). At the interactive level, one acts independently and improves their motivation and self-confidence. In addition, by clearly communicating their health knowledge, one interacts with social groups and influences social norms. At the critical level, one interprets and applies their health knowledge to improve their health and the health of their communities. By reflecting on social and economic determinants of health, one can overcome personal, structural, social, and economic barriers to health. Thus, expanding from a basic perspective of using health services and managing chronic diseases, the interactive and critical levels account for a public health approach of empowerment (8,9). By promoting greater autonomy and personal empowerment, health literacy also brings social benefits such as engaged citizenship and ethical responsibility (4,8).

Currently, health literacy encompasses a varied range of definitions, meanings, areas of focus, skill categories and goals (4,10-12). This thesis adopts the conceptual model proposed by Paakkari and Paakkari (4) which defines health literacy as a learning outcome in senior high school. According to this definition (4, p.136), "health literacy comprises a broad range of knowledge and competencies that people seek to encompass, evaluate, construct and use. Through health literacy competencies people become able to understand themselves, others and the world in a way that will enable them to make sound health decisions, and to work on and change the factors that constitute their own and others' health chance".

Building from basic skills such as reading, writing, and communication, it has been proposed that health literacy has five overlapping core components (4). First, theoretical knowledge, which refers to understanding facts, concepts, principles related to health, and linking health issues (4,13). Being able to contextualise and apply this theoretical knowledge to respond to health situations and act to promote health characterises the second component: practical knowledge (4,13). Then, critical thinking skills, such as questioning and contemplating, allow students to understand the dynamics of health knowledge, link and evaluate fragmented information, value health information, and rebut or refute false health claims (4,13). The next component is self-awareness, i.e., reflecting on one's body, mind, and attitudes, which brings a sense of belonging, purpose, and perspective on how to enhance one's health (4,13). Self-awareness also relates to being a self-efficient learner, that sets educational and health goals and prioritises actions to attain them (4,13). Finally, understanding ethical issues, rights, and responsibilities leads to citizenship (the fifth component), expanding students beyond the individual perspective to actively participate in their communities and societies and advocate for health (4,13).

1.2.1.2 Health Literacy Crisis

Despite the advances into health literacy research, limited health literacy skills still prevail even in wealthy, developed countries (14). The 2011 European Health Literacy Survey, investigating adult populations in eight European countries (Austria, Bulgaria, Germany, Greece, Ireland, the Netherlands, Poland, and Spain), revealed almost every second respondent (47.6%) had limited (inadequate or problematic) health literacy, with varying prevalence across countries (from 29 to 62%) (15). The 2003 National Assessment of Adult Literacy in the USA found that 36% of adults had basic or below basic health literacy (16). The Adult Literacy and Life Skills Survey 2006, conducted in New Zealand (n = 7,000), found a similar result: more than half of New Zealand adults (56.2%) had low health literacy skills (17). This health literacy crisis is due to the lack of education and support people have in making informed health decisions and navigating complex health care systems (18). The global prevalence of poor health literacy has contributed to poor health outcomes, increased use of health services, and greater health care spending across countries (19-21).

These surveys also indicated low health literacy follows a social gradient, disproportionately affecting individuals with financial deprivation, low social status, low education, old age, disabilities, migration background, or from ethnic minorities (15-17). Using the dataset from European Health Literacy Survey, Pelikan, Ganahl, and Roethlin (22) found that health literacy independently and directly determined self-assessed health. On the other hand, Stormacq, Van den Broucke, and Wosinski (23) concluded, in their integrative review, that health literacy acts as a mediating determinant of health, representing one of the factors through which socioeconomic disparities cause health inequities. Whether acting directly or indirectly, health literacy represents a modifiable risk factor of socioeconomic health disparities (22,23).

1.2.1.3 Health Inequities in Aotearoa New Zealand

Whitehead (24) defined health inequities as avoidable, unnecessary, unfair, and unjust differences in health. Socioeconomical disadvantages put groups historically discriminated against or excluded at higher risk for worse health and health outcomes than those in a higher socioeconomic position. A fair society needs to achieve health equity, i.e., eliminate systematic disparities in health among social hierarchical groups (25). In Aotearoa New Zealand, consequences from the colonisation process still cause consistent, pervasive, and compelling health inequities between Māori (the Indigenous people of Aotearoa New Zealand) and non-

Māori (26,27). Multiple ethnic groups experience health inequities (such as Pacific people and Asians), but Māori people represent the most socioeconomically deprived group, with worse health outcomes than non-Māori even after adjusting for deprivation associated with low socio-economic status (28,29). Whilst non-Māori have a life expectancy at birth of 82.1 years, Māori are expected to live 75.1 years (30).

The foundational document of Aotearoa New Zealand – Te Tiriti o Waitangi – establishes constitutional and legal obligations to ensure equity for Māori (31). This treaty was signed in 1840 by Māori chiefs and the British Crown. However, differences in the translation of the English and Māori versions culminated in the Māori giving sovereignty to the Crown without being aware of it (as this was stated only in the English version) (32). Thus, Aotearoa New Zealand has a national and ethical responsibility to honour the Māori version of the treaty and promote social equity (33).

Stormacq, Van den Broucke, and Wosinski (23) propose improving the health literacy of the population to achieve greater health equity, i.e., reduce health disparities. This could be particularly relevant to the New Zealand context as the Adult Literacy and Life Skills Survey 2006 revealed Māori have poorer health literacy skills than non-Māori, regardless of socio-economic status (17). However, Nutbeam (12) alerts that health literacy cannot be the panacea for health equity as it is still unclear how it could mediate or moderate social determinants of health. To reach social justice we need to not only promote critical health literacy but also act on the root causes of inequity and redistribute power, resources, and opportunities better (12).

1.2.1.4 Health Literacy of Adolescents

Health knowledge and behaviour patterns developed in adolescence facilitate a healthy lifestyle which, when carried into adulthood, promote positive life-long health outcomes (34). Health literacy may encourage adolescents to engage in decision making related to personal and social health, optimising their skills to manage their own health (35). Thus, targeting health literacy intervention and research at this life-stage likely promotes healthy behaviours (such as healthy dietary patterns, adequate physical activity, and having regular medical check-ups), which can ameliorate future health risks (such as injuries, tobacco use, alcohol and illicit drug use, and sexual behaviours that cause unintended pregnancies and sexually transmitted diseases) (4,10,19,34,36-39). These health-enhancing behaviours, supported by self-efficacy, autonomy, healthy decision making, and judgment skills, may lead to improved health outcomes, such as

reduced rates of obesity and noncommunicable diseases (4,10,19,20,34,36-40). In addition, health literacy can provide adolescents with the skills and knowledge to enable them to competently access and use health services (41).

Adolescents are still developing cerebral executive functions such as decision making and judgment skills (42). Thus, they may have difficulty in evaluating and managing long-term consequences and controlling impulses (40). It has been shown that they tend to underestimate risk factors and consequences of their health-related actions, which makes them prone to risky behaviour (e.g., unprotected sexual activity, dangerous driving, and substance use) (43). On the other hand, their cognitive abilities and capacity for processing information, abstract thinking, reasoning skills, and autonomy increase, leading to a greater understanding of health information (38). Furthermore, they naturally engage with social issues, embracing the role of key agents of change in their communities (44-46). Thus, strong health literacy skills can empower adolescents with autonomy and motivation to make informed choices, promote health and well-being, act ethically and responsibly, educate their families and communities, and change socioeconomic determinants of health aiming for health equity (18,36,39,40,47).

Multiple factors affect how adolescents develop health literacy. This thesis adopts a social ecological conceptual framework (48). At the micro level, the health literacy of an adolescent improves their health-related knowledge, skills, and attitudes – which, in turn, enhance health literacy. Other internal factors with a bidirectional relationship include age, gender, beliefs, values, and experiences. Health education (curricula and all aspects of the classroom), the school setting, family, and friends also impact on the health literacy of an adolescent, at the meso level. Broader societal elements such as government policies, the media, and socioeconomic conditions represent the macro level, which affect the lower components. Thus, this framework considers intrapersonal, interpersonal, and community factors that shape health understanding, literacy, and behaviours (48).

Most children and adolescents spend most of their time in schools and, therefore, this is the ideal setting for interventions to improve their health literacy skills (8,39,49). Indeed, health literacy may be a mediator in the well-established association between education and health (36). By mitigating a broad range of health and wellbeing complications that reduce academic success, health literacy may increase students' motivation and ability to learn, prompting improved attention and post-school aspirations (20,36,39). Academic achievement impacts

health behaviours in adolescents, for example, low literacy levels are associated with higher substance use and violence (38).

Compared to adults, the evidence about health literacy of children and adolescents remains scarce, with little research, practice, and policymaking (11,19,38). At this point in time, few studies have assessed the health literacy of adolescents, its determinants, and how to enhance it. Moreover, the literature lacks consensus on the definition of children and adolescent health literacy, which compromises the development of measurement instruments and interventions (10). There is a paucity of measurements tools developed for adolescents and validated in school settings.

The New Zealand Adult Literacy and Life Skills Survey 2006 revealed that among participants aged 16-18 years, more than two thirds presented poor health literacy skills (score at levels 1 and 2 - from 0 to 275 - in a scale with five skill levels ranging from 0 to 500). The same survey in Australia found that 67.6% of 15- to 19-year-olds had poor health literacy, and only 2.3% had strong health literacy skills (50). This unsatisfactory health literacy of adolescents is likely linked to poor educational opportunities whilst studying health-related topics in secondary school. However, as these surveys were conducted more than a decade ago, the picture could be different now. The European 2017/2018 Health Behaviour in School-aged Children survey found a less alarming scenario, with 13.3% (from 6 to 18%) of adolescents (aged from 13 to 15 years) from ten countries (Austria, Belgium, Czechia, Estonia, Finland, Germany, North Macedonia, Poland, Slovakia, and England) having low health literacy (51). Nevertheless, this survey was conducted in Europe with younger adolescents, using a measurement tool validated for their age, and only 19.5% (from 13% to 38%) of the adolescents surveyed demonstrated high health literacy skills (51). This indicates poor health literacy skills could still be a problem for adolescents in Aotearoa New Zealand.

1.2.1.5 Health Literacy and High School Education

Health literacy was regarded as an outcome of school health education since its earlier conceptualisation (5). However, it took more than 20 years for a clear definition of health literacy in the context of health education (52). Nutbeam (7) re-established this concept as a key outcome of health education to raise consciousness of conditions that have an impact on health, guiding social change and political action to overcome structural barriers to health. Education for health literacy became pivotal to empower individuals with critical thinking and

problem-solving skills that allow them to, guided by ethical principles and engaged citizenship, make informed choices to improve their own wellbeing and the wellbeing of their communities (53,54). However, health literacy is still not internationally defined as a learning outcome in the basic education system (4,11,53). A few countries (Australia, Canada, Finland, and the USA, as explained below) have explicitly included health literacy as an outcome of school education. School health education has mostly ignored health literacy in the development of curricula and assessing of students (53). Unsurprisingly, no long-term study has investigated the impact of a basic education curriculum on health literacy or health outcomes (36).

Only Australia, Canada, Finland, and the USA have incorporated health literacy as a theoretical framework within the national school health curriculum (55,56). The USA was the pioneer in implementing a curriculum framework for health literacy but more action is needed, such as implementing consistent health education standards across all states and evaluating educational programmes (53,57). Canada also has different policies for different provinces, but the curricula across grade levels support health literacy (55,56). An exemplar in integrating a health literacy component in the school health curriculum, Finland adopted a similar approach to the USA by conceptualising health literacy as a school learning outcome with a multidimensional framework (53,58). Further, in Finland the health subject is mandatory throughout all school years (58). Australia has also placed schools as a key setting to promote health literacy but with a whole-school approach based on the WHO health-promoting school model (53,59). The Australian national school curriculum included health literacy as an underlying proposition (60).

Despite curriculum movements that have led to health literacy inclusion, teaching health education to enhance students' health literacy is still a challenge.

Integrating health literacy and school health education to enhance the health of future generations and reduce disparities requires upstream, systems-level changes focused on empowerment and engagement (36). Schools must equitably enable students to develop health literacy skills (54). The HeLit-Schools concept (61) highlights eight standards that characterise a health-literate school: including health literacy in the school's mission statement and agenda for development; modifying the school daily life to promote health literacy; providing opportunities for the students and staff to develop and enhance their health literacy; ensuring clear and simple communication of health issues with students and parents or guardians; using health literacy to promote health in the school environment; and collaborating with the

community and health professionals (61). Thus, health literacy needs to be embedded within the school's mission, ethos, curricula, aims, and policies to guide classroom-based, whole-school, and community-based practices (4,36,39,62). Schools also need a standardised approach to measure health literacy throughout the different development phases of childhood and adolescence (53).

1.2.1.6 Secondary School Curriculum and School Health Education in Aotearoa New Zealand

In 2002, a secondary student qualification was introduced in Aotearoa New Zealand – the National Certificate in Educational Achievement (63), which follows a standards-based assessment for each senior level (64). Schools started assessing the skills and knowledge of a student according to specific standards within each subject through internal and external assessments (64). Each subject teacher selects standards from a NCEA matrix to be formally assessed. The students receive credits from achieved standards, which contribute towards a NCEA certificate (with merit or excellence, depending on the level of achievement) (64). With the implementation of the NCEA, health education was established as a senior secondary school subject and formally assessed. However, at the senior high school level, health education is not a compulsory subject – students have the option of electing which learning areas to specialise in and gain credits for the NCEA. Not all schools in Aotearoa New Zealand offer health classes at the senior level.

The New Zealand Curriculum Framework provides a common direction for schools throughout the country (65). The levels six, seven, and eight of the New Zealand Curriculum Framework propose achievement objectives for the senior high school years (Years 11, 12, and 13) (65). Each syllabus level aligns with the NCEA framework. Schools and teachers have the scope, flexibility, and authority to modify this national framework based on the needs, interests, and talents of their students (65). Acknowledging the principles of Te Tiriti o Waitangi, the national curriculum values cultural diversity and te reo Māori me ōna tikanga: the Māori language and its customs (65).

The health and physical education syllabus integrates health education, physical education, and home economics (65,66). Its framework presents four underlying and interdependent concepts: hauora (Māori philosophy of health and well-being); health promotion (personal and collective action to create supportive physical and emotional environments); the socio-ecological

perspective to health (that the interrelationships between an individual, others, and society affects one's health); and the attitudes and values linked to hauora (positivity and responsibility regarding one's own health; respect, care, and concern for others and the environment; social justice). It also considers critical thinking as a key concept given that each student needs to make sense of health-related information, their experience, and their ideas, using creativity, critical analysis, and metacognition (67). Seven areas of learning are taught in health classes at both primary and secondary levels: mental health, sexuality education, food and nutrition, body care and physical safety, physical activity, sport studies, and outdoor education (65). The following key competencies guide the curriculum: developing critical thinking skills; using language, symbols, and texts; managing self; relating to others; and participating and contributing (65).

The national curriculum argues that schools must address health and wellbeing issues affecting students' learning to facilitate academic achievement and provide equal educational opportunities (65). Previous analyses if the New Zealand health curriculum indicated that its purpose, vision, principles, values, and key competencies align with critical health literacy as they relate to a socio-critical analysis of public health concepts (68,69). For example, in the last year of high school (Year 13), the curriculum expects students to demonstrate a critical perspective related to the following standards of the NCEA matrix: analyse a New Zealand and international health and ethical issue; evaluate health practices currently used in New Zealand; and evaluate models for health promotion (65,70). However, the curriculum has no explicit usage of the term 'health literacy'.

In terms of funding, the New Zealand Ministry of Education determines the distribution to a school or kura (state schools based on Māori culture and values that teach in te reo Māori, the Māori language) based on the decile rating. This index, re-calculated every five years after each Census (last index from 2015), considers five socio-economic indicators from households with school-aged children in each school's geographic area: household income, parents' occupation, household crowding, parents' educational qualifications, and income (71). Then, schools are grouped in ten deciles (from one to ten, one indicating the lowest socio-economic position) to compare the student community of a school with all others around the country. However, because households around a school's region may not represent the households of the enrolled students, this index does not provide an accurate socio-economic measure. Thus, in 2023, a new measure based on a statistical model, the Equity Index, was introduced to replace the decile system to better determine the extent of socioeconomic disadvantages that affect students

placed within a school (72). It is believed that the Equity Index would ensure equitable distribution of resources for schools across the country, with schools with the most socioeconomically disadvantaged students being better supported to reduce the impact of socioeconomic factors on students' achievement (72).

1.2.2 Significance of the Research

Poor health literacy skills make high school students vulnerable to distorted and misleading health information which spreads rapidly and vastly on online platforms (73,74). Adolescents already make health decisions that shape lifestyle behaviours (73,75). They also frequently use media, accessing health claims from different sources (76). Thus, schools must teach them to identify unverified claims, which appear constantly in news outlets (77). Unless adolescents are trained to understand health information, they may be less able to make informed health choices (38). They must be able to critically appraise health claims and discriminate reliable scientific information from misconceptions and non-scientific claims (4). Schools can promote interpretive scientific skills, such as understanding the quality, limitations, and biases of evidence (78), through cultivating higher levels of health literacy (39).

As research on health literacy has only recently focused on children and adolescents (11,19,38), the literature lacks a consensus of what is the main component and associated factors of health literacy in this population (4,10). A systematic review found 12 definitions and 21 models of health literacy proposed for children and adolescents, all of which reflected the multidimensionality and complexity of this concept (10). However, programmes and interventions could not meet the needs and demands of this age group as most dimensions of children and adolescent health literacy were based on adult frameworks (10).

The small amount of research, practice, and policymaking being conducted focused on children and adolescents (11,19,38) reflect on health literacy skills not being considered a learning outcome in the basic education system (4,11,53). Currently, the term 'health literacy' is not embedded in the school curriculum in Aotearoa New Zealand. Thus, it is not explicitly taught in schools. Nevertheless, health-related subjects and critical thinking skills are taught in health classes, with the aim of developing students' health literacy without naming it as such. Thus, the present research investigates strategic methods being used in Aotearoa New Zealand high schools to teach health topics, aiming to inform the development of school-based strategies to strengthen the health literacy of senior high school students. These strategies may mirror, to

some extent, international school-based efforts to improve the health literacy of senior high school students, but the strategic suggestions will be ultimately informed by the existing practices and narratives of New Zealand senior health teachers and their students. Furthermore, this thesis presents results from the first cross-sectional study with an age-appropriate validated tool to measure the generic health literacy level of senior high school students in Aotearoa New Zealand. This survey aims to explore students' preferences in learning about health literacy. Thus, this thesis builds, from international perspectives, strategies to address local needs and relevance.

1.3 Methodological Approach to the Research

I initially planned to conduct participatory action research to include educators and students in a collaborative process aiming to improve the health literacy of students. Participatory action research, which contributes to knowledge and practice through democratic participation, would have been an appropriate approach for my original design. I met with two schools in 2020 who joined this project; however, with the Coronavirus disease (COVID-19) pandemic, the New Zealand Government introduced regulations to protect the population, and school visits were not allowed. In 2020 to 2022 the COVID-19 pandemic adversely impacted the global communities and more specifically negatively impacted the secondary school system in New Zealand (79). The New Zealand Government closed schools to mitigate infection rates and therefore, teaching and learning was conducted via online platforms. Besides the physical barrier, the pandemic imposed urgent issues for school staff, which also negatively impacted my rapport with schools. Unable to visit schools and losing contact with teachers (who stopped replying to my messages in face of other priorities), I had to adapt my methods to circumstances beyond my control. The participatory action research was no longer a viable option. Thus, based on a pragmatic approach to the constraints put in place during the COVID-19 pandemic, I modified my methodology from a mono method qualitative research approach towards utilising a mixed methods approach. Tackling the complex research problem of this thesis required more than a single method of inquiry.

Mixed methods research combines at least one qualitative and at least one quantitative component in a single project (80). I considered this methodology appropriate based on philosophical positions. This thesis takes an intermediate ontological view (what is considered real) that ties both objective and subjective fragments of the multiple realities of our world in pursuit of a sense of reality (80). Mixed methods research adopts this same approach to build

a more comprehensive understanding of a phenomenon under study (81). It accepts several methodologies based on the needs of the inquiry itself rather than depending on underlying ontological questions or worldviews (82). Further, it also takes an intermediate stance between positivism and phenomenology, which is the epistemology (what can be known) that guided the construction of knowledge in this research. In terms of axiology (what is valued), it adopts a pragmatic approach focusing on social endeavour (82). Thus, taking a pragmatic approach, mixed methods research overcomes the epistemological, ontological, and axiological limitations of mono research and combines the strengths of these paradigms to seek authentic true empirical knowledge (80). Currently, mixed methods research has taken a more positivist stance by focusing on eliminating bias, explaining the true nature behind a phenomenon, or improving validity or quality criteria (by reading the phenomenon through various methods) (80).

It is my position that a researcher needs to understand data in regard to the research questions, rationale, and aims. Establishing data collection and analysis techniques according to the goals of the research improves the complementarity of qualitative and quantitative elements within a mixed methods design (80). This thesis involves implementing equal quantitative and qualitative inferential processes, thus culminating in a parallel mixed design. Although the research steps initially followed a chronological plan, some methods overlapped during the same time period due to delays caused by the COVID-19 pandemic. Beyond merely combining findings, I triangulated the findings into a new level of meta-inferences (80), integrating results from the different research strands. The next section explains the structure of the thesis.

1.4 Structure of the Thesis

Following this introduction chapter, I present four studies of my mixed methods research. Study 1 (Chapter 2) is a scoping review, which mapped what has been done in schools around the world to enhance the health literacy of senior high school students. Study 2 (Chapter 3) is a class observation study to identify and categorise pedagogical strategies that health teachers from two New Zealand secondary schools implemented in their high school classes. Study 3 (Chapter 4) is an interview study that explored the perspectives and experiences of teachers and students from three New Zealand secondary schools regarding senior health classes. Study 4 (Chapter 5) is a questionnaire-based survey using a validated tool to measure the health literacy level of senior high school students from four New Zealand schools. The survey also included an open-ended question to reveal students' preferences regarding how to learn about

health literacy. The closing chapter displays meta-inferences from the findings emerging from the research to propose strategies for schools and teachers to improve the health literacy of senior high school students. Figure 1.1 illustrates the longitudinal sequential outline of the thesis chapters and the overarching aim of each study. A final discussion chapter, based on meta-inferences integrating the results of the different studies, concludes the thesis.

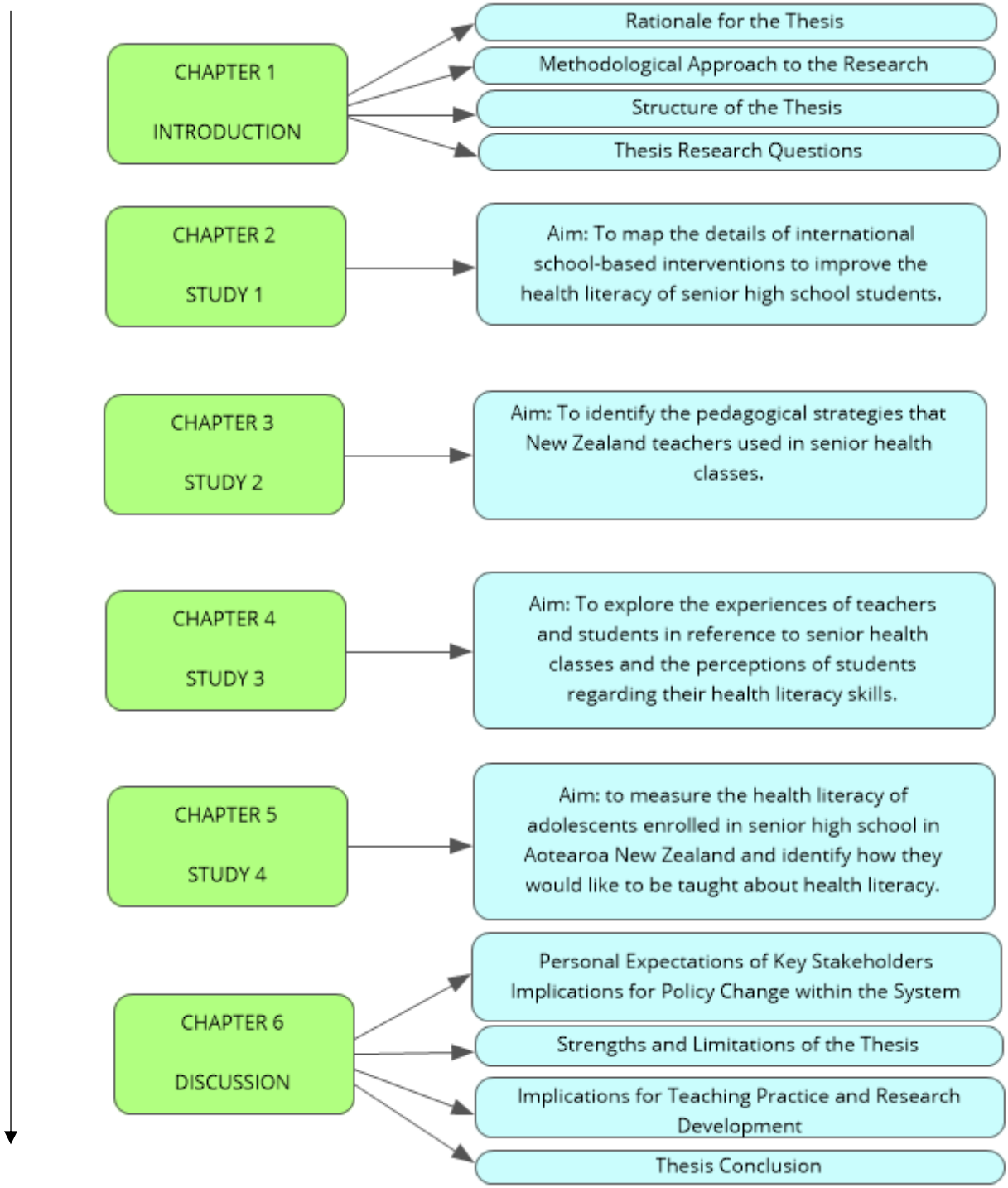


Figure 1.1 Longitudinal outline of the thesis.

Figure created on Inspiration® 10 (83).

1.5 Thesis Research Questions

The overarching question driving this thesis was:

What strategies could be implemented in school health classes in Aotearoa New Zealand to improve the health literacy of senior high school students?

As the first in-depth research on how to improve the health literacy of senior high school students in Aotearoa New Zealand, this research was exploratory rather than hypothesis-driven (84). Therefore, this thesis aimed to investigate the health literacy of senior high school students and understand how health classes could be optimised to help them develop these skills.

Several steps had to be accomplished to achieve my ultimate goal of proposing school-based strategies to empower senior high school students in Aotearoa New Zealand with strong health literacy skills. Each study of this mixed methods research followed a specific question, to address the overarching research question, as outlined in Table 1.1. The data from the individual studies contributed to addressing the thesis' overarching question.

Table 1.1 Research questions of the distinct phases of the project

Study	Research Question(s)
Study 1: Scoping review	What are the characteristics of educational programmes developed and implemented in schools to improve the health literacy of senior high school students?
Study 2: Observation of New Zealand health teachers	What pedagogical strategies do health teachers in Aotearoa New Zealand secondary schools employ in senior classes?
Study 3: Perspectives of senior high school health teachers in Aotearoa New Zealand and their students	What are the experiences of senior high school health teachers in Aotearoa New Zealand and their students regarding how health is taught, and what are students' perceptions of their health literacy?
Study 4: Questionnaire-based survey	1. What are the levels of generic health literacy among adolescents enrolled in senior high school in Aotearoa New Zealand? 2. How do senior high school students in Aotearoa New Zealand want to be taught about health literacy?

In the next chapter (Study 1), I report on the findings from a scoping review that mapped the types of peer-reviewed studies investigating school-based programmes that aimed to improve the health literacy of senior high school students. Study 1 intends to review international experiences in their pursuit of developing health literacy.

2 Study 1: School-based Interventions to Improve the Health Literacy of Senior High School Students: A Scoping Review

"… when I learned about the aspects of like, hauora, and wellbeing and stuff, I can relate it back to myself. And then if I go through something, and I need some help, I can think about what I learnt." Wendy, 16 years old, Year 12

2.1 Introduction

School-based interventions aimed at improving adolescent health literacy represent an emerging field yet to be comprehensively reviewed (11,37). Grant and Booth (85) reviewed the strengths and limitations of the application of fourteen different types of review. I decided to undertake a scoping review, after considering these different reviews, given that the scoping review method has been shown to be particularly suitable for identifying and examining the extent and nature of research undertaken widely (85,86). My aim was to provide a descriptive overview of school-based interventions to improve the health literacy of senior high school students. The scoping review method was the most appropriate method to identify the design and characteristics of relevant studies. A systematic review would be suitable if I were to critically appraise the effectiveness of interventions. But rather than having a sole focus on assessing effectiveness through randomized controlled trials, a scoping review presents an overview of the literature and maps key concepts underpinning a research topic (87,88). Thus, scoping reviews can identify knowledge gaps, set research agendas, and highlight implications for decision making (89).

A preliminary search identified five systematic reviews and one systematic mapping review related to my topic and target population. The first systematic review investigated randomised controlled trials of school-based and community-based interventions to improve mental health literacy in adolescents aged from 10 to 19 years (90). The second examined controlled studies evaluating the effects of media health literacy school-based interventions on adolescents' (aged from 10 to 18 years) body image concerns, eating concerns, and thin-internalization attitudes (91). The third review focussed on school-based health literacy interventions targeting adolescents aged from 12 to 16 years with socioeconomically disadvantaged backgrounds (92). The fourth review investigated school-based health literacy programmes for children aged 2 to 16 years old (93). The fifth systematic review, which was the only one amongst these six reviews that took a local approach (rather than an international one), presented a framework

for promoting health literacy in schools and evaluated whether Australian school programmes met the proposed guidelines (62). The systematic mapping review located community-, school- and Internet-based interventions/programmes aiming to improve mental health literacy, attitudes/stigma, and behaviours of adolescents aged from 12 to 18 years (94). These reviews included overlapping populations and interventions with the present scoping review. However, they addressed specific age or socioeconomic groups and domain-specific health literacy models, not fully answering my research questions. The objective of this scoping review was to map the details of international school-based interventions that aimed to improve the health literacy of senior high school students.

2.1.1 Research Question

The following overarching research question guided this review:

- What are the characteristics of educational programmes developed and implemented in schools to improve the health literacy of senior high school students?

A secondary question examined the design of the studies reporting these programmes:

- What are the types of peer-reviewed studies investigating school-based programmes to improve the health literacy of senior high school students?

2.2 Methods

This review followed the Joanna Briggs Institute (JBI) methodology for scoping reviews (87). The protocol for this scoping review was published in the JBI Evidence Synthesis journal (95).

2.2.1 Eligibility Criteria

2.2.1.1 Participants

This review considered studies investigating senior high school students (years 11, 12, and 13 in Aotearoa New Zealand/UK; grades 10, 11, and 12 in the USA; and equivalent grade levels in other countries). Studies with senior high school students plus participants from other grade levels were included only when results for senior high school students were reported separately.

The first step to assess eligibility of studies was to review the age range of participants. If participants were aged between 15 and 18 years, or if their grade levels were equivalent to years 11, 12, and/or 13 New Zealand, the study moved to the next eligibility step: relevance of the intervention. Studies with no information regarding participants' school grade level nor age were excluded. Studies with senior high school students plus participants from other grade levels were excluded if only ambiguously combined outcome data was available.

Studies targeted at teachers would be included only if the primary aim of the intervention was to improve the health literacy of senior high school students. This was not the case for any of the records identified in the search. Studies with the primary purpose of upskilling teachers were excluded.

2.2.1.2 Concept

This review considered studies investigating any type of school-based intervention aimed at improving health literacy (including domain-specific health literacy such as media, mental, or nutrition health literacy) regardless of intervention methodology and structure. Examples of school-based interventions included educational programmes, school curricula, lesson plans, lectures, hands-on activities, and community projects, among others. Any learning activity, professional collaboration, staff training, or community involvement placed in schools to enhance the health literacy of students were considered for inclusion. Interventions were categorised according to Nutbeam's (8) levels of functional, interactive, or critical health literacy. As explained in the previous chapter, at the functional level, a person understands health risks and use of health services. At the interactive level, a person can act independently and improve their motivation and self-confidence, as well as influence social norms and interact with social groups. At the critical level, a person reflects on social and economic determinants of health and can overcome personal, structural, social, and economic barriers to health. Other facets explored were study design, mode of delivery, duration, teaching strategies, content and related skills, and assessment tools. Studies that measured health literacy following implementation of an intervention were included even if the intervention was not specifically aimed at improving health literacy.

2.2.1.3 Context

This review considered studies within school settings. This included novel educational programmes or activities within the school environment; teaching methods already embedded in the school curriculum; and teacher training aimed at improving students' health literacy. Studies describing an intervention with a compulsory component outside of the school setting were excluded.

2.2.1.4 Types of Sources

This scoping review considered both experimental and quasi-experimental study designs, including randomized controlled trials, non-randomized controlled trials, before and after studies, and interrupted time-series studies. In addition, analytical observational studies, including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, were considered for inclusion. This review also considered for inclusion descriptive observational study designs such as case series, individual case reports, and descriptive cross-sectional studies. Study protocols were also included. This was a strategy to ensure that this review explored the characteristics of school-based interventions proposed to improve the health literacy of senior high school students (regardless of whether the effects of the interventions were investigated). Qualitative studies that focused on qualitative data including (but not limited to) methodologies such as phenomenology, grounded theory, ethnography, qualitative description, and action research, were also considered. Congresses or conference abstracts were excluded due to limited information. Non-empirical studies, such as reviews and text or opinion papers, were excluded.

2.2.2 Search Methods

The search strategy aimed to locate published primary studies. An initial limited search of MEDLINE (Ovid) and the ProQuest Education Database was undertaken to identify relevant studies. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were employed to develop a full search strategy for MEDLINE (Ovid) and the ProQuest Education Database. The search strategy, including all identified keywords and index terms, was adapted for each included database.

Only studies published in English were included due to resource limitations. Studies published from 1998 onward were included because, although the term 'health literacy' had been present

in the health literature for at least 30 years, it was not until 1998 that the broad concept of health literacy was described, and at that time it was still a relatively new concept (8,96).

I searched the following databases on 3 May 2021:

• MEDLINE via Ovid, using the strategy in Appendix I.

• Embase via Ovid, using the strategy in Appendix II.

• ProQuest Education Journals, using the strategy in Appendix III.

• Education Research Complete, using the strategy in Appendix IV.

• SAGE Journals, using the strategy in Appendix V.

• Index New Zealand (INNZ), using the strategy in Appendix VI.

Gray literature was not searched because this review focuses on transparent data analysis and peer-reviewed material to validate the substance of the claims being made. The reference lists of articles included in this review, as well as those of relevant reviews identified in the search, were screened for additional papers.

2.2.3 Study Selection

All citations located in the search were collated and uploaded into EndNote X9 (97), and duplicates removed. I screened titles and abstracts for assessment against the inclusion criteria for the review. In the next step, I retrieved in full potentially relevant sources and assessed them in detail against the inclusion criteria. During the study selection process, I consulted my supervisors for clarifications, as needed. Reasons for excluding studies at the full text stage were recorded and reported. Appendix VII presents a process map describing the selection of studies. The results section reports the search and the study inclusion process in full, including a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram (98).

2.2.4 Data Extraction

I extracted data from included studies using a data extraction tool (see Appendix VIII). The extracted data included details about the participants, conceptual underpinning, context, study

methods, and key findings relevant to the review question. When required, I contacted the authors of one study (99) to request additional data (confirm the school setting).

2.2.5 Data Analysis and Presentation

As scoping reviews aim to explore and synthesize a body of evidence rather than to rigorously assess its quality, this review provided a descriptive overview of the interventions, documenting the extent and nature of research undertaken in this area (87). Risk of bias of included studies was not appraised. The report of this review follows the guidelines for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (98).

I summarized the extracted data and reported it in diagrammatic form (numerical summary, using charts), and a descriptive format (narrative summary). Quantitative analysis (e.g., descriptive statistics such as frequency) indicated the geographic region of studies, design, and targeted population (school grade of study participants); mode of delivery (extracurricular or during school hours, implemented by teachers or other professionals); duration; and healthy literacy level (functional, interactive, or critical). I determined the health literacy level of the included studies based on the content delivered and the teaching strategies used. Descriptive qualitative content analysis (87,100) provided a summary of common intervention characteristics, coded and classified into overall categories (e.g., teaching methods, content, health literacy assessment tools). I coded data using NVivo Version 12 (101).

2.3 Results

2.3.1 Selection of Sources of Evidence

The search identified 2,722 records. After removing duplicates, I screened the titles and abstracts of 2,032 records for eligibility and assessed 171 articles in full text. Thirty-five studies published between 2008 and 2021 met the eligibility criteria. Figure 2.1 describes the screening process.

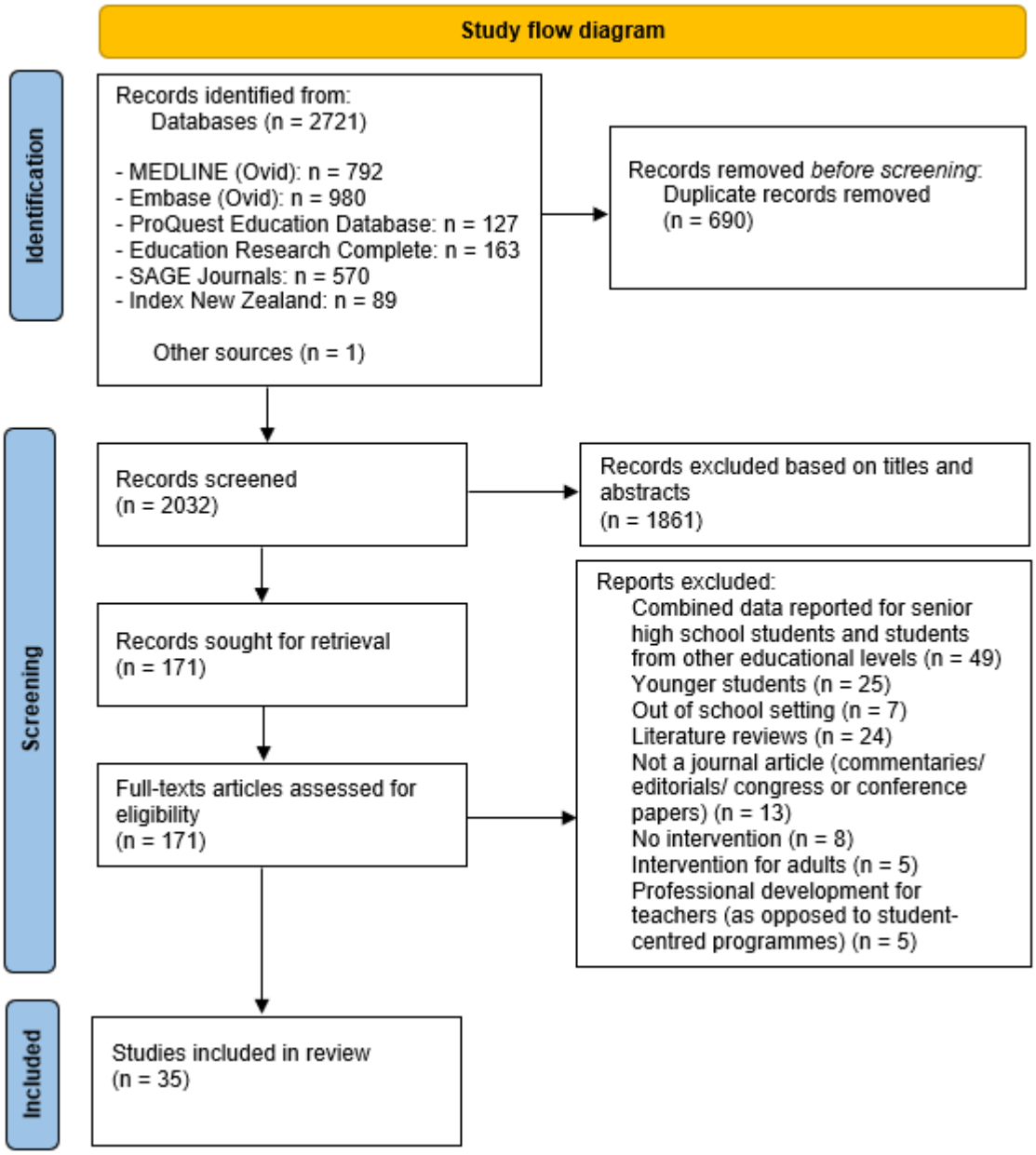


Figure 2.1 Study flow diagram

2.3.2 Results of Individual Sources of Evidence

This subsection presents a summary of the characteristics (study ID, study design, concept, intervention, health literacy level) of each included source of evidence (Table 2.1). More details on each study are available in Appendix IX.

Table 2.1 Characteristics of studies

Study ID	Study Design	Intervention	Health Literacy Level
Begoray 2009 (102)	Case series	Health component of the Planning 10 curriculum.	Functional
Begoray 2018 (125)	Case series	Health and arts lessons to help students create graphic novels about media influences on a health/wellness issue.	Critical
Bjørnsen 2018 (128)	Controlled before-and after study	School nurses led seminars and discussion groups.	Functional
Boivin 2018 (99)	RCT	Reading educational materials: 'A Guide to Fertility' versus 'Baby Bump and Beyond.'	Functional
Cummings 2015 (133)	Description of a teaching activity	Fishbowl discussion about a health issue.	Interactive
Darraj 2018 (134)	Cluster-RCT protocol	Trained teachers will deliver two lectures followed by group discussion.	Interactive
Ekornes 2020 (129)	Case report	A community worker followed up the students. Psychiatric nurses expanded student health services.	Functional
Eschenbeck 2019 (119)	RCT protocol	Health experts will deliver the StresSOS (several teaching methods). Control groups = online intervention (same programme or active control).	Interactive

Study ID	Study Design	Intervention	Health Literacy Level
Ghorbani 2009 (112)	Case report	Health experts presented the teen health Web site to students.	Functional
Gould 2010 (126)	Case series	A health educator and an art instructor delivered the course “World Health and Art Activism” (interactive exercises). Students developed and implemented an action plan.	Critical
Hart 2016 (121)	Before-and-after comparison	An accredited instructor facilitated the teen Mental Health First Aid training (interactive exercises). Staff and parents also received training.	Interactive
Hart 2018 (122)	Cluster-RCT	Teen Mental Health First Aid training. Control group: Physical First Aid training.	Interactive
Hart 2020 (120)	Cluster-RCT	Teen Mental Health First Aid training. Control group: Physical First Aid training. This study is a secondary analysis of Hart 2018.	Interactive
Hudson 2020a (114)	Before-and-after comparison	A study author delivered a PowerPoint presentation about cancer.	Basic
Hudson 2020b (113)	Before-and-after comparison	A study author delivered a PowerPoint presentation about cancer.	Functional
Jacque 2013 (104)	Before-and-after comparison	Teachers delivered a biology curriculum on infectious diseases (interactive exercises).	Functional
Jacque 2016 (103)	Controlled before-and-after study	This study is a secondary analysis of Jacque 2013. The control group (age- and gender-matched students) did not receive the curriculum.	Functional

Study ID	Study Design	Intervention	Health Literacy Level
Karimi 2019 (105)	Cluster-RCT	An instructor delivered a programme to the intervention group (problem-based learning).	Interactive
Keselman 2015 (130)	Case series	Students developed, with support from a youth specialist and a health sciences librarian school and community outreach activities.	Interactive
Komolafe 2020 (115)	Controlled before-and-after study	Study authors delivered a lecture on stroke to the intervention group.	Functional
Lanfredi 2019 (116)	Controlled before-and-after study	Clinical psychologists delivered lectures on mental health. Then, classes received an art course (control) or a mental health literacy course (interactive exercises).	Interactive
McCuaig 2014 (145)	Case series	Health literacy curriculum (interactive exercises). Students created a website page on healthy living.	Critical
Milin 2016 (107)	Cluster-RCT	Healthy Living course (control) versus integration of the Mental Health and High School Curriculum Guide in this course (trained teachers) versus this integration plus follow-up eLearning modules.	Interactive
Ojio 2020 (123)	Description of a teaching activity	Mental health programme using videos and films.	Interactive
Pais 2014 (131)	Case series	Teachers and researchers guided students on a community profiling project.	Critical
Peralta 2021 (108)	Case report	New (first-year delivery) school health programme.	Critical

Study ID	Study Design	Intervention	Health Literacy Level
Sangalang 2020 (117)	Cluster-RCT protocol	Researchers delivered interactive sessions to the intervention group and encouraged students to participate in whole-school activities.	Interactive
Steckelberg 2009 (138)	Controlled before-and-after study	Teachers delivered an evidence-based medicine curriculum (interactive exercises) to the intervention group, who developed and presented projects to solve a practical health problem.	Critical
Tammen 2019 (110)	Before-and-after comparison	Module of the Great Diseases curriculum (interactive exercises).	Critical
Ueno 2014 (118)	Before-and-after comparison	Researchers delivered an interactive lecture.	Functional
Uribe Guajardo 2019 (124)	Before-and-after comparison	An accredited Instructor delivered the teen Mental Health First Aid training (interactive exercises).	Interactive
Vamos 2008 (127)	Description of a teaching activity	Students were to create an educational booklet addressing women health issues.	Critical
Weinstein 2017 (132)	Description of a teaching activity	"Adopt-a-Disease" programme: students were to present to the class their research on a disease of their choice.	Critical
Wharf Higgins 2009 (48)	Case series	Health component of the Planning 10 curriculum.	Interactive
Yamaguchi 2020 (111)	Quasi-cluster RCT	School teachers and a health care teacher delivered a class about mental health (interactive exercises) to the intervention group.	Interactive

2.3.3 Characteristics of Sources of Evidence

This subsection presents the overall characteristics of the included studies. As seen in Table 2.2, most included studies were undertaken in North America (42%); presented a uncontrolled design (49%); focused the intervention on senior high school students (77%); implemented the intervention during regular classroom hours (82%); investigated interventions delivered by teachers (49%); investigated a short health literacy programme (in terms of the quantity of sessions and their length; 49%); focused on interactive health literacy (40%); and explored domain-specific health literacy models (52%). Table 2.2 also demonstrates most studies investigated a curriculum either already in place or integrated in schools (48,102-111). Other teaching methods include presentations by guest speakers (112-118), training programmes (119-124), and interdisciplinary projects integrating health classes with art or geography classes (125-127). Further, two studies expanded the student health services – whilst in one school nurses organised seminars and discussion groups (128), in the other school teachers, social workers, and health care professionals formed an inter-professional collaboration to follow-up the students (129).

Table 2.2 Characteristics of included studies

Study region	Study design	Study population	Intervention methods	Delivery mode of intervention
• North America (42%) • Asia (19%) • Europe (19%) • Australia (17%) • Africa (3%)	• Cases series/reports (29%) • Randomized controlled trials (26%) • Before-and-after comparisons (20%) • Controlled before-and-after studies (14%) • Descriptive (11%)	• Senior high school students (77%) • Intermediate to high school students (17%) • Primary to high school students (3%) • Junior and senior high school students (3%)	• Curriculum (29%) • Presentations by guest speakers (20%) • Educational training programme for students (17%) • Short educational activities (14%) • Interdisciplinary projects (14%) • Expansion of the student health services (6%)	• Normal classroom hours (82%) • Extracurricular activities (12%) • Curricular and an extracurricular activity (3%) • Unclear (not reported) (3%)

Person delivered the intervention	Intervention duration	Health literacy model of the intervention	Health literacy domain of the intervention
• Teachers (49%) • Researchers (17%) • Accredited instructors (14%) • Health experts (11%) • School health professionals (6%) • Teachers and researchers (3%)	• One to eight sessions (that lasted from 20 minutes to 2 hours each) (49%) • Twenty-two to 40 sessions (14%) • One curricular year (14%) • Unclear (not reported) (14%) • Six weeks to 6 months (number of sessions not reported) (9%)	• Interactive (40%) • Functional (34%) • Critical (26%)	• Health literacy (48%) • Mental health literacy (31%) • Cancer literacy (6%) • Depression literacy (3%) • Media health literacy (3%) • Fertility literacy (3%) • Nutrition literacy (3%) • Oral health literacy (3%)

Besides these descriptive results, content analysis coded common intervention characteristics into overall categories: teaching methods, materials, content, and assessment tools. The first category relates to the main basis of the intervention in terms of structure, whilst the second category lists the strategies used. The third describes the materials required, the fourth the topics and skills explored, and the fifth the measurement tools used in the studies.

2.3.3.1 Teaching Methods

The interventions (as shown in Table 2.2) promoted, overall, active learning through interactive lectures (109,112,117-122,124,126), seminars (128), student-led presentations (103,104), and problem-based (105) and case-based learning (120-122). These overarching strategies involved hands-on activities (103-106,109,110,117,118,125-127,130-132), laboratory work (103,104), question and answer sessions (118), group discussions (103,104,109-111,116,117,119-122,124,126,133,134), brainstorming (115,117,126), role-playing (103,104,109-111,116,117,119-122,124,134), quizzes (110,119), music (117), and games (116,117). Some interventions involved students creating educational materials such as graphic novels (125), posters (117), booklets (127), and websites (106). Others required students to take action to improve community health (120-122,126).

2.3.3.2 Teaching Materials

Materials for the interventions included posters (106,109), flipcharts (109), overhead transparencies (109), computer projections (109), graphics (117), slideshows (113,114,116,117,120-122,124), videos (films, stories and interviews) (107,110,111,115-117,119-124,126,134), scholarly and news articles (126), books (126), student booklets (workbooks/worksheets) (103,104,109,110,116,120-122,124), fliers (115), brochures (99,106), stationery items (such as pens, scissors, coloured cardstock papers etc) (117,127), computers with Internet access (106,127,132), and an educator's manual (110,117,123).

2.3.3.3 Teaching Content

The content of interventions included a variety of health topics such as healthy living and wellbeing (48,106,125), mental health (stress, social phobia, anxiety and eating disorders, depression, suicide, schizophrenia) (107,111,116,119-124,134), cancer (113,114), fertility (99), infectious diseases (103,104), stroke (115), metabolic diseases (110), oral health (healthy

teeth and gingiva, dental caries and gingivitis) (118), hygiene promotion (117), women's health (127), health issues and decisions (48,102,105,109,112,128,131,133), health dimensions (127), psychosocial and biological pathways (114,116,132), population health (126), social determinants of health (126), participatory citizenship (131), media influences (125), and art activism (126). In some interventions, students were able to choose the topic of their interest (106,109,125,126,128,130-132).

Students identified health concerns (106,107,120-123,125-127,130,131,133) and engaged with research methods such as accessing and critically appraising health information (48,109,110), identifying useful resources and reliable health information websites (106,112,127,130,131), and proposing hypotheses and solutions for practical problems (105,106,109). They also learned to recognise health problems through signs and symptoms (99,115,116,118-123), and how to self-check (107,118), self-help (107), seek help (107,111,120-124), help peers (120-122), cope (119), and modify behaviours and prevent diseases (114,115,118,127). They reflected on risk factors (99,113-115,127), statistics (114,127), stigma (111,116,124,134), misconceptions (116), treatment and response options (99,115,118,127,131), health disparities (113,126,127), social actions to improve health equity (116,126), public health implications (126,131,132), health rights (131), and legal, political, economic and cultural influences and implications (125,127). The activities demonstrated and promoted critical thinking and inquiry (48,102-106,109-111,116-122,124-127,130,132,133). Some interventions also stimulated communication skills by asking students to share their results through presentations (130-132) or educational materials (106).

2.3.3.4 Health Literacy Assessment Tools

Most studies performed quantitative assessments but with unvalidated and heterogeneous tools. Only five studies used validated tools to examine the effects of the intervention in the health literacy of students. Among these, four used tools validated for adolescents: the Health Literacy Measure for Adolescents (105,135), the Health Literacy for School-Aged Children scale (128,136), the Mental Health Promoting Knowledge scale (128,137), the Critical Health Competence Test (109,138), and the Knowledge about Mental Illness test (116,139). One study used a tool validated for adults, the Cardiff Fertility Knowledge Scale (99,140). Nineteen studies used unvalidated tools (107,111,120-122,124,129).

Few studies (n = 6) used qualitative methods such as focus groups and interviews to explore how students perceived the intervention and its impact on their health literacy (48,102,109,125,130,131). A few other studies investigated participants' impressions and experiences through survey questionnaires (48,102,109,110,121,125,129-131).

Among the studies that assessed the effects of the intervention on the health literacy of students (n = 25), 96% reported improvements (48,103-105,107,109-116,118,120-122,124,126,128-131). However, quantitatively evaluating the effectiveness of the interventions in improving the health literacy of students is beyond the scope of this scoping review.

2.4 Discussion

This scoping review identified 35 primary peer-reviewed studies addressing school-based interventions for improving health literacy in senior high school students. Due to its nature, this scoping review does not provide any quantitative recommendations regarding the effectiveness of school-based interventions to improve the health literacy of senior high school students. Nonetheless, it presents an overview of the nature and extent of interventions that have been conducted around the world with this goal. This section highlights the characteristics of educational programmes developed and implemented in schools to improve the health literacy of senior high school students. Furthermore, it discusses the state-of-art of the research in this area.

2.4.1 Including Health Literacy in School Curricula

As expected, most interventions were implemented during regular classroom hours, by teachers, and had a short duration. This finding indicates the feasibility of embedding health literacy in the school curriculum. Promoting health literacy outside of classroom hours would be challenging as this would require extra time from both students and staff. Thus, aligning the content and methods of health literacy interventions with the learning goals of the school's health curriculum tackles time constraints and facilitates the implementation of these programmes (141).

The variety of teaching content identified in this review indicates that embedding a health literacy programme within the curriculum can be multifaceted to meet the needs of all stakeholders. Rather than implementing a one-size-fits-all formula, educational programmes must allow modifications according to specific needs of schools. Researchers could build

health literacy educational programmes together with schools, teachers, and students rather than proposing solutions as an external force without considering input from agents and users of the education sector (21,36). Health literacy learning resources would preferably be designed with and for teachers, with contributions from young people, and facilitate coordination across subjects (21,141).

Although this current review found that most interventions related to the curriculum aspect, as did Smith et al.'s systematic review (92), some studies explored an eco-holistic approach (128,129). The eco-holistic approach of the WHO Health Promoting Schools framework (59) considers, beyond the formal health curriculum, the wider physical and social school environment, and engagement with families and communities to create a supportive environment that helps students develop their health literacy (49,142). According to the social ecological conceptual framework (48), besides the health education curricula and all aspects of the classroom, the school setting contributes to the development of health literacy skills in adolescents. Systemic changes might be necessary to ensure the mission, aims, and policies of schools support health literacy (36,62). This review indicates schools can follow the eco-holistic approach to optimise their organisational health literacy and, consequently, foster the health literacy of students.

2.4.2 Interprofessional Collaboration

With several interventions implemented by health experts (e.g., 112,116,118), this review indicates that schools could develop collaborations with health professionals and researchers. This in fact has been proposed as one of the characteristics of a health-literate school (61). Such partnerships could enhance teacher professional learning, which is fundamental for adolescent health literacy programmes to support teachers in the expected paradigm shift and to overcome present limitations related to assessment and sustainment of outcomes (62). Furthermore, two studies that expanded the student health services (128,129) indicated how other school staff besides teachers can help students develop health literacy skills.

Another aspect is that future-focussed learning on complex life and world issues and phenomena requires integration of different areas of knowledge in the curricula, as opposed to isolated disciplines that do not communicate between each other (143). This was illustrated by the included studies, which implemented interdisciplinary projects integrating health classes with art or geography classes (125-127). Exploring socio-scientific issues through multiple

learning disciplines cultivates competencies for engaged citizenship (144). Many school subjects can promote interrelated competencies of health literacy, but the skills learned in different subjects must be applied to health contexts (55). Thus, this review suggests interdisciplinary projects may facilitate the promotion of health literacy in schools. Teachers would need to collaborate and determine which skills would benefit all involved subjects.

2.4.3 Active Learning and Interactive Classes

The findings suggest that, to promote learning and engagement, teaching methods should be based on active learning and explore real-life scenarios (105,120,134), interactive lectures (109,112,119), problem-based and case-based learning (105,121), hands-on activities (118,126,145), group discussions (111,116,133), student-led presentations (103,130,132), and ludic activities such as role-playing, quizzes, music, and games (104,117,121). Moreover, this review supports the autonomy and capacity of senior high school students in leading projects to improve community health (126,127,131), and creating educational materials (125,145).

The idea of using active learning is also supported by Smith et al. (92), who argue that interventions with hands-on or practical learning activities are more effective than the traditional didactic learning method. This active method invites students to actively participate in the learning process by engaging with the teacher and the class content, rather than passively and supposedly taking in information. In comparison to conventional courses, programmes with interactive tasks focused on context-specific learning may promote more positive attitudes towards school science and health, improve adolescents' health literacy to a greater degree, and better motivate them to change behaviour (92,146,147). Nash et al. (93) also agree that active learning is a critical success factor for health literacy programmes, alongside curriculum content and integration.

The student-centred approach of active learning yields many methods, including interactive learning, in which students also interact with their peers. This is an effective strategy that values the student voice and ensures their preferences and needs are met (62,148). Not only does it bring students a sense of leadership, ownership, and empowerment but it also promotes peer modelling of healthier and less risky behaviours (62,149-153). Moreover, when presenting their research findings to peers, students can practise communication skills in a supportive environment, promoting confidence and self-worth (154). By expressing beliefs, ideas, and health-related information, adolescents develop efficient communication, which is a key

characteristic of a health literate citizen (155). Furthermore, interventions that allowed students to have the autonomy to choose the topic to be explored (125,128,132) aligned with the aim of health literacy of motivating students to cherish their own values and preferences, find their own voice, and think critically, instead of passively accepting traditions (55).

In terms of the materials used in the interventions, these consisted of accessible school resources, including media and the Internet. Using technology in class was intended not only to promote engagement but also to facilitate research tasks. In Aotearoa New Zealand, it is estimated that 145,000 school students lack adequate Internet access at home (156). Thus, the fact that this review indicated the utility of the Internet in school-based health literacy interventions becomes particularly relevant for Aotearoa New Zealand. Schools must provide opportunities for students to access online health information and develop research and critical appraisal skills.

2.4.4 Health Literacy Skills

The included studies addressed specific skills of health literacy: critical thinking skills (111,116,133), problem-solving skills (104,110,126), communication skills (130-132), research skills (123,125,145) and data analysis skills (48,110,138). These critical and evaluative skills underpin and facilitate critical health literacy (157), allowing adolescents to make informed health decisions and incorporate healthy behaviours throughout their lifespan (158,159). They also empower adolescents to reflect on health issues and create solutions (155).

There was a balance between studies that focused on general health literacy, which involves skills that are applicable across domains (e.g., critically accessing health information), and those that explored domain-specific health literacy (e.g., cancer health knowledge is required for cancer health literacy). Exploring domain-specific issues and skills may provide an opportunity for schools to promote health literacy skills relevant for the context of students and their specific needs. This review corroborates with the literature (108) that educational activities can address a specific level of health literacy and a school's context (4). Each intervention focused on interactive, functional, or critical health literacy. Schools may choose which model to promote for each study level or year period.

The hierarchical development of health literacy skills over these different levels progressively allows for greater autonomy and personal empowerment (8). Thus, a comprehensive health

literacy programme should facilitate intellectual and capability development through functional and interactive learning activities, which then enables students to navigate the complexities of critical health literacy (160). However, literature on curriculum reform targeting critical health literacy is still scarce (145). Similarly, this review indicated that the included studies focused mostly on interactive and functional health literacy. Although these interventions did not aim to promote the critical level, they provided opportunities for students to develop the skills that would allow them to progress to the third level of health literacy.

2.4.5 Research on School-Based Interventions to Improve the Health Literacy of Senior High School Students

Most included studies (42%) were conducted in North America. A similar number of studies (around 19%) was conducted in Asia, Australia, and Europe. Only one study was conducted in Africa (115). This indicates a bias in terms of the way school-based interventions to improve the health literacy of senior high school students have been researched. On one hand, it is possible the lack of studies from Africa and Latin America is due to publication bias, i.e., that studies from these locations are not being published in English language mainstream journals. On the other hand, these geographical areas could need support to conduct research in how to improve the health literacy of adolescents. Considering that low health literacy follows a social economic gradient (15,16), low- and middle-income countries are potentially disproportionately affected by it compared to high-income countries. Having the highest social and health inequalities in the world (161), which are linked to the health literacy of their population (36), low-income countries could potentially benefit from large scale interventions aimed at improving health literacy. Aotearoa New Zealand would also benefit from such research as no study investigating school-based health literacy interventions for senior high school students was conducted in this country.

Similar to other reviews related to this topic (62,90,92-94), the studies included in this review applied a variety of research designs. Around half of studies (49%) were uncontrolled, and only a quarter (25.7%) were randomised controlled trials (RCTs). Randomised controlled trials are the gold standard to investigate effectiveness as other study designs present inherent bias that does not allow for conclusions on causal relationships (162). However, contextual variance in the school setting, such as student-teacher interaction, school ethos and parental involvement, are significant factors that may contribute to variability in outcomes after implementation of the same intervention in different schools (163). Other variances include student achievement

levels, the teachers themselves, and socio-demographic backgrounds. Thus, RCTs are not necessarily the gold standard for educational research, because the contextual variance may lead to the same intervention having different results for different schools, classes, or students.

Besides heterogeneity in terms of design, characteristics, content, and implementation, the included studies also presented diverse assessment tools to investigate the effects of interventions in the health literacy of students. Further, only four studies used assessment tools validated for adolescents (105,109,116,128). These were the Health Literacy Measure for Adolescents (105,135), the Health Literacy for School-Aged Children scale (128,136), the Mental Health Promoting Knowledge scale (128,137), the Critical Health Competence Test (109,138), and the Knowledge about Mental Illness test (116,139).

Other reviews on this topic also found heterogeneity in outcomes measures, measurement tools, and criteria for success (62,90,92-94). The variability in both the nature of interventions and the outcomes assessment of the studies included in this scoping review will hinder conclusions regarding the evaluation of the effectiveness of interventions in future systematic reviews. Future studies should aim for consistency in theoretical frameworks in the design, implementation, and evaluation of health literacy programmes for adolescents, sharing understandings, definitions, and concepts (62). It is also important to use standardised and validated assessment tools. However, it is still unclear which health literacy instrument is the most reliable and the most valid for adolescents (37). Task-performance assessments may be more likely to successfully measure health literacy than self-report ones (57). In addition, Strauss, Schatzman, Bucher, Ormston, Spencer, Barnard, and Snape, argue, as cited in Merriam and Tisdell (164), that research should include qualitative methods, which may be able to better explore adolescents' experiences and the underlying meanings that shape their perspectives.

2.4.6 Strengths and Limitations

The scoping review search strategy only aimed to identify studies that specifically used the term 'health literacy'. Nevertheless, this review identified studies that investigated domain-specific health literacy (e.g., cancer literacy, nutrition literacy). This suggests that the several domains of health literacy are indexed under the umbrella term 'health literacy'. Moreover, due to resource limitations, the search strategy included only studies published in English. This indicates a potential bias in researching, locating, and reporting research findings, as evidence from studies published in other languages is missing. The search process also did not include

grey literature, as the focus was on transparent data analysis and peer-reviewed empirical material to validate the substance of the findings. Nevertheless, the search of peer-reviewed articles was comprehensive and provided many sources that addressed the research questions.

2.4.7 Implications for Practice

Health literacy interventions could be feasibly embedded in school curricula. Educational programmes may involve class activities (e.g., 119,122,124), interdisciplinary programmes (e.g., 125-127), and community projects (e.g., 126,127,131). Modifications in the school environment and services (e.g., 128,129) and partnerships with health experts and researchers (e.g., 112,113,115) contribute towards a health-literate school (61), i.e., a school that enables students to develop health literacy skills through organisational health literacy (54). Students should also be involved in the decision making of health literacy interventions to ensure these meet their specific needs and preferences (62,148). For example, schools could give autonomy to students to choose which topic or aspect to focus on (e.g., 109,130,131), revealing a health literacy level (functional, interactive, or critical), and possibly a domain-specific health literacy to be explored. Teaching strategies should be based on active learning and interactive activities (92,93,146,147) to increase engagement and facilitate critical thinking, problem solving, research, data analysis, and communication skills. These strategies and skills promote the core components of health literacy (theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship) (4) and help students progress over the three health literacy levels (8). Besides encouraging students to work together (62,149-153) and share their results (154), using real-life examples (e.g., 105,120,134) and multi-media resources, including the Internet (e.g., 106,127,132), may also make health literacy programmes more appealing to students. Using the Internet is particularly relevant to Aotearoa New Zealand, where a considerable number of students lack adequate access at home (156). Providing opportunities for students to access online health information can promote research and critical appraisal skills that allow them to identify distorted and misleading online health claims (73,74).

2.4.8 Implications for Research

The findings of this review may inform future research systematic reviews. The heterogeneity of interventions and outcomes will hinder assessment of effectiveness. Only data from homogenous school-based interventions to improve the health literacy of senior high school students (e.g., 121,122,124) could be pooled in a meta-analysis (165). Similar interventions

that provided continuous data for the same outcome but with different assessment tools (e.g., 120,122) would need to be pooled through standardised mean difference (165). Assessment of heterogeneity would indicate whether generalisable conclusions could be made (165). The use of non-validated assessment tools will reduce the certainty of the evidence due to indirectness of the outcome (166). The findings of this scoping review reinforced the gap in the literature in terms of the lack of reliable, validated, and standardised instruments to measure health literacy of adolescents (37,167). Other gaps in the literature identified in the present scoping review include endorsing an optimal intervention duration and effective teaching strategies that sustain positive long-term benefits.

Future studies should aim for consistency of interventions and validated assessment tools (62), thus providing robust evidence that could be pooled. Considering the contextual variance of complex school systems (163), controlled before-and-after studies, as well as RCTs, could provide high quality evidence illustrating the effects of educational interventions. The control group could be instruction as usual, an educational intervention not related to health literacy, different frequencies of intervention, or different strategies for promoting health literacy. Another important aspect to consider in future primary research is to include school staff, teachers, and students in the planning and assessment of interventions. Inviting these stakeholders in the research team would ensure meaningfulness and applicability of health literacy-based educational programmes (168), increase feasibility (141), and determine key outcomes of interest (169). Merriam and Tisdell (164) highlight the proposition from Strauss, Schatzman, Bucher Ormston, Spencer, Barnard and Snape that research should include qualitative data (such as interviews and focus groups) to reveal the perspectives of these key stakeholders. Furthermore, primary studies aiming to improve the health literacy of senior high school students could explore, beyond the classroom, the school wider physical and social environment (49,142,170,171).

2.5 Conclusion

This scoping review contributed to the literature by outlining the characteristics that influence the way health literacy is taught in schools for students at the senior level. The findings indicate the feasibility of embedding health literacy in school curricula, as opposed to encouraging health literacy skills through extra-curricular activities. Partnerships with health professionals and researchers could help teachers develop and implement these programmes according to the needs of their school and students. Other school staff (e.g., nurses, social workers) could also

help to implement these programmes, including projects to improve community health. School teachers from different subjects could also partner to lead interdisciplinary projects that improve students' health literacy.

In terms of health literacy skills, the interventions of the included studies promoted critical thinking, problem solving, research, data analysis, and communication skills. To engage students in school-based health literacy programmes, this review suggests the use of active learning, interactive activities, and real-life examples. Besides encouraging students to work together and share their results, teachers should consider giving autonomy to students to choose which topic or aspect to focus on. Multimedia resources, including the Internet, may also allure to students to engage in health literacy programmes. Furthermore, this review indicates schools could explore domain-specific health literacy and target a specific health literacy level to address the needs of their students and communities. In addition, with almost half of the studies being uncontrolled and none conducted in Aotearoa New Zealand, more regionally specific studies with a controlled design are necessary.

3 Study 2: Observing the Teaching of Health in Senior High School Classrooms in Aotearoa New Zealand

"I like learning about people's emotions, and like, how they feel and like, how it links to their overall wellbeing, which health teaches me." Pauline, 17 years old, Year 13

3.1 Introduction

The previous chapter (Chapter 2) presented a scoping review that identified the characteristics of school-based programmes that have been implemented around the world to improve the health literacy of senior high school students. The review further comprehensively mapped the types of peer-reviewed studies that have been published in English-language journals on this topic. The findings provided insights for the development of these programmes in Aotearoa New Zealand. The next stage of the thesis aimed to identify the pedagogical strategies that health teachers in New Zealand secondary schools employed in senior classes.

Despite the school setting being recognised as the main avenue for health literacy, few countries have included health literacy as a learning outcome in school curricula (54). Nevertheless, learning related to health knowledge, skills, competencies, attitudes, and behaviours are part of school practices (172). The focus on teaching health without explicit teaching of health literacy is the scenario of most countries, with few school-based initiatives to promote health literacy education (54). This is the case in Aotearoa New Zealand. Thus, I decided to undertake the present study to evaluate teaching practices already in place in senior high school classes to inform my research into how to improve the health literacy of students through health classes.

3.1.1 Teaching Observation and its Impact on Teaching and Learning

Observation was considered a crucial research tool for this research because it takes place in the setting where the phenomenon of interest naturally occurs (164). A systematic measure of classroom processes allows for better understanding of this setting and identifies ways to evaluate and improve teaching and the overall learning climate (173-175). Thus, I proposed this method would provide first-hand information on the context and practices of senior health classes in Aotearoa New Zealand. Observing health classes and the way in which health is taught would also allow me to make inferences about whether these strategies could be linked to the development of health literacy.

In contrast to routine observation, I developed and applied a structured observation protocol that addressed a specific research question and was subject to checks and balances that produced trustworthy results (164). This demanded training and preparation to minimise the subjective, selective, and unreliable nature of human perception (164). For this study, I trained myself to develop the following skills of an effective observer: paying attention; writing descriptively; recording field notes; separating detail from trivia; using systematic methods to validate and triangulate observations; and using self-knowledge and self-disclosure to report strengths and limitations of my own perspective (176).

3.1.2 Teaching Effectiveness

I organised my descriptive field notes of the observations based on Ramsden's six principles of effective teaching (177). Ramsden developed his theory for higher education in Australia. However, I found his focus on learning from students' perspectives applicable to secondary school, especially considering that senior high school students are transitioning from adolescence to adulthood. Furthermore, Australia has a similar political, economic, socio-cultural (multiple cultural perspectives), and educational context to Aotearoa New Zealand, which makes Ramsden's theory applicable to both countries. In addition, Ramsden's framework for effective teaching (177) abandons the mainly passive, monologue approach of lecturing, towards a more active, dialogue-type teaching activity that leads to more comprehension, integration of knowledge, and problem solving. Ramsden (177) argues that we need to move away from superficial approaches to learning that rely on memorising towards active engagement, which helps students understand and see the world in a different way. Only then students will be able to comprehend, integrate knowledge, and develop problem-solving skills – and thus strengthen their health literacy skills.

Ramsden's approach is consistent with the pedagogical model proposed by Freire (178), who also criticized the passive, monologue approach of traditional literacy education, in which students passively receive facts and information from the teacher, who acts as the authority and possessor of knowledge. Freire (178) defends that the student-teacher relationship must be based on collaboration and mutual participation. Thus, an educator must attempt to know the perspectives, needs, values and ideas of each student in the classroom, and guide them into using literacy to analyse, discuss, and change the world according to what is relevant to students (178). Ramsden (177) defends that teaching can be better understood when taken from the student's perspective, which resonates with the ideas of Freire. Both Ramsden and Freire value

students' lives, environments, and their understanding of the world. Their student-centred educational models have the common goal of promoting student engagement, leadership, and empowerment. This approach, when applied to health literacy, helps students make educated health choices and actively participate in promoting and enhancing their health as community members (179). Furthermore, Ramsden's principles also align with the effective pedagogy proposed by the New Zealand curriculum (65).

The first principle of effective teaching is "interest and explanation", which relates to the ability to make a subject genuinely interesting (177). This propels students to put the effort in to master it (177). Next, "concern and respect for students and student learning". This principle postulates that a teacher can help students develop their autonomy by being available and genuinely interested in them and in teaching (177). The third principle, "clear goals and intellectual challenge", considers how a teacher must explain to students what they will learn, which concepts they must master, and how they can use this knowledge – whilst making this challenge compelling (177). The next principle, "appropriate assessment and feedback", appraises the use of assessment tasks. These assessment tasks should use various techniques to provide evidence of students' understanding rather than asking them to merely reproduce definitions memorised by repetition (177). Furthermore, assessments should be followed by helpful feedback, in which the teacher is accessible to students to comprehensively discuss their work (177). The fifth principle, "independence, control, and engagement" suggests that when students have a sense of control over how to learn a topic and which aspects to focus on, they learn better and enjoy learning more (177). Finally, "learning from students" argues that a teacher must be open to change, adjusting the curriculum, teaching strategies, and assessment based on students' misunderstandings, learning progress, and individuality. Thus, by using observation as a research method and Ramsden's six principles of effective teaching, this study aimed to identify the pedagogical strategies that New Zealand teachers used in senior health classes.

3.1.3 Research Question

The following overarching research question guided this review:

- What pedagogical strategies do health teachers in Aotearoa New Zealand secondary schools employ in senior classes?

3.2 Methods

3.2.1 Participants and Sampling

I conducted this study in Tāmaki Makaurau/Auckland, Aotearoa New Zealand. I chose the location for practical reasons, as I was based in this city. The study population was health teachers working in a secondary school in senior classes, i.e., Years 12 and 13. Typically, the age range for students within Years 11, 12, and 13 are 15 to 18 years (180). I excluded health teachers that were not assigned to senior classes, and health teachers that only taught Year 11. Although students were in the classrooms, they were not part of my study population. My focus was on how health teachers managed classes and disseminated health topics. I made no descriptive notes regarding students' experiences (thus consent was not required from them).

I used purposive sampling for this study. I selected information-rich cases to generate understanding of teaching practices in depth (176). My study sample was three senior health teachers from two co-educational (mixed-gender education) secondary schools (Years 9-13). The schools had different deciles and geographical locations (in the urban area of Tāmaki Makaurau/Auckland). School A had a decile 10, and School B a decile 4. Thus, as explained in the introduction chapter, the decile level of the schools indicated that School B was in a geographical location with more households with school-aged children from lower socio-economic communities than school A (71). I collected no demographic information from teachers to avoid unintentional identification. I assured participants and school principals that participants' and schools' identities would be kept strictly confidential. Thus, this study reports no information that could personally identify participants or schools.

3.2.2 Procedure

Between December 2019 and February 2020, my supervisors and I liaised with the health education head of each school. After initial contact by email, we met them in person to build a relationship, present the study project, and discuss its feasibility. Both were interested in participating in this research and put me in contact with health teachers teaching at the senior level in their schools. Then, teachers and school principals received a Participant Information Sheet (PIS) (Appendix X and XI) and provided written informed consent (Appendix XII and XIII) to participate in this study. Ethical approval was obtained from the University of Auckland Human Participants Ethics Committee (reference number 024388).

I followed the availability of health teachers in reference to being able to observe teaching practices in their classrooms. Due to the alert levels of COVID-19 at the study time, we had to reschedule the observations to a date when I was able to physically attend classes in the schools. This was only possible at the end of School term 2 (28 April to 3 July 2020). I observed the classes during regular class hours.

3.2.3 Data Collection

This study was based on an observation procedure (164,176), i.e., participants were in natural settings (classrooms). Observation findings, when used in conjunction with other research methods, may substantiate results and triangulate emerging findings (164). Gathering data though class observations allowed me to record teaching activities as they occurred. The teachers introduced me to students (when I first came to class) and then started class activities. My role was an observer as participant, indicating I was a known, overt observer that had limited and formal contact with members (181). I entered the classrooms to collect data and sat in the back of the classroom, where I would be least disruptive to the class. During the class, I did not interact with teachers or students.

I made descriptive field notes on paper as I observed classes, using code names for participants and schools. Later I copied these notes in word documents. I stored the digital notes on a password-protected computer and sent the original paper notes to recycling (unreadable little pieces). All my notes focused exclusively on teachers' pedagogical practice, the classroom setting, and health topics.

3.2.4 Data Analysis

I conducted a deductive qualitative content analysis (100) to interpret my descriptive field notes. Qualitative content analysis is used to analyse written, verbal, or visual communication messages (182). It categorises words according to their content, providing a condensed and broad description of the phenomenon of interest (100). When applied in research, this systematic and objective means of describing and quantifying phenomena enhances understanding of the data (100,183-185).

Similar to content analysis, thematic analysis also identifies patterns across qualitative data (186). However, whilst thematic analysis aims to interpret aspects of the research topic with minimal description to data sets (186), content analysis primarily aims to describe a

phenomenon conceptually (100,187). As my focus was on describing data with a relatively low level of interpretation, content analysis was the most suitable method. This method of analysis follows three phases: preparation, organisation, and reporting (100).

In the preparation phase, I selected my unit of analysis: the observation protocol (my documentation, or descriptive field notes) of each class. Observation protocols and whole interviews were large enough to be considered as a whole and small enough to provide a context for developing the most suitable unit of analysis (173). I also read my field notes several times to immerse and familiarise myself with the data (188). For the organisation phase, I developed a deductive categorization matrix (Ramsden's framework and my question concerning teaching of health literacy) as aligned with my research question (100). I reviewed the content of all data and coded my field notes according to my categorization frame (100,189). Then, I analysed the meaning of each relevant phrase or action from teachers under each category, and codes emerged from this process. I applied the stability design (test-retest) (183), i.e., I categorised my data twice to increase the reliability of my study. Finally, for the reporting phase, I documented the analytical process and the results. I described the context, selection and characteristics of participants, data collection and process of analysis aiming to facilitate transferability.

3.3 Results

At School A, I observed three Year 12 Health classes taught by one teacher. The first two classes, on 19 June 2020, focused on gender stereotypes, expectations from families and society, and gender discrimination. In the last class, on 02 July 2020, the teacher discussed the following with students: sexual orientation and gender identity; how acceptance, or non-acceptance, from families and society can affect wellbeing and mental health; and what strategies a person can use to help a friend that is confused about their sexual identity/gender orientation or information around disclosure. At School B, I observed two Year 12 and two Year 13 Health classes, taught by two teachers (one teacher per year level). The Year 13 class on 18 June 2020 was about infectious and non-communicable diseases around the world and the impact of socioeconomic determinants of health. On 25 June 2020, the teacher helped students prepare for their NCEA exam in which they had to explain how poverty relates to social and economic determinants of health and how these factors impact the life expectancy of groups within and/or across nations. The Year 12 students were, in both days, working in

groups on their individual internal NCEA assessment about proposing an action to promote health.

Each phrase or description under a category were linked to at least one code. Most related to more than one code. Some codes repeated across categories. I completed the categorization matrix as guided by Ramsden's framework (177) and provided sufficient detail to allow for a clear understanding of how I carried out the qualitative analysis. Full details are shown in Appendix XIV. Table 3.1 presents all the emergent codes that could be aligned with Ramsden's categories. Each of these categories and associated codes will now be described in more detail.

Table 3.1 Codes for each category

Category	Codes
Interest and Explanation	Active learning, critical thinking, guidance, multimedia, real-life examples, statistics, student voice, supportive environment, and topics relevant to students.
Concern and Respect for Students and Student Learning	Active learning, choices, classroom setting, critical thinking, guidance, responsibility, student voice, and teacher availability.
Clear Goals and Intellectual Challenge	Critical thinking, description, guidance, instruction, revision, and student voice.
Appropriate Assessment and Feedback	Individualised feedback, on-the-spot feedback, questions to the group, and writing tasks.
Independence, Control, and Engagement	Choices and student voice.
Learning from students	Reward, student voice, and technology.

3.3.1.1 Interest and Explanation

This category captured strategies that the observed teachers used to make the health class topics genuinely interesting to students. The teachers implemented '*active learning*' methods and stimulated '*critical thinking*'. They explored '*topics relevant to students*' such as gender biases, sexuality orientation, infectious and non-communicable diseases, socioeconomic determinants of health, and health promotion. The teachers also used '*multimedia*', '*real-life examples*' and '*statistics*' to illustrate the class topics, for example by showing short videos, clips from

sitcoms, and statistics about diseases and health disparities across and within countries. Teachers provided '*guidance*' to students by directing their reflections on these class materials to facilitate engaging discussions. This also involved the '*student voice*' as students were invited to share their opinions and perspectives and this required a '*supportive environment*' that made them feel comfortable and safe to do so.

The following examples of observation notes (from lesson 1) illustrate this category:

*"The teacher played an episode of a sitcom (*Brooklyn Nine-Nine*) to introduce the class topic: sexual orientation/identity and family's acceptance."* – coded as '*multimedia*', '*real-life examples*', and '*topics relevant to students'.*

"The teacher led a discussion with students about the differences between the reactions and posture of the parents and friends of the character." – coded as '*active learning*', '*critical thinking*', '*guidance*', '*student voice*', and '*supportive environment*'.

3.3.1.2 Concern and Respect for Students and Student Learning

This category outlined strategies that the observed teachers used to help students develop their autonomy. The teachers used "*active learning*" methods, which propelled students to actively engage in the learning process rather than passively receiving information. Inviting the '*student voice*' throughout the class and stimulating '*critical thinking*' also contributed to encouraging students to exert their autonomy. Setting up a '*classroom setting*' that promotes group interaction (by sitting in groups rather than individually, in rows, facing the teacher) and allows '*choices*' of where and with whom to sit also gave students the opportunity to make their own decisions. The teachers also gave '*guidance*' to students regarding the tasks that should be completed and which aspects to discuss, demonstrating '*teacher availability*' to help them but reinforcing the '*responsibility*' of students in the learning process.

The following examples of observation notes (from lesson 2) demonstrate this category:

"The teacher reminded students that the task was due the following Friday at 12 pm. She told them that they had the whole week to work on it, and if they had any questions, she was there to help them." – coded as '*responsibility*' and '*teacher availability*'.

"*The teacher encouraged students to sit together in the group of their choice but respected that a student wanted to work on their own."* – coded as '*student voice*' and '*choices*'.

3.3.1.3 Clear Goals and Intellectual Challenge

This category revealed strategies that the observed teachers used to ensure teaching and learning goals and methods were explicit and aligned with curriculum standards. The teachers gave clear '*description*' about the topics of each class and each activity, which concepts they were expected to master, and how they could use this knowledge. They conducted '*revision*' of activities and concepts from previous classes. They also gave clear '*instruction*' regarding what students were supposed to do in each class activity and provided '*guidance*' for students about how to succeed in the learning process. Moreover, to engage students in these class challenges (such as completing activities and learning new concepts), the teachers created space for the '*student voice*' and stimulated '*critical thinking*' processes.

The following examples of observation notes (from lesson 3) support this category:

"*The teacher explained in the beginning of the class that they would continue the work from the previous class and asked students to recap on what they had done in the previous class."* – coded as '*description*' and '*revision*'.

"*The teacher guided students in the direction expected, e.g.,: 'this is the issue you need to address and come up with intrapersonal strategies.' / 'What I'd like you to do is personalize the strategies to Sam. What could Sam do to change his situation?' / 'You need to address something you think is injustice'."*– coded as '*critical thinking*', '*guidance*', '*instruction*', and '*student voice*'.

3.3.1.4 Appropriate Assessment and Feedback

This category identified strategies that the observed teachers used to collect evidence of students' understanding. The teachers put '*questions to the group*', encouraging the whole class to participate in discussions. By listening to students' answers and comments, the teachers could infer their learning progress. Furthermore, the teachers also provided '*on-the-spot feedback*' during these discussions, clarifying concepts, and ensuring students were in the proposed learning direction. In addition, the teachers set '*writing tasks*' for students to complete, including NCEA internal assessments. While students were working, the teachers walked around the classroom and clarified questions through "*individualised feedback*" for each student or group of students. The teachers were available to read students' work to provide

further "*individualised feedback*", outlining how students could enhance their work and understanding.

The following examples of observation notes (from lesson 4) illustrate this category:

"*The teacher instructed students to write about economic and social determinants of health that relate to a disease of their choice. The teacher asked them to present statistics to support their theory, and hand in the text at the end of the class."* – coded as '*writing tasks*'.

"*The teacher went around the class during the group activity, answering specific questions from each group. For example, the teacher explained the differences between social and economic determinants of health to a group of students that had not understood the difference between these concepts. As other groups also had similar questions, the teacher explained this again to each group and the whole class."* – coded as '*individualised feedback*'.

3.3.1.5 Independence, Control, and Engagement

This category described strategies that the observed teachers used to give students a sense of control over learning. The first strategy was including the '*student voice*' in the classes. The teachers invited students to share their perspectives in class discussion and asked whether they agreed with some aspects of the class resources. The teachers also led brainstorm activities, stimulating students to describe what aspects of a topic they considered relevant. The second strategy was giving students opportunities to make '*choices*'. The teachers allowed students to discuss the topics of their choice (within a range of topics, e.g., infectious diseases, a plan to promote health) and decide how much they would delve into them in a deeper manner. The teachers respected students' choices in terms of the level of achievement to pursue in line with the required NCEA assessments and exams (achieved, merit, or excellence). Furthermore, the teachers gave options for students to choose between activities and whether to work in groups or individually.

The following examples of observation notes (from lessons 5 and 7) demonstrate this category:

"*The teacher encouraged students to come up with their own ideas on how to promote health in the school and chose which idea to follow."* – coded as '*choices'*.

"*The teacher encouraged students to work in their assignments but let them decide if the work was completed to their standards (in this case they had free time) or if they should continue working in the assignment."* – coded as '*student voice*'.

3.3.1.6 Learning from students

The last category outlined strategies that the observed teachers used to keep the learning environment open to change. The teachers listened to the '*student voice*' regarding whether students wanted more time to complete an activity, change the physical space of the classroom (e.g., open a window), or modify aspects of classroom activities (e.g., work individually even though the class instruction was to work in groups). The teachers also embraced "*technology*" in classes, allowing students to use their phones during class activities to take photos of the board or to do Internet research. One teacher finished the semester with a class movie and highlighted this as a "*reward*" for their arduous work during the school term.

The following examples of observation notes (from lesson 6) support this category:

"*The teacher allowed students to use their smartphones."* – coded as '*technology'*.

"*The teacher asked if students wanted her to read the text. Then, the teacher asked students to let her know when they had finished an activity, so that she could read it when they were ready. The teacher also asked students if she could erase some information from the whiteboard"* – coded as '*student voice'*.

3.4 Discussion

3.4.1 Inferences Developed from the Observational Notes as Aligned with Ramsden's Categories

In this study, I conducted a qualitative content analysis of descriptive observational notes to identify strategies health teachers in New Zealand high schools use in senior classes. I conducted a deductive analytical process using Ramsden's six principles of effective teaching in higher education (177). Kyngäs' study cited in Elo and Kyngäs (100) demonstrated, through content analysis, that the concept of 'illness' had the same meaning for different populations, i.e., adolescents with rheumatoid arthritis or diabetes. Similarly, the present study demonstrates the utility of Ramsden's principles of effective teaching in senior high school education. This framework enabled detailed inferences to be made regarding the observational notes made. The

subsequent discourse will use Ramsden's categories as subheadings to structure the ensuing discussion.

3.4.1.1 Interest and Explanation

This study indicates that, to keep students interested and engaged in their learning, the observed teachers used '*active learning*' methods and stimulated '*critical thinking*' processes. Actively involving students in the learning process and promoting critical thinking skills can increase students' interest compared to traditional lectures and make learning more meaningful for them (190,191). Using virtual media can also ensure the learning experience of high school students is more interesting and fun, which in turn contributes to the development of critical thinking skills (192,193). In the present study, the observed teachers used '*multimedia*', '*stories*', and '*statistics*' in '*active learning*' activities to make the learning experience more appealing to students.

The observed teachers also established a comfortable and non-judgmental classroom, building a '*supportive environment*'. They invited students to share their opinions and perspectives, giving space to the '*student voice*' throughout the classes. Furthermore, they provided '*guidance*' to students, by directing students' reflections in whole-class discussions. These strategies contribute to positive teacher–student interactions, which can motivate high school students to dedicate themselves and to appreciate the school subject (191,194). Finally, exploring '*topics relevant to students*', i.e., topics that are meaningful to students' lives and communities, also further motivates students to engage in learning and improves their academic performance (195-197). Moreover, discussing '*topics relevant to students*' can bring a sense of belonging to students and help them develop independent thinking and critical thinking skills (198). Health literacy interventions and programmes should include these strategies to promote student engagement through interesting (from students' perspectives) topics and activities and captivating explanations.

3.4.1.2 Concern and Respect for Students and Student Learning

Students invest in their education when they recognise how it serves their purposes, when lessons reflect their own needs and values, and when they feel teachers are respectfully learning from them (179). Teaching should be based on a horizontal student-teacher relationship that, through dialogic principles, promotes freedom and autonomy of students (178). Beyond

increasing engagement and student achievement (199,200), fostering students' autonomy represents a key outcome of strong health literacy skills, that contributes towards positive health behaviours and outcomes, engaged citizenship, and ethical responsibility (4,8).

The observed teachers used '*active learning*' methods to help students develop their autonomy. Further, by encouraging the '*student voice*', providing '*guidance*', and stimulating '*critical thinking*' skills, teachers can help students become independent thinkers (201). It is critical to foster student autonomy in the learning process as the perception of autonomy support is positively associated with problem solving and critical thinking skills (202). Engaging in '*active learning*' (such as problem-based learning) can increase student autonomy and, at the same time, perception of support from the teacher (203). In the present study, teachers also provided support to students by guiding activities and reflections, besides showing '*teacher availability*' to help them throughout the class. Nevertheless, they reminded students in several moments that the students had to take '*responsibility*' for completing tasks and managing their time.

Another crucial aspect to support the autonomy of students is giving them '*choices*' in class, after all, choosing how to act is the core feature of autonomy (204). Having the opportunity to make choices leads high school students to perceive a greater autonomy support than having no options in class (205). The teachers observed in the present study allowed students to choose with whom they would work. Furthermore, the teachers proposed a '*classroom setting*' which encouraged students to sit in groups of their choice. This setting promotes student collaboration and participation in the classroom, in contrast with sitting individually, in rows, facing the teacher. Sitting in groups can be more effective as high school students may prefer to interact with peers than working on their own (206).

3.4.1.3 Clear Goals and Intellectual Challenge

Students often rely on learning goals to complete their homework, to prepare for exams, and to review the course material (207). Thus, informing students about learning goals may facilitate learning. However, it can be difficult for teachers to address crosscutting concepts of lesson plans, and to help students make these connections (208). The observed teachers in the present study used '*description*', '*instruction*', '*revision*', and '*guidance*' to make teaching and learning goals and methods aligned and explicit. They also used the '*student voice*' to identify previous knowledge of the students, which can negatively impact on students' understanding

of core concepts (208). Once the teachers were aware of students' perspectives, they could then stimulate the '*critical thinking*' process to engage students in intellectually challenging tasks, thus promoting one of the main components of health literacy (4).

3.4.1.4 Appropriate Assessment and Feedback

High school students appreciate receiving feedback that is easy to understand and that improves their learning (209). '*Individualised feedback*', which was a strategy used by the observed teachers in this study when assessing students' work on '*writing tasks*', helps students understand their scores and take charge of their learning (207). However, despite considering this type of feedback beneficial to students, high school teachers may not provide in-depth feedback to all students in all tasks due to workload constraints (210). The observed teachers in this study used other alternative strategies that could ensure students are going in the right direction of the intended learning when teachers lack time to provide '*individualised feedback*'. These included asking '*questions to the group*' to check for students' understanding throughout the class and giving '*on-the-spot feedback*' to clarify questions and redirect students' reflections.

3.4.1.5 Independence, Control, and Engagement

To empower adolescents, schools must provide learning opportunities for them to identify problems of their interest and topics that bring a sense of connection with society (160). The teachers observed in this study proposed activities in which students could choose a topic of their choice, within a range of topics, to give students a sense of control over how to learn a topic and which aspects to focus on. They also allowed students to decide whether their work was finished or if they wanted to aim for higher quality, and which level of achievement to pursue in NCEA assessments and exams. Giving opportunities to make '*choices*' in class is important not only to allow students to make decisions and exert their autonomy (as discussed above), but also to increase students' interest, engagement, learning, and positive state-like affect (e.g., pride, excitement, and satisfaction) (211,212). Another strategy used by the observed teachers was to invite the '*student voice*' into the class, giving space for students to share their opinions and ideas. This strategy also increases engagement, achievement, motivation, and sense of empowerment (213).

3.4.1.6 Learning from Students

According to Ramsden (177), the first five principles do not adequately represent all the criteria of good teaching. He considers 'learning from students' as the most important message of his model, i.e., a teacher should be open to change and use knowledge about students to select and deploy teaching strategies (177). In the present study, the observed teachers embraced the '*student voice*' by allowing students to voice their preferences, which were then incorporated in class. One teacher also gave students a class movie as '*reward*' for their dedication during the school term, reinforcing students for their positive class performance and engagement. In addition, teachers allowed students to use their cell phones during classes to take photos and do Internet research. This reflects how teachers adapted the learning environment (which would usually not allow cell phones) to the lifestyle of students and thus increased levels of reciprocity and engagement. In Aotearoa New Zealand, it has been estimated that a third of adolescents usually spend four or more hours on the Internet per day (214). Thus, including '*technology*' in class also reflects a change in the learning environment based on the preferences of students.

3.4.2 Strengths and Limitations

Using observation as a research tool had several strengths. This method allowed me to gain information directly from classrooms in which health classes are taught, allowing a better understanding of this setting (164,174). Furthermore, my categories were conceptually and empirically grounded (177). This increased the validity and credibility of this research (173). I reported my analysis in enough detail to allow for replication. However, as a qualitive approach, the findings can only be valid to the classes and times in which the observations were made, indicating further research would be necessary to further validate the claims being made in the study. Moreover, I observed classes during the end of one school term. Lessons vary over the course of the school year. Ideally, I would observe teachers multiple times at different points during the school year (215). Nevertheless, the literature generally recommends four classroom observations to obtain a reliable estimate of teaching quality (215).

Despite not evaluating teaching quality, I observed seven classes to gain insights on how health topics are taught and further inform the next study in this thesis focused on interviewing key informants. This also allowed me to gain insight into how health literacy could be developed in high school students, which is investigated more formally and discussed in more detail in the next chapter. Furthermore, the findings of this study align with the pedagogical practices

that Dixon, Abel, and Burrows (216) revealed were applied in senior health classes in Aotearoa New Zealand. They interviewed adults who had taken health classes in senior high school (between 0 and 11 years prior to the study). Participants reported these classes were based on student-centred approaches, provided a non-judgmental supportive environment, and had an energetic, fun tone (216). Thus, the pedagogical strategies employed in health classes, identified in the present study through Ramsden's six principles of effective teaching (177), were also valued by students, who kept good memories of their health classes' experiences years after completing high school (216).

3.4.3 Implications for Practice

This study outlined strategies that could be useful for school health teachers aiming to engage in high-quality teaching, which will ultimately develop their health literacy. These strategies relate to helping students build a genuine interest in the subject, developing their autonomy, understanding teaching and learning goals and how they relate to teaching methods. Furthermore, the strategies provide examples of how to collect evidence of students' understanding, give them a sense of control over learning, and show that the learning environment is open to change. Paakkari and George (217) agree that, to promote health literacy competencies, schools must take the student-centred approach proposed by Ramsden (177) and Freire (178), which characterised the senior health classes that I observed. This approach was also reported and valued by New Zealand adults who took health classes in senior high school (216). Rather than the traditional model based on discipline and memorisation, that does not encourage questioning, schools need to provide conditions for students to exert their autonomy (217). This approach is vital to create conditions that promote learning of health literacy (4). The meta-cognitive skills of health literacy, i.e., critical thinking, self-awareness, and citizenship, enable lifelong learning and should be prioritised over theoretical and practical skills related to knowledge (217).

Critical thinking stimulates students to reflect on socio-political power dynamics (218) and question authority that imposes what a "good" health practice is (217). Only through a horizontal student-teacher relationship (178) can students understand that scientific knowledge is not fixed, but rather built based on how a specific group of people in a specific period interpret the natural world, with the available explanatory models and technological metaphors of their time (219). This is why both Ramsden (177) and Freire (178) propose abandoning the passive, monologue, authoritative approach of education, which has also been criticised in the

New Zealand literature (216). With this traditional type of teaching, most students finish school as “scientific illiterates” that, although having memorised concepts and terms, are unable to use them in their daily reflections and to scientifically discourse with the world (220). Thus, through critical thinking students can take an attitude that re-examines, questions, challenges, and changes knowledge (221). This attitude also relates to self-awareness and citizenship, which encourage students to develop autonomy (222) to recognise what, how, and why they want to learn and participate in the world rather than being imposed values and practices by the authorities or peers (217).

The current global health literacy crisis (18) is not due to lack of information, nor to inability to access information (217). Wagner, as cited in Paakkari and George (217), explains that, to navigate the globalised and digitalised world, people must be able to compare, classify, and assess the quality and credibility of the abundant available health information. However, most people lack the skills that allow them to do so (18). Nevertheless, Paakkari and George (217) argue that the responsibility of health outcomes should not be placed solely on individuals because environmental factors, societal processes, and real-life contexts play a crucial role in the attitudes, motivation, and constraints that influence health behaviours. This positioning aligns with the socio-critical model of school health education in Aotearoa New Zealand that focuses on population health concepts, such as the influence of determinants of health, to build action competencies (223).

Health teachers around the country could consider employing the strategies presented in this study to support students in the development of health literacy skills, especially meta-cognitive skills (217). These strategies promote both the individuation function of health literacy, i.e., critical thinking, self-awareness (in terms of students’ values and preferences), and student voice (rather than passively accepting traditions), and its socialization function, i.e., participation, democracy, autonomy, and responsibility (55). These broader competencies allow students to address struggles that they (or someone in their communities) could be facing in the present moment instead of developing skills that they might need in the future, from a hypothetical perspective (217).

3.4.4 Implications for Research

Future studies should investigate how the senior high school health curriculum could further support the strategies identified in this study to create learning conditions for health literacy.

Dixon and Robertson (224) argue that the curriculum also needs to be examined to ensure it opposes a moralistic approach to health education that over-emphasises biological aspects aiming for individual behaviour change to avoid illness and disease. Moreover, with health education being combined with physical education as a learning area in Aotearoa New Zealand, future research should identify where these two subjects agree and differ in terms of a social-critical approach, and what are the implications for the national curriculum (224). Any modifications in the curriculum or pedagogical practices should inform initial teacher training and in-service professional learning (224).

Another aspect to consider is that health literacy interrelates with scientific literacy (225,226). Despite health literacy having independent components such as attitudes, values, mindset, and skills applied specifically to health, and capabilities related to contemporary health issues, it is largely based on scientific literacy (226). Thus, future research should analyse how the New Zealand curriculum could enhance the link between science, health, and physical education to enhance the health literacy and scientific literacy of senior high school students. In addition, it is also important to analyse whether the junior high school health practices align with those of the senior level, and how to encourage more students (specifically male students) to choose to take health classes in senior high school (216).

3.5 Conclusion

This study indicated that the strategies teachers used in the observed health classes aligned with principles of effective teaching and education for health literacy. The first aspect is that teachers described class goals and activities, providing clear instruction and guidance. Second, they established an interactive classroom setting with a supportive environment, asking questions to the group, and demonstrating availability to help students, through individualised feedback, on-the-spot feedback, or revising topics. Third, the classes explored active learning, multimedia, statistics, stories, technology, and topics relevant to students. Fourth, the teachers gave students choices and promoted critical thinking, the student voice, and responsibility. In addition, the teachers proposed writing tasks and gave reward to students.

4 Study 3: Health Classes in Aotearoa New Zealand: Health Teachers' and Senior High School Students' Perspectives

"I think when a teacher is supportive, and gives you a lot of feedback that also, you know, can put you on the right track, and you feel like you're... a good teacher wants you to succeed, too."
Lily, 17 years old, Year 13.

4.1 Introduction

The previous chapter (Chapter 3) identified, through a classroom observation protocol, strategies that health teachers of two New Zealand secondary schools use in senior classes. The present chapter expands the former by listening to the experiences voiced by teachers and students in reference to the intended and perceived teaching and learning strategies used in senior health high school classes. It was proposed that exploring the perspectives and narratives about the way in which health is taught in senior high schools would provide an informative further lens on how teachers plan and teach health classes and what increases student engagement in the learning process. One of the assumptions underpinning this teaching process is the implicit goal of providing students with competent levels of health literacy.

Interviews can reveal behaviours, feelings, interpretations, thoughts, intentions, and past experiences which cannot be directly observed. Researchers can only discover these things by asking people questions (176). Interviewing teachers and students has been a commonly used research strategy to gain insights into their perception and process of teaching and learning. For example, interviews can reveal students' attitudes towards school subjects (227) and factors that demotivate their learning engagement (228). Therefore, it was envisaged that using interviews as a data collection method would augment the observation method used in the previous chapter. The input from key stakeholders further informs my thesis research in terms of how to optimise senior health classes to improve the health literacy of students.

As noted in the introduction chapter, senior high school students in Aotearoa New Zealand are taught health related subjects that inevitably impact their development of health literacy. For example, all items in the NCEA learning matrix for health (Appendix XV), which describe key aspects to be learned (and assessed) in this subject, relate to health literacy (70). The underlying concepts of the health curriculum and the NCEA emphasis on population health concepts, which students are expected to analyse through a socio-critical lens, make health learning in Aotearoa New Zealand promising in terms of promoting critical health literacy (68).

Nonetheless, within the suite of topics and concepts being taught, the term health literacy is absent. Furthermore, there is a lack of local and international research about the effects of health education at the high school level (68,172). Thus, the present study aimed to investigate how health is taught in senior high schools, and how students perceive health classes and their health literacy skills.

4.1.1 Research Question

The following question guided this research:

- What are the experiences of senior high school health teachers in Aotearoa New Zealand and their students regarding how health is taught, and what are students' perceptions of their health literacy?

To answer this question, I investigate four aspects of the overarching question:

1. What strategies do health teachers in Aotearoa New Zealand apply in senior classes?
2. How do health teachers in Aotearoa New Zealand determine the curriculum for senior classes?
3. How do senior high school students in Aotearoa New Zealand appraise health classes in terms of interest, teaching, and learning?
4. How do senior high school students in Aotearoa New Zealand enrolled in health classes feel about their abilities to find, understand, assess, and use health information?

4.2 Methods

4.2.1 Participants and Sampling

Congruent with Study 2, I conducted this study in Tāmaki Makaurau/Auckland, Aotearoa New Zealand, for practical reasons, as I was based in this city. I used purposive sampling aiming for information-rich cases that would reveal key aspects to address the purpose of the study (176). This method assumes that a sample with specific characteristics provides the best material for the investigator to discover, understand, and gain insight (164). The selection criteria for this study were: health teachers working in a New Zealand high school, in charge of at least one Year 12 or Year 13 class; and senior high school students aged over 16 years (in Year 12 or Year 13) taking health classes with the interviewed teachers. Health teachers that were not

assigned to senior classes or only taught Year 11 were excluded. All participants consented to be interviewed and audio recorded. Teachers and students were allocated pseudonyms and students were also given the option to choose a pseudonym to ensure confidentiality. I assured participants and school principals that participants' and schools' identities would be kept strictly confidential. Thus, this study reports no demographic information that could personally identify participants or schools.

4.2.2 Procedure

The two schools that participated in Study 2 also agreed to participate in Study 3. School principals and teachers received a participant information sheet (Appendix X and XI) and provided written informed consent to participate in this study (Appendix XII and XIII). Ethical approval was obtained from the University of Auckland Human Participants Ethics Committee (reference number 024388). The interviews started in August 2020, at the beginning of school term 3. However, at that time, COVID-19 lockdowns were in place, thus, I was unable to use a face-to-face approach. Consequently, I emailed teachers and scheduled online interviews to be undertaken through the cloud-based videoconferencing software Zoom (229). In-school advocates enabled me to contact students (via email) who were interested in participating in this study. I sent these students the participant information sheet (Appendix XVI) and directly scheduled the online interviews with them. They provided written consent (Appendix XVII).

Due to the COVID-19 crisis persisting and stress being placed on students and staff, after a couple of interviews, it became difficult to maintain communication with the initially contacted schools. Therefore, I sought out new schools more receptive to engaging in this research. In May of 2021 (beginning of school term 2), I invited another high school in Tāmaki Makaurau/Auckland to participate in this study. The school principal of this school provided informed consent and introduced me to the Head of Health and Physical Education. At that time, New Zealand was in COVID Alert Level 1, which meant I was able to visit the school and use my original face-to-face strategy. In June of 2021, I recruited health teachers during class breaks. After they provided written consent, the interviews took place at the school in a vacant office space. The teachers at this new school also allowed me to go into their class and directly invite students to participate in this study. I scheduled an interview time with the students who were interested in the study. They provided written consent before the interview started.

4.2.3 Data Collection

This involved semi-structured interviews to yield relevant descriptive data, taking a neutral stance to minimize bias and aiming for quality data and valid findings (230,231). Thus, this qualitative study adopted a neo-positivist approach to interviews (231). I prepared an interview schedule for students (Appendix XVIII) and another for teachers (Appendix XIX). The questions explored students' and teachers' in-depth views and experiences in reference to health classes. Although the interview guide required specific data, the semi-structured questions allowed for flexibility so that each participant could individualise their responses.

The interview schedules started with questions related to demography. For students, I asked what their age was, level of study, ethnicity, and if they would like to choose a pseudonym. For teachers, I asked which year they were currently teaching (to confirm they were teaching at the senior level). The next part of the interviews included questions regarding experiences (past and present behaviours, actions, and activities) and values (beliefs, opinions, and thoughts) (176). I used both interpretive and hypothetical questions. Strauss, Schatzman, Bucher and Sabshin explain, as cited in Merriam and Tisdell (164), that the former type of question allows researchers to check understandings and enables interviewees the opportunity to reveal more information and opinions, whereas the latter asks participants what they would do in a particular situation. The previous chapter (Study 2) outlined the usefulness of Ramsden's (1992) six principles of effective teaching in my observations of health classes. Therefore, I used this framework to develop the interview schedule (177). This enabled me to identify the strategies that teachers in Aotearoa New Zealand consider relevant to promote the learning of health topics at the senior level (aspect 1 of the research question) and how senior high school students in Aotearoa New Zealand appraise health classes (aspect 3 of the research question).

Based on the first principle of effective teaching proposed by Ramsden (177) (interest and explanation), I asked teachers about the strategies they used to engage students in health topics, and to assess students' previous knowledge. For students, I asked what made them interested in learning about health topics, what was relevant for them, and how well they understood what they were taught. Relating to the second principle of effective teaching (concerns and respect for students and student learning), I asked teachers about the strategies they used to connect with students and encourage learning. For students, I asked how easy was it for them to learn health topics, and to identify any difficulties they might have. Addressing the third principle

(appropriate assessment and feedback), I asked teachers about the strategies they used to create assessments and how they gave feedback to students. For students, I asked their opinion about the quality of the feedback they received from teachers, whether they felt it affected their motivation, and what type of feedback they liked. Based on the fourth principle (clear goals and intellectual challenge), I asked teachers about the strategies they used to communicate intended learning outcomes to students and to align learning goals with teaching methods. For students, I asked how they perceived their learning and understanding in class, their teachers' expectations, and whether what they were expected to know was relevant for them. Relating to the fifth principle (independence, control, and active engagement), I asked teachers about how they managed interpersonal differences and the uniqueness of individual learners. I also asked teachers what strategies they used to foster a sense of student control over learning and interest in the subject. For students, I asked how much control they had over learning, and if anything could be done differently to increase their interest. Based on the last principle *(*learning from students), I asked teachers about strategies they used to show students that their teaching was open to change, to identify the effects of instruction on learning, and to modify the instruction based on students' needs. For students, I asked what changes in the classroom would make learning better.

In addition to these questions that were aligned with Ramsden's framework (177), I added a few more questions. The scoping review chapter (Study 1) demonstrated that health literacy has been embedded in classroom curricular activities. Two studies from Canada included in the review reported experiences with respect to health literacy in the school health curriculum at the senior high school level (48,102). Thus, I reasoned that a series of questions in reference to curriculum planning would be informative. I, therefore, asked teachers how they constructed the curriculum and integrated different health topics, which strategies they used to teach these topics, and what influenced their teaching methodology choices.

The scoping review also indicated that the measurement of health literacy of adolescents can be problematic, especially when validated assessment tools are not often reported in the literature. Research on the health literacy of children and adolescents is limited compared to adults (11,19). Thus, I added some questions that could provide insights into the health literacy skills of students. I assumed they would not understand the term 'health literacy', as it is not included in the New Zealand health curriculum, thus my questions captured aspects of health literacy skills. I asked them about their ability to find, understand and use health information, and whether they found these skills helpful when making health-related decisions. I inquired

about how they judged the reliability of a health practice claim, considering this has been identified as a deficit in high school students in Australia (73). Further, I inquired where they had learned these skills, to investigate whether they have been learning these skills in health classes. Finally, I asked students to give an example of a health issue, propose a plan to address it, and describe a plan to improve their own wellbeing. All these questions posed to students related to health literacy and the health matrix of the NCEA (70) (Appendix XV).

Before each interview, I reminded teachers and students that participation was voluntary and confidential, the interview was going to be audio recorded, and at any moment they could withdraw participation or decline to answer. As per my role in creating a positive interaction, I kept a respectful, sensitive, non-judgmental, and nonthreatening stance, being neutral towards the content being heard but caring about the person in front of me and their willingness to share their experiences and opinions (164,176). The online interviews used the same question format incorporated in face-to-face interviews. For online interviews, I used the Zoom software (229) so that the participant and I could hear and see each other synchronously on a videoconference. Having visual cues helped me build rapport with participants. Using technology overcame the constraints of lockdown. Recruitment of participants was ongoing until the data reached saturation i.e., when data and emerging findings were repetitive, with no new information emerging from new interviews (164).

4.2.4 Data analysis

Although the interview guide followed a previously established framework, an inductive process (data-driven) was used to capture the richness of the interview data. I used the software Otter.ai (232) to transform the audio files in transcripts. This interview study is participant (student and teacher) led, with the narratives from participants being the most crucial elements. Thus, I used thematic analysis (233) to interpret what the participants said. Thematic analysis is an ongoing organic process, particularly useful to investigate under-researched areas and unknown views of participants (233). The emergent themes provided meaning and understanding with respect to participants' perspectives as framed by the research question (and its four aspects) of Study 3.

The thematic analysis process has six phases (233). First, I familiarised myself with the data by reading the transcripts. These were uploaded to the qualitative coding software NVivo Version 12 (101) and carefully read several times. Moving to the second phase, I created a set

of codes that represented meanings and patterns observed in the data. The codes were at the semantic level, i.e., they captured explicit meaning as stated by participants (233). I read the data again and collated codes with supporting data. Some excerpts could be aligned with more than one code, and those with the same meaning received the same code. New codes were added as needed. This phase allowed me to gain a deeper understanding of each individual code, and to adjust and revise codes. In the next phase, I grouped codes into themes that captured important aspects that could be used to answer the research questions. Different codes were analysed and sorted into potential overarching themes, and sub-themes within them. The fourth phase involved evaluating and revising themes. Collated extracts for each theme were checked for coherence. Then, I read the entire data set again to ensure each theme reflected evident meanings. Similar themes were merged, re-coding was done as necessary, and any theme not contributing to the overall analysis was removed. In the next phase, I defined and further refined the themes in terms of their essence as they related to the research questions. I read collated data extracts again, identified the scope and content of each theme, and added sub-themes. I ensured there was little overlap between themes. With a set of fully worked themes, I moved to the sixth and last step: the final analysis and write-up of the results within and across themes.

Students were also invited to state their ethnicity. Prioritisation was applied to allocate participants to a single ethnic group for analysis purposes. Rather than reflecting the ethnicity most present in a person's self-identity, this prioritisation ensures ethnic groups of policy importance or of small size remain present (234). For example, a hypothetical student who self-identified as Samoan and New Zealand European would have a prioritised ethnicity of Samoan. After establishing the prioritised ethnicity, students were grouped into six ethnic groups, based on the Ethnicity New Zealand Standard Classification 2005 V2. 1.0 (235): European, Māori, Pacific Peoples, Asian, Middle Eastern/Latin American/African, and Other Ethnicity. Thus, the hypothetical student with a prioritised ethnicity of Samoan, for example, would be classified into the Pacific Peoples group.

4.3 Results

Ten teachers and twenty students participated in the study. All three participating schools were co-educational (mixed-gender education). As shown in Table 4.1, most teachers were from high-decile schools. As shown in Table 4.2, most students were enrolled in Year 13, and European. All students were from high-decile schools and half of them were 17 years old. The

interviews lasted around 30-40 minutes with teachers, and 15-20 minutes with students. All names reported are pseudonyms. Gender was not determined.

Table 4.1 Characteristics of participants (teachers)

Characteristics	**n**	**%**
School Decile		
High (decile 10)	7	70
Low (decile 4)	3	30

Table 4.2 Characteristics of participants (students)

Characteristics	n	%
Age (years)		
16	5	25
17	10	50
18	5	25
Study level		
Year 12	5	25
Year 13	15	75
School Decile		
High (decile 10)	20	100
Prioritised ethnicity		
European	15	75
Māori	4	20
Middle Eastern/Latin American/African	1	5

4.3.1 Results of the Thematic Analysis of Interviews with Teachers

Three themes emerged from the interview data with teachers: building a relationship with students, teaching strategies used in classes, and developing the school health curriculum. This subsection describes each theme and their subthemes. Figure 4.1 presents the themes and subthemes from the teachers' interview dataset.

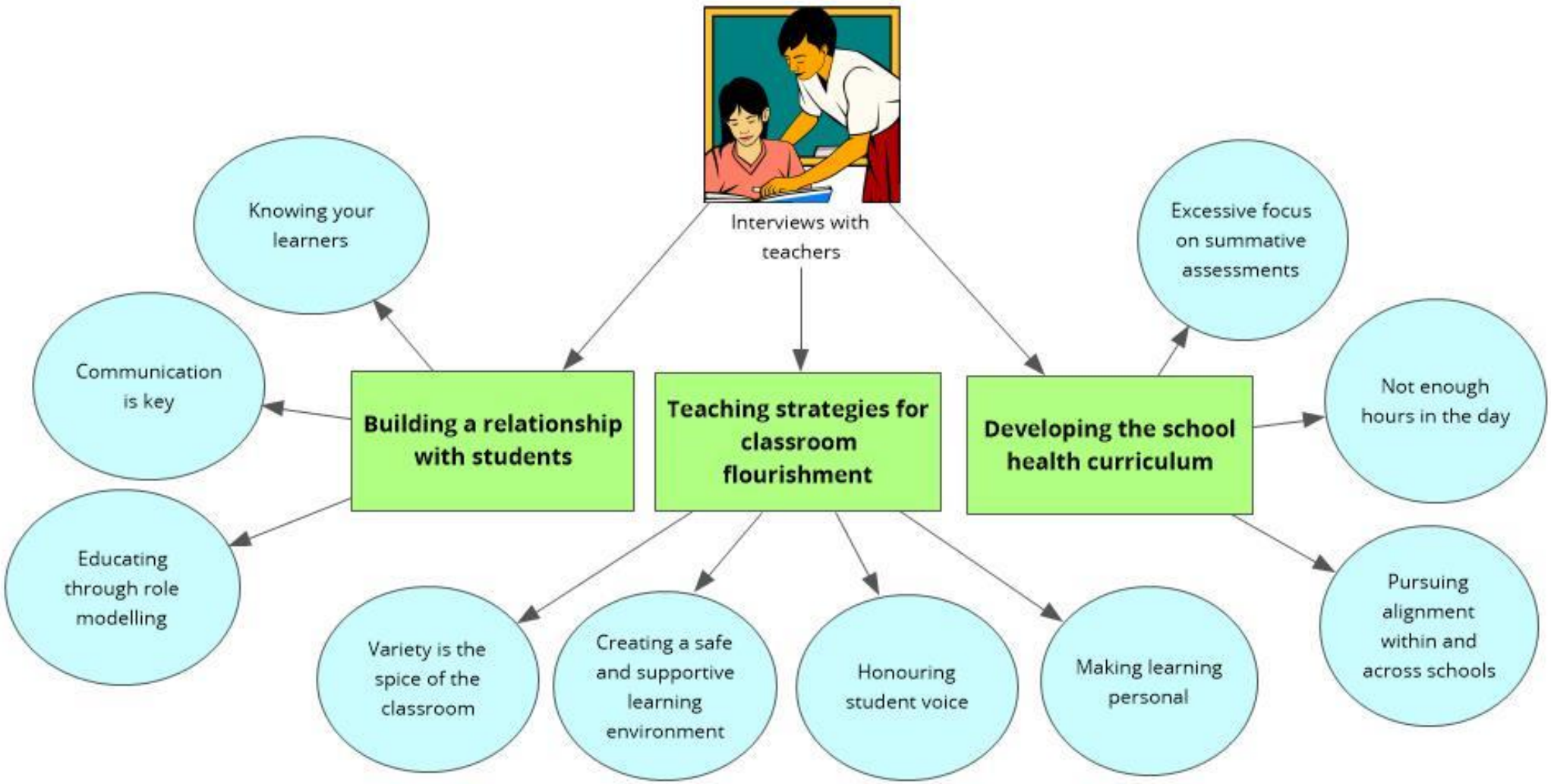


Figure 4.1 Themes (in green squares) and subthemes (in blue circles) that emerged from the teachers' interview dataset.
Figure created on Inspiration® 10 (83).

4.3.1.1 Theme 1: Building a Relationship with Students

Teachers considered building a relationship with students as the primary aspect of teaching. This theme englobes three subthemes: ‘knowing your learners’, ‘communication is key’, and ‘educating through role modelling’.

Knowing your learners

Teachers inferred that they spent time connecting with each student to find out about their personal life, interests, strengths and weakness, preferences and needs. This allowed them to tailor teaching methods and strategies, optimizing engagement and learning. It also helped them to know better how to help each student achieve their goals. Furthermore, they believed when students felt seen, valued, and cared about, they formed a strong bond with the teacher, and this relationship facilitated the learning process. The quotes below illustrate this theme:

“Having good relationships with learners, because once those relationships have been established, then I know what intrigues those students, and I know what they are interested in, and I know how to connect with them. And when you know how to connect with a student, then you know how to interest them in a topic.” Louise, decile 10 school

“I think there needs to be a lot of time spent on the basics and getting to know your kids, because that's how you're going to get them to get the best results that they can, by knowing them and helping them first before you do the learning.” Tui, decile 10 school

Communication is key

The second subtheme demonstrates how teachers valued communication with students. It not only allowed teachers to know their learners, but also revealed students’ stage in the learning process. It helped teachers identify previous knowledge and confirm if students were going in the right direction of learning. They also considered verbal feedback as a strategy to address student misconceptions or misunderstandings. Moreover, some interviewed teachers felt they needed to inform students about learning goals and expectations of each class or activity. The transcripts suggested that if some students did not understand a task or a concept, teachers considered they needed to improve communication and provide better explanations. The following quotes support this theme:

"And then I guess, another thing is just those conversations that are being had, and for me, I guess just having a conversation with them, I can kind of gauge what they're sort of, you know, taking in. And if they've, you know, used that knowledge in everyday life." Sarah, decile 10 school

"Usually, at the beginning, I will verbally tell them that this is what we're doing. And this is what needs to be done at the end of the lesson. And if throughout the lesson, if it doesn't look like they are going to achieve the outcome, I'll have to reset the class as well, and just remind them again, yeah reminding them a couple of times throughout the lesson." Anne, decile 10 school

Educating through role modelling

The last sub-theme relates to the role teachers acknowledged they had in setting an example to students. The first aspect revealed their sense of passion and enthusiasm for teaching and health topics. They believed this inspired and motivated students to learn. Secondly, the teachers suggested that they modelled lifelong learning by showing an investigative mind that does not always know answers but is constantly attempting to learn more. Lastly, teachers recognised they also needed to follow class and school's rules and expectations, rather than demanding these only from students. The quotes below demonstrate this sub-theme:

"So, I will be quite honest with my students, if I don't know the answer to a particular question, I will tell them that I don't know the answer. And I will also let them know that I'll investigate into that, or I'll see if I can find out more information. So, I'm modelling what it is to be a lifelong learner. (...) I try to embody what it looks like to be a lifelong learner and somebody that doesn't just accept information at face value but wants to dig deeper and learn more. And so that's what I try and show my students as a role model, so to speak." Louise, decile 10 school

"I think it's important that the students are aware that it's a two-way street. I don't think it's fair if I stand in front of them saying you need to do this, you need to do that, and I do completely the opposite in the class, you know. If I'm telling them rules and expectations, then I need to meet those myself." Tim, decile 10 school

4.3.1.2 Theme 2: Teaching Strategies for Flourishing

The former theme represents a teaching strategy that teachers used in class. However, as teachers regarded the aspect of building a relationship with students as the most important aspect of teaching, it became a theme by itself. This second theme complements the former one with other strategies that teachers used in class to facilitate learning and respect the uniqueness of each student. It englobes four subthemes: 'variety is the spice of the classroom', 'creating a safe and supportive learning environment', 'honouring student voice', and 'making learning personal'.

Variety is the spice of the classroom

Teachers recognised each student as an individual. They incorporated various pedagogical strategies in their classrooms to account for different learning abilities and preferences. They believed this helped students in their learning process – experiencing different activities rather than always having one type that they might not like. The following quotes support this sub-theme:

"I like to do a different range of interactive activities in my lesson and different ways for them to learn, as well. So, for those who benefit from writing, have the opportunity, but for those who benefit from having a discussion with a group, or watching a video, have that opportunity for that same outcome as well." Anne, decile 10 school

"I've noticed that some students will like to write things, some students will like to have a discussion, some students might be a bit more of a visual thing. So, I try and vary my teaching methods to try and connect with a variety of styles of learning that I may have in the classroom. (...) I'm prepared to present information in several different ways to thrive." David, decile 10 school

Creating a safe and supportive learning environment

This sub-theme reflects teachers' efforts in building a supportive learning environment. The first aspect involved establishing an inclusive classroom culture, which encouraged students to participate in class discussions. Disagreements were inevitable, but respect was pivotal. Teachers discussed with students how they all came from diverse backgrounds and had valuable insights to share. Regardless of whether students agreed or disagreed with different opinions, teachers instructed them to listen and respect each other, without judgements or

shaming. Teachers considered understanding this culture of a free space to ask questions and share opinions as a main objective and intended outcome of health classes. They felt they did not show judgement towards students. The second aspect involved teachers making sure students understood tasks and concepts, helping them with whatever they could need. They divided long tasks and assignments to support students in their learning process, always checking their work and providing feedback. They also felt that they made sure students knew they could count on them for anything. The quotes below exemplify this subtheme:

"I set up an environment where they're comfortable, and non-threatening. (...) no put downs, speak people's opinions, you can ask whatever question you want (...) don't judge people (...) respect other people within where they come from. It's okay to disagree. It's not a problem. But I go back to them no put downs and recalling or humiliating others. (...) they become a lot more comfortable sharing things with me. (...) I tell them that I'm not judging. (...) if they tell me things, I try and keep a straight face and not give away expressions, which could show a judgement. (...) Of course, inside you might be but on the outside you can't be. And that way, I think they open up to you a bit more in terms of the trust factor. (...) I think they find that motivating. (...) I think the students will come up with more authentic responses to things." David, decile 10 school

"Always trying to find out if students are understanding what you're talking and again, I often use a show of hands 'who gets what I'm talking about?', 'If you don't get on with your work, if you don't know what you're doing come and see me'." Mary, decile 10 school

Honouring the student voice

Teachers emphasised a student-centred approach to learning. They valued the voice of students, allowing them to participate in the decision-making process at the beginning, during, and after each school term. Teachers planned and reviewed their methods based on the input they got from students. They recognised students liked being able to choose, and that it motivated them to learn more and achieve. Teachers suggested that students had the chance to choose a focus to explore among a set of areas, and to suggest other areas of knowledge within health that interested them. When necessary and within reason (considering the need to cover specific topics), teachers adapted the content of classes to engage students and promote learning more optimally. Teachers also asked how students wanted to learn and be assessed. They believed it was important to know what worked best for students and adapt to their preferences. The

feedback from students further shaped their teaching and the assessment of the course in following years. The following quotes illustrate this subtheme:

"I guess just kind of giving that student voice on each of our topics. Kind of asking them at the start, what kind of areas they want to focus on. I mean, we do a set of areas that we need to focus on for the assessment, but then what other areas do they want to kind of delve into, we'll discuss. And then like, getting student voice on how they want to be assessed, or how they want to learn about it." Paula, decile 4 school

"...they can pick and choose what they want to do, the avenue they want to go down. (...) Although there is a framework, it's giving students the choice to be able to select something that they're interested in, within reason to still meet the criteria. They're a little bit more invested in what they're doing rather than 'oh the teacher's told me I have to look at acupuncture, I don't care about acupuncture'." Tui, 10 decile school

Making learning personal

The last subtheme reflects how teachers adapted their instruction and expectations to each student. They identified which students needed extra support by asking them individually how they were coping and if they experienced any struggles. This informed teachers regarding which students needed more one-on-one time support in class. They also enabled availability to help students during lunchtime or before the start of the school day. The other aspect was concerned with the way teachers encouraged students to identify their academic goals, giving feedback accordingly. Teachers believed this strategy motivated students to reach their goals and made it easier for them to attain their educational aspirations. The quotes below support this subtheme:

"So, making sure that the ones that need support have more one-on-one time, or the ones that can kind of do their own thing or understand easier, they kind of have a little bit more freedom to do what they need to do." Paula, decile 4 school

"I sort of ask them at the beginning of the year what they're aiming for, I'll be like 'Are you wanting to get a merit or an excellent endorsement?'. And then if they've got that idea at the beginning of the year of what they want, I think that helps motivate them. So, if I'm marking an assessment, and I say, okay, you're only working at an achieve level, here's the feedback. I'll give them feedback knowing that they aim for a merit. And so, they'll sort of see that, okay, this is what I need to do in order to get there." Sarah, decile 10 school

4.3.1.3 Theme 3: Developing the School Health Curriculum

Teachers valued the direction and guidance the New Zealand Curriculum provides. They appreciated how professionals who developed the curriculum considered their input and feedback in the review process. They followed the NZQA (236) framework and selected assessments among those offered by NCEA. The NZQA is a New Zealand Government Agency that ensures the assessment processes being applied in the New Zealand education system are credible and meet a recognised standard (236). Nevertheless, they acknowledged some obstacles, which could be classified according to the subthemes 'excessive focus on summative assessments' and 'not enough hours in the day'. The other subtheme, 'pursuing alignment within and across schools', reveals teachers' efforts to ensure consistency in health classes at the school and in school assessments around the country, and to embrace the student voice.

Excessive focus on summative assessments

Teachers appreciated the ability to choose, together with the school, what areas of the NZQA and NCEA frameworks fitted best and were more important for them. However, they recognised how the excessive focus on summative assessments negatively impacted the learning process. The transcripts revealed that the need to cover topics of assessments restricted the teaching of other important areas and topics. Moreover, they felt a lack of integration between assessments. The quotes below demonstrate this subtheme:

"I don't think the framework limits us too much. The framework is supposed to be broad, so that you can go in directions that are relevant to your school. Sometimes the biggest barrier is just assessment. Assessment takes up a good amount of time. And you end up falling into traps, such as teaching to the assessment, rather than teaching because this is what we want to learn." Louise, decile 10 school

"We just kind of move from one (topic) to the other. And definitely, like Year 12, it's assessment, assessment, assessment, basically... there's a little bit of freedom, but we just kind of once we've done the assessment, we just move on and start the next one. (...) we just kind of go through it's not really linked or integrated at all." Paula, decile 4 school

Not enough hours in the day

The second subtheme presents a barrier teachers faced: lack of time. The first aspect includes general life events that may have delayed students' completion of assessments. Teachers proposed that they needed to find a way to assist students without privileging them. They further suggested that time also limited the depth and range of their teaching, besides constraining relationship-building activities. Furthermore, teachers recognised the need to constantly upskill by using current data, gaining new knowledge, and understanding events around the world. This consumed a lot of time added to their workload. Teachers also commented on how students themselves dealt with time constraints, as they could not take too many classes. While some teachers believed the fact that health classes are not compulsory at the senior level hindered student engagement, others defended students' right to choose topics of their interest, as all areas of knowledge are important. The following quotes support this subtheme:

"We get that quite a lot (lack of time). So, in terms of like NCEA assessments they hand in, there's a date. (...) But there's always special cases. There are kids who have medical certificates, kids who have things going on in their lives, there are a whole lot of different things. But we've got the deadline that we have to make. (...) And it's really, really hard to balance this because it's not black and white. It's like a real grey area, like what do you do to make sure that this kid has success, but then not make it unfair for the other 20 kids in your class kind of thing. So that's something that I don't really know how to fix." Tui, decile 10 school

"You have to stay on top of the game and on top of what is new all of the time, it changes all the time. (...) And the work that goes into the planning, that's what potentially makes health education a little bit harder than other subject areas. Because the content changes so much and you have to constantly upskill, I tend to be time poor. I'm resource rich, I have many resources at my disposal, and I know what I'm doing. But I'm sometimes time poor to catch myself up on content that's new, and perhaps plan things that are new and to the latest advancements. So that's one of my barriers, is having the time to do that as effectively as I want to all the time." Louise, decile 10 school

Pursuing alignment within and across schools

Teachers put in place strategies to achieve consistency in health classes at their school. As more than one teacher managed senior classes, the health department had frequent meetings to establish learning outcomes, activities, resources, and assessments. They also shared experiences, reviewed learning units together, and occasionally observed each other's classes. An external moderation complemented the internal discussions that ensured all senior health teachers within a school cover the same topics. Teachers relied on NZQA to check the marking of students' assessments and joined the New Zealand Health Educators Association. They believed this organisation provided high-quality resources (which they adapted as needed), relevant updates, and a useful platform where they could communicate with other teachers around the country. Furthermore, teachers ensured the curriculum plans were also aligned with the feedback from students, being open to changes led by the student voice. They also constantly reflected on their teaching, aimed for improvement, and aligned future actions with their experience. The following quotes illustrate this subtheme:

"Keeping the programme consistent between the teachers is something that's really important. And we sit down, and we have discussions, right throughout the year, but particularly at the start of the assessment, this is what we want to achieve, this is the activities that we need to do. And the teachers do have freedom to teach the way that they want to teach, but we're teaching towards the same goal, and just making sure that there's consistency between what we've set on paper we're going to do, and then where we actually get to as well." Tui, 10 decile school

"We do our own internal moderation to make sure the teaching and learning and assessment that happens here is correct, simple check each other's work, and we send our work away, or the students work away and our marking away (to the NZQA body), to be moderated, to be checked, to make sure we're marking correctly." Louise, decile 10 school

4.3.2 Results of the Thematic Analysis of Interviews with Students

Three themes emerged from the interview data with students: 'developing life skills though health classes', 'thriving in a supportive learning environment', and 'developing health literacy skills though health classes but not quite there yet'. This subsection describes each theme and their subthemes. Figure 4.2 presents the themes and subthemes from the students' interview dataset.

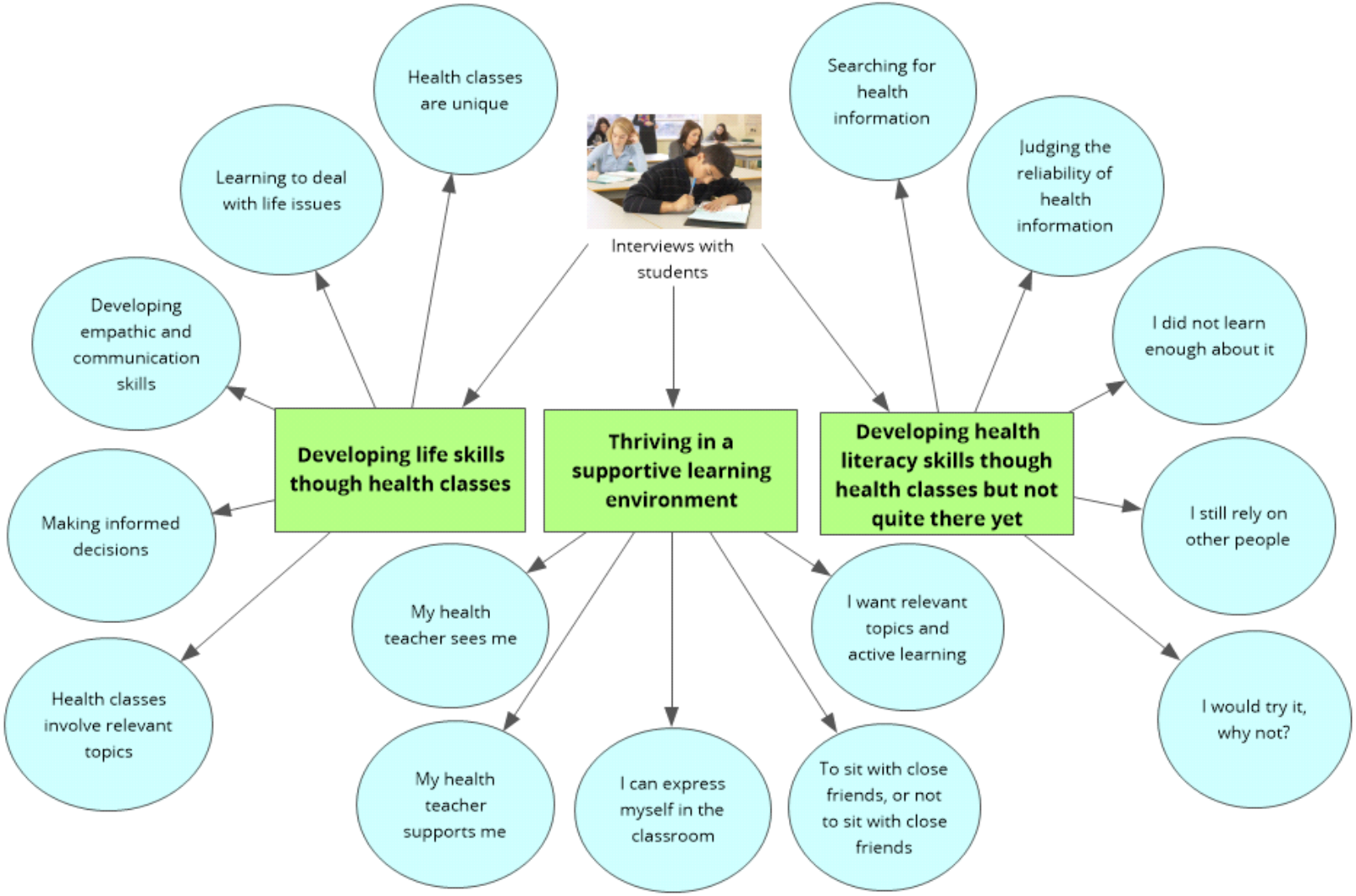


Figure 4.2 Themes (in green squares) and subthemes (in blue circles) that emerged from the students' interview dataset.
Figure created on Inspiration® 10 (83).

4.3.2.1 Theme 1: Developing Life Skills though Health Classes

Students considered they learned life lessons through health classes, i.e., valuable guidance for their present and future decisions, conduct, and relationships in life. This theme englobes five subthemes: ‘health classes are unique’, ‘learning to deal with life issues’, ‘developing empathic and communication skills’, ‘making informed decisions’ and ‘health classes involve relevant topics’.

Health classes are unique

The first subtheme reflects how students believed that health classes promoted unique skills and knowledge that are valuable in both the short and long-term. This made them stand out from other schoolmates who have not formally learned about health. Thus, they believed all students should take health classes. The quotes below illustrate this theme:

“*There are lots of very unique things that only Health will provide as a subject.”* Josh, 18 years old, Year 13, decile 10 school, European

“I use it in everyday life because it actually is quite helpful. And I'm surprised it's not more encouraged to do health. (…) I noticed now when I'm talking to people about certain subjects who don't do health (classes) they don't understand, like, a lot of people don't know a lot about sexuality, about drugs and alcohol. (…) We can try and help them by obviously, the skills that we’ve learned in health, which I think everyone should have, like health is a really good subject to like, take, and I believe everyone should take it.” Pauline, 17 years old, Year 13, decile 10 school, Māori

Learning to deal with life issues

The second subtheme demonstrates how students considered health classes helpful because it empowered them to deal with issues any person may face in life. They felt equipped with problem-solving skills to improve their wellbeing, and the wellbeing of relatives, friends, and people in general. This allowed them to propose plans to improve their wellbeing and address a health issue instead of feeling helpless, as indicated in the following quotes:

“And because a lot of people are facing different kind of illnesses that they need help with and learning about it sort of gives us an insight of how we can help in our own ways, which is really good.” Idris Elba, 17 years old, Year 13, decile 10 school, European

"I feel a lot of it (health class) is relevant because the whole point of it is telling us how to deal with everyday situations, situations we may be put in, and other things like that. (…) it's nice to know, like, that if I'm in a situation, I've learned the skills to deal with it." Olivia, 16 years old, Year 12, decile 10 school, NZ European

Developing empathy and communication skills

This sub-theme relates to the previous ones in terms of understanding the human nature, health, and society better. Students believed they could understand and interact with other people better after gaining the skills learned in health classes. By developing empathy, they felt that they had less preconceptions and wanted to make people's lives better. They asserted being more aware of local and global issues, improving the way they talked to people (more assertive and less aggressive), and contributing to conversations related to health. This gave them a perception of participating in society, as demonstrated in the quotes below:

"I've learned how to talk to people more assertively instead of passive aggressive like I normally do. And it kind of made me have more understanding for the people. (…) I can actually bring facts in. (…) And like, it gives me something to talk about. Like, it almost makes me able to contribute to adult conversations, because I actually know information on it." Olivia, 16 years old, Year 12, decile 10 school, European

"… (health class) teaches you like how to look at people and understand, try and understand how they're feeling. Yeah, because I don't know how they've done it. But I do believe that health class has really helped me understand other people and their situations. (…) (health) gives you the tools to navigate yourself through like life, and stuff. And it gives you a way of feeling empathetic towards others, which is like a really good skill to have." Pauline, 17 years old, Year 13, decile 10 school, Māori

Making informed decisions

Students considered that health classes provided information that helped them make positive health choices. Some students mentioned understanding more about healthy lifestyles, life values, and the connections between various aspects of wellbeing. Others emphasized the gained ability to deal with peer pressure, especially in parties where teenagers can be influenced to consume alcohol and drugs. The following quotes support this subtheme:

"Because if you're educated on the pros and cons of something, you're going to be able to make a more reasonable decision, you know, and act more responsibly, once you've known the consequences. Whereas if you hadn't been aware of what the implications of drugs or alcohol, or anything like that, had then you may just not be sure. And you could just take it. So definitely having that knowledge has helped me make better decisions." Lily, 17 years old, Year 13, decile 10 school, European

"I feel like I'm at an age where I could be pressured by others into doing stuff I don't wanna do. And so yeah learning about health topics I'm able to be aware and make my own decisions and choices. (...) if someone comes up and starts like pressuring me to do something, I know I have the right to say no, and I can just you know, control my own situations. If I go to like a party or something, I know that I won't be pressured into doing things." Mary, 17 years old, Year 13, decile 10 school, European

One student (X, 18 years old, Year 13, decile 10 school, European) said that health information "*hasn't yet (helped me make good decisions). Like it's made me think about what I've chosen to do, but it hasn't stopped me from making the dumb decisions I've made*". However, when asked whether health classes or personal experience had encouraged her to identify the problem of smoking, she acknowledge that "*a bit of both... because without my health class I wouldn't have been able to see the long-term effects apart from the people in the ciggy packets*." This student reported vaping now instead of smoking and wants to quit it soon.

Health classes involve relevant topics

The last subtheme presents topics that students considered important for them, or for any adolescent: mental health (anxiety, depression, stress), human rights, world issues, cultural diversity, sexuality and gender, healthy lifestyle, hauora (Māori philosophy of health and well-being), alcohol and drugs addictions, body function, diseases, and skin care. The quotes below exemplify this subtheme:

"Just wanted to know more about like, how I can like, like protect myself from things like, diseases and stuff and also like mental illness stuff. (...) I picked health because I wanted to learn all the stuff, like I wanted to know that, and the sex and stuff and, you know, just get better knowledge of it, because I didn't really understand much at the start like in Year 9, now I know a lot so it's really good." Peter, 16 years old, Year 12, decile 10 school, Middle Eastern/Latin American/African

"I feel like in any teenager life would be like, I guess, alcohol, like all that sort of stuff. So that's all relevant to me. (...) like, physical health, mental health, and then like other aspects, and like, learning about how different aspects affect each other, and then how you can cope. And how it's all, it really is like a knock-on effect, like if your mental and emotional wellbeing is good, it's gonna affect your spiritual, social, and physical, and vice versa for all of them." Mary, 17 years old, Year 13, decile 10 school, European

4.3.2.2 Theme 2: Thriving in a Supportive Learning Environment

Feeling comfortable and supported in class motivated the interviewed students to learn about health and excel academically. This theme comprises aspects of the learning experiences that students valued. These aspects reflect their perception of strategies that teachers used to support and motivate them, optimising their learning. This theme includes five subthemes: 'my health teacher sees me', 'my health teacher supports me', 'I can express myself in the classroom', 'to sit with close friends, or not to sit with close friends', and 'I want relevant topics and active learning'.

My health teacher sees me

The first subtheme demonstrates how students appreciated efforts of their teachers to bond with them. They appreciated being treated as individuals rather than a group of students. They suggested that their teacher motivated them by knowing the strengths and difficulties of each student in the class, caring about all of them, having a genuine interest in their lives, and by being approachable and available to help. The following quotes support this subtheme:

"I like teachers who like, put an effort to like bond with their students, like create kind of like a relationship with them. (...) I'm like, comfortable enough to like, ask her questions. Whereas like, with some other teachers, I'm not comfortable enough asking them questions. It's because she's really approachable, and like, will be open to help." Emily, 17 years old, Year 13, decile 10 school, European

"They're (health teachers) always supportive of those that are struggling, and they're encouraging them to do better. And then they are also able to help excel like people who want a bit of a push too. So, they're always catering for all levels." Lily, 17 years old, Year 13, decile 10 school, European

My health teacher supports me

This subtheme reflects the support students get from their teachers: explaining class topics clearly; using different pedagogical methods; giving helpful and specific feedback; having high but realistic expectations (adapted to each class and student); inspiring students to do their best without any pressure (i.e., the perception of undue pressure was felt to lead to the experience of negative stress); helping them understand concepts/tasks and link ideas; checking if they have any questions; and creating a comfortable, non-judgmental, and flexible atmosphere (i.e., not characterised by rigidness) that helps to discuss sensitive topics. This support motivated students to learn more. The quotes below illustrate this subtheme:

"My teacher makes it really understanding and helps if we need at all times. (...) It's easy to understand, but it's not the easy topics, it's that way my teacher explains it and is able to share like, different ways to... like for us to learn, because it's not like one set way that we have to focus on. There are different ways that we're taught it." Idris Elba, 17 years old, Year 13, decile 10 school, European

"I think when a teacher is supportive, and gives you a lot of feedback that also, you know, can put you on the right track, and you feel like you're... a good teacher wants you to succeed, too. So yeah, you definitely feel supported." Lily, 17 years old, Year 13, decile 10 school, European

I can express myself in the classroom

Students recognised that the effort and dedication they put in completing activities and paying attention in class determined their learning success. They also preferred having control in class as they worked independently whilst sitting in groups, having the opportunity to discuss ideas, and establishing their own working pace. They did not feel forced by teachers to do tasks or achieve high grades (although they felt motivated to do so as highlighted in the previous subthemes). In group discussions, they communicated their opinions freely, rather than quietly listening during the whole class. Some students also preferred having control by being able to choose specific areas within a broader topic, which made them more interested and motivated. However, others still felt limited to it. For example, one student lost motivation because he wanted to do research on the marijuana referendum rather than the euthanasia one, which he considered irrelevant to him. The following quotes support this subtheme:

"I think we have a good like control, because she allows us to work independently, she allows us to work in a group and she allows us to, like have class discussions, so that our

understanding is like, we get to hear other people's thoughts as well as our own as well as the teachers." Amy, 16 years old, year 12, decile 10 school, Māori

"A little bit, not too much. There's not too much freedom into choose like, what you do. (...) But for the last topic we did, we did get to choose like a mental health issue. So, we do have a bit of freedom to choose and stuff." Jackie, 18 years old, Year 13, decile 10 school, European

To sit with close friends, or not to sit with close friends

Students enjoyed sitting in a group with friends during class and found it motivating. Besides considering it fun, they felt more comfortable to discuss sensitive topics, share their opinion, and make questions to the teacher. However, they recognised that working with friends was distracting in some moments and telling their friends to focus was difficult. Despite these occasional disruptions, some students felt their groups completed tasks. Most students would have also liked to interact more with other students outside their circle, beyond whole class discussions. The quotes below demonstrate the perceived value of sitting with close friends as well as working with class colleagues:

"It's nice to be surrounded by a friend when maybe you're talking about some uncomfortable like topics. I think it's really good how we get to sit with people that we're familiar with. (...) Yeah, I would like to talk to people that I haven't necessarily talked to before. 'Cause it could like help me figure out who they are as a person, like through their opinions on different topics." Pauline, 17 years old, Year 13, decile 10 school, Māori

"Is pretty hard in my class to be honest, because I have a lot of my friends. (...) Sometimes it is good because like, you can have those conversations to further understand. But then sometimes when you're like with your friends you want to go off on like some other topic that is irrelevant. (...) I'm gonna regret saying that but like... sometimes it is hard to focus when you have your close friends sitting next to you." Jackie, 18 years old, Year 13, decile 10 school, European

I want relevant topics and active learning

The last subtheme reflects the importance of developing interactive activities on relevant topics to engage students. The transcripts indicated that exploring topics that are relevant and interesting from students' perspectives motivated them to learn. They needed to care about a topic to ensure that they had mastered it. Otherwise, they indicated that they would just do the

bare minimum aiming to pass rather than excel their knowledge and skills. Secondly, they proposed that educational activities should be fun and engaging as opposed to listening to "teacher talk" the whole lesson, which students termed as boring. They enjoyed learning through hands-on activities, group and class discussions, debates, interactive tasks and presentations, group work, games, videos, and scenarios. The following quotes illustrate this subtheme:

"If I don't really care about the topic, then I won't be motivated like if it was something that I like. (...) Well, I'd still do it, I just won't have as much... if I like it, I probably will know more about it. And I can write more down if I know about it." Egan, 17 years old, Year 13, decile 10 school, Māori

"We have a lot of discussions that help a lot. (...) Maybe a bit more interactive task works. Like I love when we do debates in class and stuff. Because when like, we just get given worksheets all the time to fill out in health, that's just how you lose a bit of motivation doing stuff like that. So, if we do more interactive like, activities and stuff, I find that such a good way for like me to like engage and I'm actually learning through that." Jackie, 18 years old, Year 13, decile 10 school, European

4.3.2.3 Theme 3: Developing Health Literacy Skills though Health Classes

This theme presents how students perceived their health literacy skills. The first two subthemes related to strategies they used to search for health information and judge its reliability which were classified as the subthemes 'searching for health information' and 'judging the reliability of health information'. The following subthemes reflected how students perceived a deficit in skills related to health literacy: "I did not learn enough about it" and "I still rely on other people". The last subtheme, "I would try, why not?", revealed students' vulnerability due to this deficit.

Searching for health information

Students recognised the value of researching to check information and investigate health issues. They appreciated the support the health teacher and school librarian gave them in providing tools to search for health information and explaining how to cite references. The tools they used for searching health information included Google, government websites, school website

and resources, books, Google Scholar, and YouTube (videos of professionals). The following quotes support this subtheme:

"The librarian came in and the teacher taught us, she went through on the board how explain, how to use... is that called Google Scholar? Yeah, she taught us how to use all of that. And like, just gave us information, we have like a few docs of how to like cite things and find information that is relevant and also like reliable. (...) the health topic that I picked was kind of different to what the librarian gave us. (...) So, I had to like, go off and try find my own stuff. And sometimes I was successful, sometimes I wasn't." Jackie, 18 years old, Year 13, decile 10 school, European

"Kind of this year and last year, we learned, like scholar websites to search up like keywords and to go into the library, you know, and to search things rather than just doing like a really vague like Google Search, we've learned how to look like deeper into like better articles to get better information, which was good." Taylor, 17 years old, Year 13, decile 10 school, European

Judging the reliability of health information

Students appeared to be aware of false online information and how Google searches could provide misinformation. Thus, they tended to believe in New Zealand Government websites and those provided by the teachers or written by medical professionals rather than Wikipedia and random websites found through Google. To judge the reliability of information, they reflected on the reputation of the person or company who wrote it, the date of publication (aiming to get recent data), its relevancy for Aotearoa New Zealand (prioritising local sources), and whether multiple sources confirmed it (checking for consistency). They found this task difficult and relied on their own judgment whether the information made sense. They also took stock of the statistics backing up the information and how this aligned with real experiences, i.e., some tended to believe more in a person who had experienced the issue discussed (e.g., depression) than in a person who had not. Some students mentioned learning about information and source checking in other classes besides health, such as sociology, geography, and maths. The quotes below illustrate this subtheme:

"That's like reliable, I believe, because it's from the government. (...) I can tell by actually like reading it, if you just read through it, you'll notice it's not reliable, because sometimes they won't put an author name, a date, you know. If it was made in 2003, you can look for a newer one, maybe one that was recently researched. (...) So yeah, I think it's mainly about the author

who writes it, and the company and the company's well known, that's good." Idris Elba, 17 years old, Year 13, decile 10 school, European

"I try not to use Wikipedia because that's like, knowing that someone can change it often. I just try to look for like, national like, official websites. (…) it's probably more of a guessing game sometimes, but I try to look the most legit thing I can find. The teacher kind of just like, if she doesn't point us in their direction, and we have to search it off ourselves, she kind of gives us like things about 'Is this legit? Does this sound reasonable? Does the sound realistic kind of thing?' And like, kind of give us this like, guidance." Olivia, 16 years old, Year 12, decile 10 school, European

I did not learn enough about it

Some students felt they had not learned enough in class about how to search for health information and judge its reliability. They had difficulty finding the best route to search for health information and felt that they lacked the knowledge and confidence to judge its reliability. One student mentioned that they have been taught a little about this in previous years, but in the current year they had not as they were expected to know it already. The following quotes support this subtheme:

"I didn't really learn, I guess, I can't really think of an example I was taught to how to look for health information. (…) we sort of learn... not like... it's more for evidence and alternatives we learn in health... not like if we've caught something, like a problem when we're searching. (…) Not lots, no, learned a little bit in class (about how to judge the reliability of information) but not so much. I don't have the confidence." Juan Carlos, 17 years old, Year 13, decile 10 school, European

"Yeah (it is difficult to judge the reliability of health information), so you don't know if it's true or not. (…) Yeah, they (teachers) kind of just tell you to like, it's best, like getting research and information on the like background, kind of thing a bit." Karen, 18 years old, Year 13, decile 10 school, European

I still rely on other people

While some students recognised the health teacher and the school librarian helped them with tips and tricks to find useful information online, others did not consider they are able to find health information and judge its reliability on their own. They considered the resources the

teachers and school librarians provided as trustworthy, reliable, and easy to understand (with bullet points). Thus, they preferred to use school resources, because they believe the difficulty lay in going beyond them. When faced with the need to judge the reliability of health information, they relied on the opinions of teachers, doctors, family, and friends. The quotes below illustrate this theme:

"(…) if it's coming from the librarian, you kind of know it's reliable because she's not gonna put stuff that she doesn't trust in there. (…) Oh yeah, that is a bit challenging (looking for information that is not in the resource), because you have to go off by yourself. And we were taught a little bit, but we're mainly taught on like, the information that like, was given from the librarian. (…) I found, like, just talking to other people like the other students in health classes, and like, my parents, and like my teacher, maybe going to library to find some books or something. But yeah, it was a bit more challenging trying to find resources myself when I wasn't given them." Jackie, 18 years old, Year 13, decile 10 school, European

"The library provides us with a website, and we can look at like the biographies and stuff through the website and like they have, they only use like really useful resources and stuff, which is good... (…) Like my family. If they all say one thing, then I trust it. Or like my teacher, if I find information and I asked my teacher if it's true, she says 'Yeah', and I ask the people I sit with and they say 'yeah', then I'm honestly gonna think it's true." Emma, 17 years old, Year 13, decile 10 school, European

I would try it, why not?

Most students did not know how to judge whether a health practice claim was reliable and reported not having learned about this in health classes. They believed practices work differently for each person, and that people needed to test it themselves to check for benefits. Some students would usually trust online health information if it came from a well-known person or company, without checking its reliability. If a family member, a friend, a doctor, or more than one person recommended a health practice, especially if it is perceived as natural medicine or if it supposedly brought a desired benefit, they would likely try it, without considering the possibility of negative effects. Only two students mentioned they would like to see scientific evidence – but one said even without it he would be more likely to believe in the claim. The other mentioned the placebo effect, and how a scientific experiment would show if the practice really worked. However, this student knew about this because his dad had participated in a clinical trial. In contrast, one student said she would more likely believe in

personal experience than in scientific evidence. Another student commented on how social media influencers may sell products that do not work – but this perception also came from personal experience, when shopping online for a product that was different from the expected. Thus, the transcripts indicated students' vulnerability towards false health claims, as indicated in the following quotes:

"I think it's definitely just a trial-and-error thing 'cause like, a lot of things like that work for me could like not work for you. Um... we haven't really learned about like, judging stuff like that. Like it is just like if you try it and you don't like, it's not... you don't feel an effect on it. And that does not work for you. But like I don't really like, know how to judge like, stuff like that because there's so much stuff that comes out… they're like, 'oh doing this will help, doing this will help, doing this will help'. But it is kind of hard to like, differentiate like which one is good and like which one is bad." Jackie, 18yo, Year 13, decile 10 school, NZ European

"I usually see it on Instagram and TikTok. (…) Yeah, well sometimes it pops up. I find it interesting. Don't always believe it, though. (…) So, someone like New York Times or something, they're pretty reliable. 'Cause they're a big news company. (…) For example, if it says the lemon juice clears acne, I want to try it. If it says it makes me feel good, I wouldn't try it." Juan Carlos, 17yo, Year 13, decile 10 school, NZ European

4.4 Discussion

This study explored experiences, understandings and attitudes of teachers and students towards the teaching and learning occurring in senior health classes. The interviews provided the opportunity to explore the in-depth views of and narratives from participants. Themes emerged from the subsequent analysis, revealing participants' perspectives regarding the teaching of health in the senior secondary school setting. The views regarding the teaching of health also enabled insights to emerge about how health literacy is being developed for secondary school students. Teachers used a variety of teaching methods to deliver student-centred education, while students considered health classes valuable and reported developing their health literature skills during class time. However, both teachers and students acknowledged limitations of the current health curriculum and identified opportunities to further incorporate health literacy into the health curriculum.

4.4.1 Strategies that Health Teachers Apply in Senior Classes

The interviewed teachers considered building a relationship with students the primary teaching strategy. They regarded this aspect of teaching pivotal as it centres on creating time to get to know students, honour student individuality, and ensure student wellbeing. They believed connecting with each student and learning about their personal life and unique characteristics allowed them to know how to best help them succeed academically and personally. Indeed, there is ample evidence suggesting that this strategy is a powerful one, with positive student-teacher connections promoting positive behavioural, emotional, social, and academic dynamics within the classroom (237,238). It has also been proposed that a strong and mutual relationship between teacher and students motivates and engages students in the learning process, making it more meaningful through increased interest (239-241). Furthermore, the interviewed teachers embraced the importance of role modelling to ensure this relationship is two-way and to increase students' interest in health topics and learning. Role modelling also improves academic student outcomes, e.g., by providing language modelling when the teacher asks open-ended questions, using students' responses to confirm or extend ideas and concepts, and introduces sophisticated vocabulary that links to students' words (242).

With a professional caring attitude, the teacher exerts their authority rather than authoritarianism, which helps students develop autonomy during the learning process (243). Thus, Freire (178) postulated a horizontal student-teacher relationship with dialogic principles that aimed to promote the freedom and autonomy of the student. This perspective of dialogue respects the knowledge that everyone brings and promotes an exchange of moral and ethical principles, driving students to believe in themselves, question their social and educational reality, and promote changes (244). Indeed, the interviewed teachers recognised the importance of having an open communication with students to get to know each of them, demonstrating interest and availability. Thus, it is envisaged that explicit health literacy school-based interventions must target students' relationships with teachers not only to respond to the diverse needs of students and help them succeed (245) but also to promote health literacy at the critical level as proposed by Nutbeam (8). Providing learning opportunities for students to engage in discussions about social and economic determinants of health propels them into becoming active citizens who can take responsible actions to promote their own and others' health (4,8).

According to the interviewed teachers, this strategy of building a relationship with students enabled the other main strategies they used in class. By getting to know students, teachers could

emphasise personal learning, i.e., it helped them identify the needs and preferences of each student. It also helped them choose a variety of methods that could be meaningful for all students. The open communication and role modelling aspects of the relationship building also helped to create a safe and supportive learning environment and to honour the student voice. By inviting students to make choices (such as choosing a topic under an area for an assignment) and voice their preferences regarding their learning (such as topics, activities, and assessments), teachers included students in the class decision making, which further enabled personalised learning. Giving space in classrooms for students to exert their autonomy increases engagement and student achievement (199,200), and promotes democracy in schools (246). Considering the needs of each student also requires a teacher to listen to their learners and give them a voice, i.e., by listening to them the teacher can learn and educate (244).

The teachers in this study also highlighted other strategies such as communicating with students, showing availability to help them, and establishing a respectful and judgement-free culture in class. This likely contributed to a supportive environment that optimised discussions and learning on health topics. As such, a teacher must respect students' opinions and rights, creating space for them to reflect and question, rather than imposing their own worldview (244).

4.4.2 How Health Teachers Determine the Curriculum for Senior Classes

The interviewed teachers reported the New Zealand Curriculum framework and the NCEA assessments determined the classroom health curriculum. They appreciated this guidance but felt limited by the assessment focus, which they felt restricted learning to specific topics that lacked integration. Excessive focus on formative assessments can negatively impact students, as was reported by senior high school students in Sweden, who associated it with stress and discouragement to participate in school (247). Embracing the student voice in assessment could be a strategy to motivate them (248).

Because of the assessment focus, perceived as excessive, the teachers felt they had little time left for other activities. They also mentioned that they lacked time to upskill themselves. Teachers in Australia also shared this limitation. Recent reports indicated that Australian teachers work on average 140-150% of their paid hours, and 90% of surveyed teachers considered not having enough preparation time for classes (249,250). Teaching requires commitment to continuous education to understand scientific, technological, and social

innovations (251). Thus, schools must support teachers to continue their education and build a curriculum that fosters student autonomy and thinking (244). Further, the teachers in this study commented on how students coped with time limits to complete assessments.

Aiming for consistency, the interviewed teachers organised meetings with other senior teachers from their department to establish learning outcomes, activities, resources, and assessments. Besides sharing experiences and reviewing learning units, they discussed how to incorporate feedback from students. This moderation process promotes consistency, comparability, and fairness in how the teachers judge the level of students' work (252). This affirmed the views the interviewed teachers gave on support from the school, which indicated that when implementing health literacy in their classes, teachers could benefit from a whole-school approach. Indeed, teachers from the UK have noted that, to effectively communicate health messages proposed in the curriculum and promote the health literacy of students, schools must have a health agenda and explicitly integrate different subjects and activities (170). Health teachers need resources and opportunities for professional development and mentoring to ensure their practice meets the health literacy rhetoric of the curriculum (253).

For students to develop health literacy, teachers must create learning conditions that address its five core components (4). To promote theoretical knowledge, teachers can select and structure topics and create activities with teacher-led discussions or reading material that help students gain information and memorise it (4). For this first component of health literacy, Barwood (13) proposes activities such as teacher talk, brainstorms, class discussion, digital media, PowerPoint presentation, and web quests. For the second component, practical knowledge, the teacher can organise activities that invite students to apply their health knowledge to hypothetical situations, preparing them for the future (4). Students are more participative at this level, which involves analysing up-to-date and real-life examples and applying skills in hands on activities, trial runs, puzzles, and role-plays (4,13). Next, to build critical thinking (the third component), students gain more control over learning by understanding the complexity of knowledge, creating links, considering different perspectives, and evaluating sources of information (4). Teachers may facilitate activities that encourage students to question, solve problems, and make decisions, such as reflecting on different scenarios, mapping concepts, creating mind maps, making predictions, debating or discussing in groups, justifying claims, and gathering and analysing data (4,13). For the fourth component, self-awareness, students should reflect on health issues based on their own perspectives, analyse their own thoughts and behaviours, determine learning goals, and evaluate their

learning process (4). Teachers can advise students in contemplating reasons, critically reflecting, and evaluating themselves through journalling, creating learning portfolios, making plans, and creating position statements (4,13). Finally, to promote citizenship, teachers can organise activities that enable students to evaluate the impact of individual behaviours on other people, reflect on collective and ethical values related to health issues, and argue in favour of a position or action based on those reflections (4). Activities that facilitate the fifth component of health literacy include drama plays, panel discussions, role-plays, and designing, planning, and undertaking school and community projects to bring awareness of health matters and address social determinants of health (4,13).

The pedagogical strategies that the health teachers in the presented study reported align with this student-centred approach of creating learning conditions for health literacy. Thus, schools can use this framework to help teachers build a curriculum that increases the complexity of learned skills. The teaching practices already in place would facilitate learning conditions that promote theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship. However, teachers cannot be solely responsible for creating such conditions. Schools must give flexibility for them to guide students in these activities. This can only be done if health literacy in included in the school curriculum and ethos. Furthermore, teachers need to be trained to effectively follow this framework and apply it to topics relevant to the students. Following the inclusion of health literacy in the national school curriculum, Australia has been training pre-service secondary school teachers to develop lesson plans that promote these skills (254). Whilst health literacy lessons for adolescents can be conceptualised at the functional and interactive level, teachers may struggle to reach the critical level (254). Using the framework proposed by Paakkari and Paakkari (4) has been shown to help Australian pre-service secondary school teachers develop lesson plans that promote the critical health literacy skills envisioned in the national curriculum (13). Thus, it should be also used as a framework for health literacy teaching in Aotearoa New Zealand.

4.4.3 Students' Perceptions of Health Classes

The interviewed students indicated that health classes helped them understand themselves, the world, and society. They believed the health course provided unique assets that would likely support them throughout their lives and allow them to actively participate in the "adult world". They felt they had more knowledge and skills than peers who did not take health classes. They also reported having more confidence to make their own decisions when faced with peer

pressure. Nevertheless, as one student pointed out, knowledge did not promote behaviour change in her case (smoking), although when further questioned she recognised her behaviour had improved and was influenced by the learning from the health classes (i.e., from cigarettes to vape, aiming to quit soon). The literature indicates a positive association between health literacy and adolescents' health behaviour, although more studies are needed to confirm this relationship (34,40,94). Students in the present study also believed experiences of health classes made them more compassionate and better communicators. They recognised health classes made them more sympathetic and less judgmental towards other people, which improved their relationships as they learned to express themselves assertively and calmly. Thus, the narratives of interviewed students agreed with the pedagogical strategies teachers reported. The perceptions of these key stakeholders indicated it would be feasible to define health literacy as a key competency in New Zealand high schools based on its five core components of theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship to enable the development of health literacy (4). Thus, it would be feasible to incorporate this framework in health education.

Despite being interested in health in general, the interviewed students expressed a desire to choose specific topics of their interest. Although they felt they could participate in class and the decision-making process, they would have appreciated more flexibility to choose the content of health classes and their assessments. They believed this would have motivated them more in class. They recognised their responsibility in the learning process but stated that they only put effort into what interests them. This aligns with Freire's pedagogy model that proposes the scientific content of an educational programme must be drawn from the students' reality for learning to be meaningful (178). The interviewed teachers reported building a relationship with students to know their students better. This strategy can inform a teacher about how to captivate students to a topic and was valued by the interviewed students who appreciated the bond with their health teacher. For example, one student mentioned being demotivated to study euthanasia, as he considered it irrelevant to him. Story telling could help increase students' interest and connection to health-related topics. A New Zealand study indicated that students appreciated getting to know more about their teacher's personal experiences with health issues in senior health classes (216).

The interviewed students also prized the supportive learning environment created by their teachers. They felt guided by their teachers, and noted the classroom was a safe space to discuss sensitive topics. In addition, the students reported enjoying active learning, which as a key

feature of health literacy interventions (93) that can increase their interest and make learning more meaningful for them (190,191). This aligns with the pedagogical practices that Dixon and Robertson (223) identified as characteristics of the socio-critical approach of school health education in Aotearoa New Zealand. They include a non-judgmental, respectful, and sensitive learning environment that invites students to interact which each other and actively construct and critique health-related knowledge (223). The value that the interviewed students gave to health classes indicates that these pedagogical strategies can engage students in health literacy programmes. Through enhanced engagement, students can improve their health literacy, develop positive attitudes to science and health, and build motivation to make better health choices (92,146,147).

4.4.4 Developing Health Literacy Skills through Health Classes

Although senior high school students in Aotearoa New Zealand are not taught explicitly about the concept of health literacy, they are taught health topics that could develop their health literacy. Regarding students' methods of gathering reliable health information, the interviewed students reported similar results to an Australian cohort (73). Both groups relied on their families for obtaining health information and shared a tendency to trust personal reports, i.e., based on real experience from any person, and familiarity, when the source was well-known and had a good reputation (73). However, the New Zealand cohort seemed to seek more information from medical and governmental authorities than their Australian peers, who mainly used information from Google (73). A survey-based study found that USA high school students looked for health information on Wikipedia (255), whereas the New Zealand cohort, in this study, disregarded Wikipedia as a source of information, because they assumed the editing process could be flawed.

It could be suggested that the rigorousness of searching and verifying information was more sophisticated than that used by the US American and Australian cohort. However, the USA survey was conducted in 2012, indicating this difference could be due to the time of the surveys instead of different school curricula in the USA and Aotearoa New Zealand. Currently, high school students are most probably more aware of the unreliability of information on Wikipedia than 10 years ago. The Australian interview study was also conducted five years prior to the present study. These studies asked different questions of students and were conducted in separate times. Nevertheless, they reveal how students perceived their health literacy skills and dealt with health-related information.

Both New Zealand and Australian adolescent cohorts acknowledged the presence of incorrect and misleading information on the Internet but still tended to believe in most available information, especially when supported by corroboration, i.e., when multiple sources present the same information. Both cohorts did not know any formal or validated method to assess health information or claims (73). The US American high school students also tended to trust online health information and had difficulty to determine its reliability (255). In addition, the Australian study revealed that adolescents lacked understanding of basic research process (73).

Interpretive scientific skills such as critical appraisal of health claims is an essential ability in our digital society as misleading and false health claims spread rapidly and vastly across media platforms (76). Indeed, the New Zealand students reported receiving health information through social media without even looking for it. Without the ability to critically assess health claims, adolescents are vulnerable to misinformation and disinformation related to health. For example, despite the Australian cohort indicating more awareness of the challenges of health interventions and potential for harm (73), both New Zealand and Australian adolescents affirmed that the best way to know if a health treatment works is trying it themselves, especially if it is a natural product or if it brings a desirable effect, such as reducing acne. This means that without the ability to assess the credibility of health information, they could trust misleading health claims in marketing campaigns and make uninformed decisions.

Some students acknowledged classes from health and other subjects (sociology, geography, and maths) promoted skills that helped them conduct research and source checking. This finding indicates teachers of these subjects could form a partnership to explore interdisciplinary projects towards strong health literacy skills of students. Nonetheless, all students considered they did not learn enough about how to search for health information and assess its reliability. The New Zealand health curriculum aims for the cultivation of critical thinking and problem-solving skills related to health at the senior high school level. Despite not being able to critically assess health claims, the interviewed students demonstrated some ability in identifying health issues, proposing action plans to address these issues, and improve wellbeing, and searching for health information.

An interview study conducted in Aotearoa New Zealand found a contrasting result – adults who had taken health classes at the senior level reported taking this subject enabled them to question and assess the validity of health-related information and claims (68). However, these participants were recalling their past experiences, with the study being conducted from 0 to 11

years after they completed high school. Thus, I would argue that these critical thinking skills towards health information and claims may have been facilitated by health classes but further reinforced in their adulthood. Critical thinking forms the basis for the development of the self-awareness and citizenship components of health literacy (4), and is a key concept in the New Zealand health curriculum (67). Thus, health literacy needs to be explicitly addressed in the health curriculum to ensure students feel progressively confident about their critical thinking skills during senior high school and can apply them in health matters.

4.4.5 Strengths and Limitations

This qualitative research ensured that participant contributions continued until data saturation was reached. However, it must be considered that all interviewed students were from high-decile schools. This study did not include perspectives of students from low-decile schools towards health classes. Perspectives from these students would have made the findings richer in terms of gathering more inclusive and diverse views. Nevertheless, this lack of representation was due to issues of conducting research during the COVID-19 pandemic.

The findings of this study reflect participants' narratives, which may be influenced by the interviewer effect – an interviewee may give responses they think are desired (256). Nonetheless, this study delved in the richness of the participants' in-depth perspectives and allowed them to elucidate their ideas in an unencumbered manner. Generating participant narratives enabled a unique exploration into their experiences as teacher and students of health in the senior secondary school setting. This exploration provided insightful consideration as to how the teaching of health could empower the development of health literacy. The thematic analysis that captured the meaning of the interviews in relation to the research questions involved a step of evaluating and revising themes. This led to the confidence that the trustworthiness in the meaning of the data could be met. The audit trail and rich description provided allowed myself as the reader to understand the context of this research (164).

4.4.6 Implications for Practice

The pedagogical strategies to promote learning of health topics identified in this study may be useful for other school health teachers around Aotearoa New Zealand. Both perspectives of teachers (what they consider important) and students (what they value) may guide the implementation and reinforcement of teaching strategies. These strategies could ensure better

health understanding for students, which transfers to higher levels of health literacy. Indeed, this study indicated that senior health classes in Aotearoa New Zealand align with the framework for health literacy as a learning outcome proposed by Paakkari and Paakkari (4). The classes could be further optimised to provide learning conditions that develop the five core components of health literacy, i.e., theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship (4).

Based on the findings of this study and the New Zealand literature (216), students considered senior health classes allowed autonomy over some aspects of learning, promoted understanding of health-related issues, involved active and interactive learning, provided a supportive, non-judgmental, and safe learning environment, encouraged a student-teacher relationship. The interviewed students, however, would like to have more autonomy over the topics explored in classes. The interviewed teachers mentioned creating polls throughout the year to invite students to state what topics they want to learn, but also not having much time to digress from the school curriculum that address the skills and knowledge assessed in the NCEA. Thus, a whole-school approach will most likely support teachers in building a health curriculum that promotes health literacy and student engagement (49,170,253,257).

Furthermore, students need support to develop health literacy skills that allow them to judge the reliability of health information. The idea and skills of health literacy need to be brought more into the spotlight given the extent of misinformation, disinformation, and deceptive marketing across media platforms (76). Regulations and bans are not enough to protect adolescents from pervasive false information (44). Schools are the main avenue to improve the health literacy of adolescents (8,39,49,53), through its environments and health education curricula (170). Thus, schools must develop organisational health literacy to empower students to make informed health choices (258).

4.4.7 Implications for Research

With health education in Aotearoa New Zealand being linked to the NCEA, the literature lacks studies that investigate effective pedagogical strategies to prepare students for the assessment of health skills and knowledge in the national qualification (216). Future studies should also investigate how health literacy skills could help students in the NCEA assessments. In the New Zealand context, the teacher can influence students to achieve high (259). Indeed, the present study indicated that the teachers helped students achieve the level they wished for. It is also

important to explore how to motivate students to aim higher, i.e., to aim for an excellent (outstanding performance) or merit (very good performance) level of endorsement in the NCEA instead of an achieved grade.

The interviewed students raised two aspects to be explored in further research. First, the necessity to understand the complex pathways that allow knowledge to influence positive behaviour changes. Health education in Aotearoa New Zealand has a more socio-critical approach that aims for understanding of public health issues rather than a moralistic approach that focuses exclusively on individual behaviour changes (223). Nevertheless, the narratives of the interviewed studies indicate that health classes positively impacted their behaviour, e.g., making their own choices when pressured by peers to drink alcohol – although they also noted that knowing that smoking is bad for you is not enough to avoid this habit. Indeed, providing knowledge does not lead, on its own, to changes in health-related behaviours (69,216). It is important to investigate how to support students in making informed health choices that help them lead a healthy lifestyle, that could be carried into adulthood (34). Second, health literacy skills could also be developed in other school subjects besides health. Thus, future studies could examine how to explicitly integrate different subjects and activities to promote the health literacy of students (170). Developing learning activities and lesson plans that address each of the five core components of health literacy skills (4) would provide useful resources for teachers. In addition, the present study indicated a possible deficit in the health literacy of senior high school students in Aotearoa New Zealand, despite learning health-related topics. Cross-sectional studies could identify and verify the level of the health literacy of this population.

4.5 Conclusion

Teachers apply a variety of student-centred methods to teach health, including making personal connections with students, making sure student voices are heard and acted on, and making learning relevant to students. Students considered health classes valuable and unique, and they could improve their critical thinking skills to develop health literacy. However, both teachers and students acknowledged time constraints and pressure from assessments as barriers to promoting the teaching and learning of health in the secondary school setting. Further research using co-design methodology could shed light on how to best incorporate health literacy into the secondary school curriculum.

5 Study 4: Generic Health Literacy of Senior High School Students in New Zealand: A School-Based Survey

"Health definitely helped me understand what people are going through and deal with them in the right way. (…) So, it's actually taught me to look at things in a different perspective." Chloe, 16 years old, Year 12.

5.1 Introduction

The previous chapter (Chapter 4) revealed senior high school students in New Zealand may have limited health literacy skills. Previously, in Chapter 2, I established the need for more research in the area of adolescent health literacy using validated assessment tools, as well as qualitative methods. There is a scarcity of literature linked to appraising the level of health literacy amongst secondary school students worldwide. No study has comprehensively assessed generic health literacy levels amongst New Zealand secondary school students. Therefore, the current study aims to address this gap in the literature. This chapter presents a cross-sectional study conducted in New Zealand schools to measure the subjective generic health literacy and health-related knowledge of senior high school students. The study also included a qualitative method (open-ended questions) to explore students' preferences in regard to how to learn about health literacy.

Whilst health literacy data of adult populations is extensive, little is known about the level of health literacy and its distribution in children and adolescents (43). Some instruments developed for adults have shown validity and reliability for adolescent populations (167,260-262). A few health literacy instruments have been developed specifically for children and adolescents, such as the Health Literacy Measure for Adolescents (135) and the Health Literacy for School-Aged Children Scale (136). However, a lack of consistency in study design and methods hinders the comparison of health literacy levels across different published studies (262). This also negatively impacts the establishment of psychometric evaluations of tools across adolescent populations (263).

Improvement of methodological approaches, such as standardised definitions and models, and transparency in the development and validation processes are necessary to establish health literacy instruments that can appraise the effectiveness of interventions proposed for adolescents (10,167,262). Given the broad and multidimensional definition of health literacy, measurement tools need to have a clear focus (i.e., generic vs domain-specific health literacy).

They could also integrate the three levels of health literacy proposed by Nutbeam (8) to align with the health promotion perspective of empowering adolescents with interactive and critical health literacy, beyond the functional level (263).

The only available data on the generic health literacy level of adolescents in Aotearoa New Zealand came from the Adult Literacy and Life Skills Survey 2006 (17). This survey measured literacy and numeracy skills relevant to health employing 191 questions about health promotion, health protection, disease prevention, health care maintenance, and system navigation. Of the 373 participants aged between 16 and 18 years, more than two thirds presented poor health literacy skills (score at levels 1 and 2 - from 0 to 275 - in a scale with five skill levels ranging from 0 to 500) (17). However, this survey used the same questions for adults and adolescents. This is problematic because specific characteristics and needs of adolescents in terms of health literacy are yet to be fully understood (10,40,75). The present survey used a health literacy tool validated for adolescents. Furthermore, whilst the Adult Literacy and Life Skills Survey 2006 focused on the capacity of participants to deal with health information and apply it (17), the age-appropriate tool used in the present study (43) was based on a more comprehensive definition that captured the knowledge, motivation, and competencies of adolescents' health literacy status (20).

This study is the first to use an age-appropriate validated measure to study adolescent health literacy in Aotearoa New Zealand. Establishing an instrument that is fit for purpose for the New Zealand school-aged population would be useful to appraise the levels of health literacy of this population. It could also provide a tool to evaluate the effectiveness of interventions constructed to develop health literacy. I decided to investigate generic health literacy to capture skills that could be applied across all health-related areas. Domain-specific health literacy would only provide insight into health literacy skills applied in a particular area. As indicated in the scoping review (Study 1) and in recent systematic reviews (167,263), the literature lacks high-quality health literacy measurement tools that were specifically designed for senior high school students and validated in school settings. I used a tool developed in Germany – the Measurement of Health Literacy Among Adolescents-Questionnaire (MOHLAA-Q) (43,264). This tool assesses health literacy as a multidimensional construct. It was designed for and with adolescents aged between 14 and 17 years, who participated in cognitive interviews and focus groups during the development process of the tool. In addition, to incorporate the student voice, the present study also investigated how the surveyed students would like to learn about health literacy.

The MOHLAA-Q (43,264) measures generic health literacy. It adopts a life course perspective of health literacy, which was defined as (20, p.3) "the motivation, knowledge, and competencies that allow a person to access, understand, appraise, and apply health-related information when making judgments and health-related decisions in everyday life" (p3). This tool was also based on the same social ecological model of adolescent health literacy as this thesis, that recognises intrapersonal, interpersonal, and community influences (48). Considering generic health literacy as a four-dimensional construct, the MOHLAA-Q captures core dimensions through different components: dealing with health-related information (Scale A), health-related communication skills (Scale B), attitudes toward one's own health and health information (Scale C) and health-related knowledge (Scale D). In the German study, the psychometric properties of the MOHLAA-Q indicated varied internal consistency of the scales (43): Scale A Cronbach's α was 0.77, Scale B Cronbach's α was 0.59, Scale C Cronbach's α was 0.54, and Scale D Kuder-Richardson coefficient was 2.63. A confirmatory factor analysis of Scales A, B, and C demonstrated a sufficient validity (Comparative Fit Index = 0.908; Root Mean Square Error Approximation = 0.062) (43). Scale D was excluded from this analysis as it differs from other scales (multiple choice response opposed to Likert scale, as explained below). Item difficulty for most items in Scale D was optimal, i.e., in the middle range (average 62%) (43). Further research is needed to confirm the structural validity of this tool and increase the internal consistency of Scales B and C (264). Thus, I investigated the reliability and validity of the MOHLAA-Q in the New Zealand context.

5.1.1 Research Questions

The following overarching research questions guided this research:

- What are the levels of generic health literacy among adolescents enrolled in senior high school in Aotearoa New Zealand?
- How do senior high school students in Aotearoa New Zealand want to be taught about health literacy?

To answer the first research question, I investigated three facets:

1. How suitable is the MOHLAA-Q to measure the health literacy of New Zealand senior high school students?

2. How do sub-groups (gender, study level, ethnicity, school decile) within the sample differ?

3. How do results from this survey compare with another international cohort?

5.2 Methods

5.2.1 Participants and Sampling

This study was conducted in the North Island of Aotearoa New Zealand. It used convenience sampling (164). This method selects participants based on their accessibility, availability, and willingness to take part. The population target were students enrolled in Year 12 or Year 13 in New Zealand high schools, aged 16 years or older at the date of participation. I excluded students under 16 years old or in Year 11 as they would have needed to provide consent from their parents. Participants' contact details were collected, processed, and stored separately from survey data to ensure anonymity. I assured school principals that participants' and school's identities would be kept strictly confidential. Thus, schools were coded with a letter (A, B, C, and D). I also used neutral pronouns in this report to avoid unintentional identification.

5.2.2 Procedure

This was a cross-sectional study measuring generic health literacy among adolescents enrolled in senior high school in New Zealand. Data were collected at schools. Initially, I contacted high schools in Tāmaki Makaurau/Auckland via email, informing them about this study and asking if they would like to participate. One large school expressed an interest in the project. I met with the principal and handed out the participant information sheet (Appendix XX). The principal signed the consent form (Appendix XXI) and introduced me to the Head of Health and Physical Education to discuss details. Ethical approval was obtained from the University of Auckland Human Participants Ethics Committee (reference number 024388).

At a second stage, I discussed the study with the Director of the Schools Partnership Office at the University of Auckland. He invited other secondary schools in Tāmaki Makaurau/Auckland and in two other smaller cities from the North Island of New Zealand to participate in this study. Three schools expressed an interest in participation. Questionnaires were disseminated within schools by onsite teachers due to the constraint of workload and the COVID-19 pandemic.

In the first school, the Head of Health sent the participant information sheets to students (Appendix XXII) via email, one week prior to me going to the school. I entered classrooms, either during a health or tutoring class, and invited students to complete the survey. I asked the other schools to follow the same procedure of distributing the PIS one week prior to the survey application. All participants consented to participate in this study by completing the survey.

5.2.3 Instrument and Data Collection

Data was collected from May until July 2021. Participants received the paper-based questionnaire in class during the first 15 minutes of their class. At the school that I visited, I collected all questionnaires and contact pages in two different opaque boxes. I asked the other three schools to do the same, and then they sent the boxes to me by mail.

The questionnaire had three sections. First, it introduced questions on the following socio-demographic factors: age (in years), gender (male/female/gender diverse/decline to answer), which ethnic group or groups the participant belongs to, as per the Statistics New Zealand 2018 Census ethnicity question (235), year of study (Year 12 or Year 13), and name of their school. The second section consisted of the survey instrument: the MOHLAA-Q (43,264), which contains four scales (A, B, C, and D). The authors who developed this instrument provided me with the English version of the questionnaire (original in German). The last section of the questionnaire addressed the second overarching question of this study through asking an open-ended question that investigated participants' preferences in learning about health literacy, namely: "How would you like to be taught about health literacy (the ability to access, understand, appraise and use health information)". This question included a simplified definition of health literacy to help students understand this concept and related skills.

This study used the scale definitions provided by the authors who developed the MOHLAA-Q (43). Scale A consists of 12 items and has been adapted from the European Health Literacy Survey Questionnaire (265). It measures the level of difficulty adolescents face with health-related information in the domains of healthcare, prevention, and health promotion. It contains two dimensions: 1) a cognitive dimension, capturing understanding, appraising, critical thinking, and functional literacy skills; 2) and a behavioural dimension, capturing information seeking and application of health information. Scale B consists of four items and captures adolescents' ability to communicate and interact using health information (behavioural/communicative dimension). The behavioural/communicative dimension of Scale

B differs from the behavioural dimension of Scale A as the former relates to communicating about health, and the latter to dealing with health information. The response options for Scales A and B use 4-point Likert-scales. Scale C includes five items that investigate health-related self-awareness, self-control, self-efficacy, motivation, and interest (affective/conative dimension) through a 5-point Likert-scale. Whilst these scales provide a subjective evaluation of generic health literacy, reported by the respondent themselves, Scale D enables an objective measure of respondents' health-related knowledge. This scale also contains a cognitive dimension, similar to Scale A. However, Scale A captures understanding, appraising, critical thinking, and functional literacy skills that help adolescents understand and process health-related information. Scale D evaluates respondents' knowledge about how much physical activity they should do, what to do in case of skin burns, how to read nutrition labels, and understanding their rights as a patient, ways of transmitting HIV/AIDS, and the health risks of alcohol use, cannabis use, and smoking. It contains eight single-choice response items, with five response options (dichotomy coded, i.e., right – 1 point –, or wrong answer – no point). Whilst in Scales A-C the total result is computed through mean scores, the total result of Scale D reflects a sum score.

5.2.4 Data Analysis

5.2.4.1 Data Preparation

Data from the questionnaires was transferred to an excel file. Students were given a reference number according to the order of data input (e.g., S1, S2 etc). Prioritisation (235) was applied to allocate participants to a single ethnic group for analysis purposes. As explained in Chapter 4, a hypothetical student who self-identified as Samoan and New Zealand European would have a prioritised ethnicity of Samoan. Regardless of whether this hypothetical student would self-identify mostly as Samoan or New Zealand European, they would be considered Samoan. This prioritisation ensures ethnic groups of policy importance or of small size remain present (234). After the prioritisation method, students were classified according to six ethnic groups, following the Ethnicity New Zealand Standard Classification 2005 V2. 1.0 (235): European, Māori, Pacific Peoples, Asian, Middle Eastern/Latin American/African, and Other Ethnicity. However, due to the small number of participants in groups 'Middle Eastern/Latin American/African' and 'Other Ethnicity', these were combined into a group 'Other' to increase the statistical power of the analysis.

Schools were grouped according to their decile rating (last index from 2015) (71). More detail on school deciles can be found in the introduction chapter (Chapter 1). Schools classified as decile from one to four were coded as low decile (as the fifth decile represents the median), and from eight to 10 as high decile. Schools with a decile rating from five to seven would have been grouped as mid decile (no participating schools were at this range).

Demographics and the distribution of specific dimensions of health literacy among the study sample were presented through descriptive analyses. Data preparation and statistical analyses were performed using the statistic software IBM SPSS Statistics ver. 27.0 (266). Cases with at least one missing item in Scale A, B or C were deleted from the dataset. Missing values in Scale D were equated with the answer option "Do not know", coded as "not right". Alongside exclusion of non-valid cases, plausibility and consistency checks were made prior to statistical analysis.

5.2.4.2 Descriptive Analysis

Absolute frequencies were computed to describe socio-demographic characteristics of the sample and responses for each item of the questionnaire. Mean scores (along with standard deviation and 95% confidence interval) were calculated for each item of Scale A, B and C, as well as mean total scores of these scales. For Scale D, a sum score was computed for each participant, followed by a mean total score for the dataset and each item. Skewness was calculated to assess the symmetry of the distribution of variables. Values greater than +1 or lower than -1 indicate a substantially skewed distribution. Kurtosis was computed to measure whether the distribution was too peaked (a very narrow distribution with most responses in the centre). Values greater than 1 indicate the distribution is too peaked, and less than -1, that it is too flat. The pattern of responses was considered a normal distribution for skewness and kurtosis values between -1 and 1 (267). Normality of data distribution was also assessed through visual inspection (268,269). Frequency histograms provided visual representation of the distribution of values (270).

5.2.4.3 Reliability and Validity Analysis

Reliability and validity tests were performed to assess psychometric properties of the survey instrument and its applicability to the New Zealand context. The Cronbach's alpha statistic (Cronbach's α) was computed through to indicate the degree of internal consistency of the

scales. This coefficient ranges from 0.0 to 1.0, with values closer to 1.0 indicating a higher level of reliability. A Cronbach's α of 0.7 or higher indicates adequate internal consistency, i.e., reliability of the observed score variance in comparison to the true score variance (271). However, values over 0.6 are also acceptable in certain cases (272,273).

Reliability of Scale D (multiple choice feature) was also assessed through evaluating the attained difficulty and discrimination indices. This analysis was undertaken only for this scale due to its different format. The difficulty of an item represents the percentage of participants who answered the question correctly (number of students who answer the question correctly divided by the total number of students who answered the question). This index, that ranges from 0 to 1.0, indicates whether students have learned the concept being tested. A low difficulty index (p) of $\leq .25$ indicates the item is too difficult, and although students attempt it, they get it wrong. A high index of $\geq .75$ means the item is too easy, i.e., most students, regardless of their year level, get it correct. Values between .45 and 0.70 are considered moderately difficult. Optimal items present a middle range ($.25 > p < .75$) (274).

The discrimination index (D) evaluates how well a question discriminates between the students who have mastered the tested content from students who have not. This index ranges between -1.0 and 1.0, and students were arranged from highest scorers to lowest scorers. The responses of the 27% students in the upper and lower groups were evaluated: the number of students in the lower group who got the item correct was subtracted from the number of students in the upper group who got the item correct. A negative index means students who score high on the test were answering the question incorrectly (and low-performing students are more likely to get it correct), indicating a problem with the question. Values of .40 and higher characterises very good items; from .30 to .39, good items; from .20 to .29, reasonably good items; from .10 to .19. marginal items (i.e., subject to improvement); and less than .10, poor items (i.e., to be rejected or improved by revision) (274).

A confirmatory factor analysis (CFA) was undertaken on the dataset for Scales A, B and C to investigate the proposed theoretical domain structure. Four goodness-of-fit indices estimated the global degree of model fit of the self-reported part of the questionnaire. Cut-off for the good fit of the model was stablished: chi-square statistic $p > .05$; comparative fit index (CFI) $\geq .90$; root mean square error of approximation (RMSEA) $< .08$; and standardized root mean square residual (SRMR) $< .08$ (275,276). The CFA goodness-of-fit indices were calculated using the software IBM SPSS Amos for Structural Equation Modelling ver. 26.0 (277).

5.2.4.4 Subgroup Analysis

A multivariate analysis was undertaken to compare sub-groups within the sample. Participants with missing demographic information were excluded from subgroup analysis. Test-specific prerequisites were verified before carrying out the test procedures. A multivariate analysis of variance (MANOVA) test was conducted to assess score differences between gender categories, study levels (Years 12 and 13), school decile ratings (low or high decile), and ethnicity groups. The MANOVA model was set with the subgroup variables (gender, study level, school decile, and prioritised ethnic group) as independent variables, and the scores (for Scales A, B, C, and D) as dependent variables. Age was not computed due to multicollinearity with study level, i.e., age and study level were strongly correlated. The only school in the low decile group was a single-sex secondary school, thus, the interaction between gender and school decile could not be investigated. The MANOVA model examined three-way interactions between study level, school decile, and prioritised ethnic group, and between gender, study level, and prioritised ethnic group. The analysis also tested two-way interactions between gender and study level, gender and prioritised ethnic group, study level and school decile, study level and prioritised ethnic group, and school decile and prioritised ethnic group. Additionally, the individual interaction of each subgroup variable with the four scales was also investigated.

5.2.4.5 Comparison with German Adolescents

Comparison between the New Zealand and German cohort (264) was conducted using primarily an independent samples t-test. The strength of effect was corroborated using Cohen's *D* (278). T-tests were computed in a Microsoft Excel Spreadsheet. To minimise problems associated with analysing multiple comparisons resulting in a type 1 error, a Bonferroni alpha correction was introduced, and the subsequent statistical level of significance was accepted at $p < .025$ (279).

5.2.4.6 Qualitative Analysis

I used thematic analysis (233) to investigate students' preferences regarding how they wanted to be taught about health literacy, drawing from the responses obtained from the open-ended question. In Chapter 4, I have presented a full description of this method. I started this analysis by reading students' answers several times to familiarise myself with the data. Next, I

developed codes to describe my content. This helped me move to generating initial codes for all data and collating all extracts that fitted into each code, using the software NVivo Version 12 (101). In the following phase, I sorted my codes into broader themes by applying an iterative process. Then, I reviewed and refined the themes. In the final phase, I developed coherent and distinctive emergent themes for the entire dataset, which were given distinct labels.

5.3 Results

This section presents the results of the current survey. Four schools participated in the study: two schools (C & D) were from a metropolitan city in New Zealand and the other two were from two different towns in the North Island of New Zealand. Two were co-educational (girls and boys), and the other two were single-sex secondary schools. The schools had the following decile ratings (2015): school A = 2, school B = 8, school C = 9, and school D = 10. In total, 464 students completed the survey. Due to missing values on Scale A, B or C, 30 questionnaires were removed from the analysis. The final dataset consisted of 434 participants (147 from school A, 29 from school B, 16 from school C, and 242 from school D). Based on skewness and kurtosis (reported in the following tables) values and visual inspection, the data presented reasonably normal distributions.

5.3.1 Characteristics of the Study Population

Participants were on average 16.7 years old (SD .68). As shown in Table 5.1, more than half were male and around half were aged 17 years and enrolled in Year 13. Students were from a varied ethnicity background: European, Asian, Māori, Pacific Peoples, and other (in decrescent order, see Table 5.1).

Table 5.1 Characteristics of participants

Characteristics	n	%
Gender		
Female	150	34.6
Male	271	62.4
Gender diverse	4	0.9
Declined to answer	3	0.7

Characteristics	n	%
Missing	6	1.4
Age (years)		
16	171	39.4
17	211	48.6
18	41	9.4
19	3	0.7
20	1	0.2
Missing	7	1.6
Study level		
Year 12	204	47
Year 13	229	52.8
Missing	1	0.2
School Decile		
High	287	66.1
Low	147	33.9
Prioritised ethnicity		
European	170	39.2
Asian	105	24.2
Māori	91	21
Pacific Peoples	36	8.3
Other	25	5.7
Missing	7	1.6

5.3.2 Reliability and Validity

As shown in Table 5.2, based on the Cronbach's alpha statistic, Scale A demonstrated adequate reliability. Scale B and Scale C demonstrated reasonable reliability. However, Scale D did not present adequate reliability. Nevertheless, as shown in Table 5.3, all items from Scale D presented moderate difficulty, with ideal difficulty indices (i.e., middle range between .45 and 0.70). Students had more difficulty with knowledge about physical activity, the health risks of alcohol use and smoking, and patient rights. In addition, discrimination indices (Table 5.3) demonstrated all questions as very good items, i.e., they were able to differentiate between students who had mastery of health-related knowledge and those who did not. The items with higher discrimination indices were related to the health risks of smoking, followed by these three topics (with same discrimination index): the health risks of cannabis use, first aid measures in case of skin burns, and reading nutrition labels.

Table 5.2 Reliability of the MOHLAA-Q scales

Scale	**Cronbach's α**
A: Dealing with health-related information	
Behavioural factor (f1)	.69
Cognitive factor (f2)	.73
Total (f1 + f2)	.83
B: Health-related communication skills	
Behavioural/communicative factor (f3)	.63
C: Attitudes toward one's own health and health information	
Affective/conative factor (f4)	.60
D: Health-related knowledge	
Cognitive factor (f5)	.49

Table 5.3 Item difficulty and discrimination index for Scale D – cognitive factor (f5)

Item - Knowledge about	# Correct (Upper group)	# Correct (Lower group)	Difficulty (p)	Discrimination (D)
know1 - Physical activity	60	25	.36	.30
know2 - Health risks of alcohol use	66	12	.33	.46
know3 - Health risks of cannabis use	100	26	.56	.63
know4 - Health risks of smoking	95	3	.37	.78
know5 - First aid measures in case of skin burns	100	26	.58	.63
know6 - Nutrition labels	109	35	.64	.63
know7 - Patient rights	78	12	.35	.56
know8 - Ways of transmitting HIV/AIDS	85	23	.46	.52

A confirmatory factor analysis of the dataset for Scales A, B, and C was conducted to check whether the original questionnaire structure was applicable with my sample. The statistical measures demonstrated an acceptable fit: chi-square = 441.37 ($p < .001$; degree of freedom = 177); CFI = .87; RMSEA = .06; and SRMR =.05). It is important to note that, throughout the course of model specification, modification indices were scrutinized, and as a result, six error variances (as indicated in the note on Figure 5.1) were correlated. No other error variances were correlated.

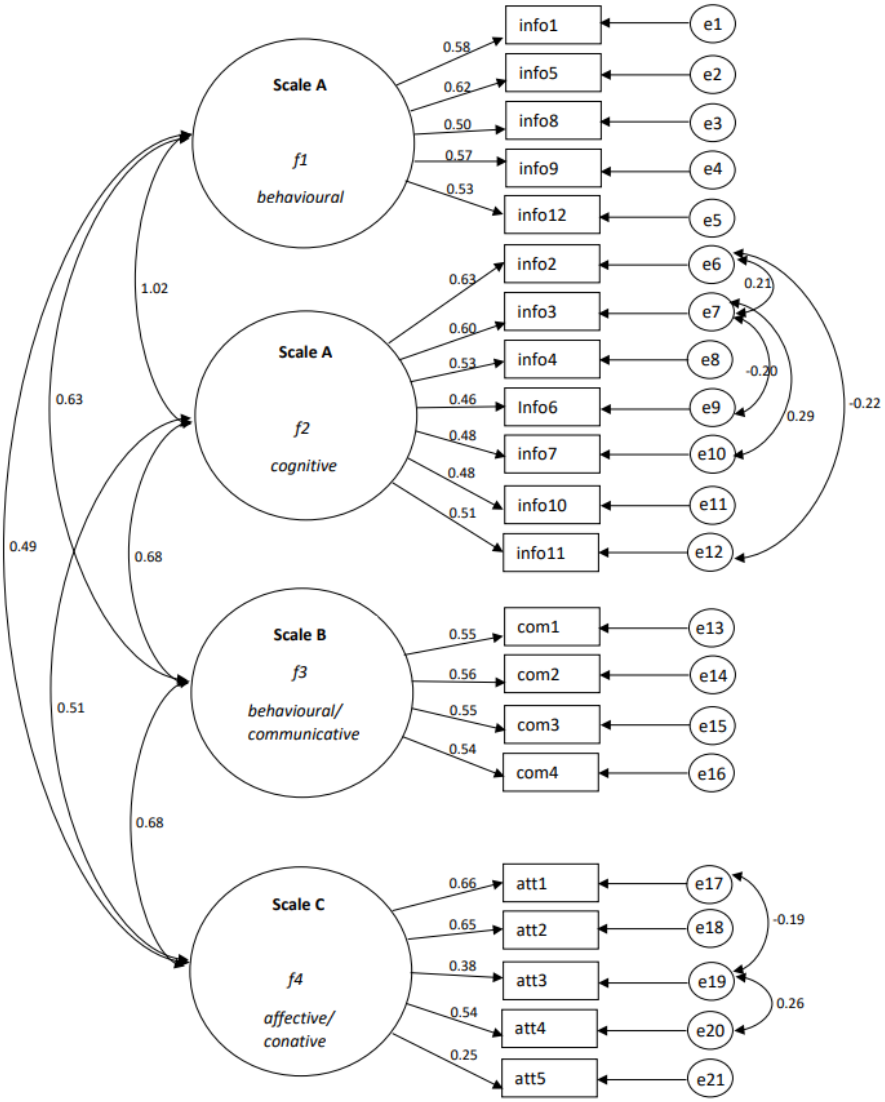


Figure 5.1 Four-factor model of the MOHLAA-Q - as confirmed using the New Zealand Dataset

Covariances: e6 and e7, e6 and e12, e7 and e9, e7 and e10, e17 and e19, e19 and e20.

5.3.3 Descriptive Analysis

5.3.3.1 Scale A: Dealing with Health-Related Information

In the behavioural factor (f1) of Scale A, the tasks that students found more difficult were getting involved in promoting a healthy environment (38.3%; info12) and finding information about how to deal with mental health problems (32.5%; info5) (Table 5.4).

Table 5.4 Frequencies of responses on Scale A – behavioural factor (f1) (n = 434)

Item	"How Easy or Difficult Is It for You to…"	Very difficult (%)	Difficult (%)	Easy (%)	Very easy (%)
info1	…find information about what to do when you feel ill to make yourself get better?	1.4	11.8	62.0	24.9
info5	...find information about how you can deal with mental problems? *e.g., permanent stress, depression, being bullied, an eating disorder*	8.1	24.4	50.7	16.8
info8	...implement recommendations that protect you during sport, in your leisure time and in traffic? *e.g., wearing a helmet or knee or arm protectors, observing road traffic regulations*	0.9	8.3	52.3	38.5
info9	...find information about healthy behaviour such as exercise and nutrition?	1.8	5.8	48.2	44.2
info12	...get involved in promoting a healthy environment? *e.g., less noise and less traffic, better air quality, more parks, and sports grounds*	6.0	32.3	47.5	14.3

As shown in Table 5.5, the cognitive tasks from Scale A that students found more difficult were: understanding a medication leaflet (31.1%; info2), judging whether information about medication in the media is credible (44.9%; info3), and judging whether they can trust media warnings of health risks (36.8%; info7). More than one quarter of students (26.1%) also had difficulty in understanding information on food packaging (info10).

Table 5.5 Frequencies of responses on Scale A – cognitive factor (f2) (n = 434)

Item	"How Easy or Difficult Is It for You to…"	Very difficult (%)	Difficult (%)	Easy (%)	Very easy (%)
info2	…understand a medication leaflet?	3.2	27.9	53.0	15.9
info3	…judge whether information about medication in the media is credible? *media: internet, TV, radio, press*	6.0	38.9	45.6	9.4

Item	"How Easy or Difficult Is It for You to…"	Very difficult (%)	Difficult (%)	Easy (%)	Very easy (%)
info4	...follow the instructions of your doctor or pharmacist?	0.5	3.7	46.3	49.5
info6	...understand how you can protect yourself from sexually transmitted diseases? *By sexually transmitted diseases we mean diseases such as HIV/AIDS, chlamydia infection, or herpes*	1.6	12.7	44.9	40.8
info7	...judge whether you can trust media when they warn you of risks to your health?	3.2	33.6	49.5	13.6
info10	...understand information on food packaging?	2.8	23.3	44.7	29.3
nfo11	...judge how what you do daily affects your health? *e.g., eating, drinking, exercise, relaxation, body care*	3.2	13.8	49.3	33.6

As shown in Table 5.6, the mean value for Scale A was 3.01 (SD = 0.43, 95% CI = 2.97 - 3.05). This dataset approximated a normal distribution.

Table 5.6 Descriptive statistics – Scale A

Scale A	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
f1	info1	434	3.10	.64	3.04 - 3.16	-.41	.61
	info5	434	2.76	.82	2.68 - 2.84	-.40	-.26
	info8	434	3.28	.65	3.22 - 3.34	-.56	.24
	info9	434	3.35	.67	3.28 - 3.41	-.91	1.11
	info12	434	2.70	.78	2.63 - 2.77	-.16	-.37
	Total	434	3.04	.48	1.20 - 4.00	-.29	.63
f2	info2	434	2.82	.73	2.75 - 2.88	-.20	-.21
	info3	434	2.59	.74	2.52 - 2.66	-.04	-0.31

Scale A	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
	info4	434	3.45	.59	3.39 - 3.51	-.68	0.25
	info6	434	3.25	.73	3.18 - 3.32	-.67	-.03
	info7	434	2.74	.73	2.67 - 2.80	-.05	-.36
	info10	434	3.00	.80	2.93 - 3.08	-.34	-.59
	info11	434	3.13	.77	3.06 - 3.21	-.66	.18
	Total	434	3.00	.45	1.00 - 4.00	-.11	.49
Total f1+f2	info 1 to info 12	434	3.01	.43	2.97 - 3.05	-.09	.73

5.3.3.2 Scale B: Health-Related Communication Skills

As shown in Table 5.7, most students reported engaging with health-related communication. However, many students stated not chatting with friends about how to avoid unhealthy behaviour (45.2%; com2), not asking all the questions that interested them in their last doctor's appointment (35%; com1), and not easily talking with their parents about health topics (33.8%; com4). Fewer students (21.2%) reported not being able to help friends or siblings with questions about health (com3).

Table 5.7 Frequencies of responses on Scale B – behavioural/communicative factor (f3) (n = 434)

Item	"To what extent do you agree with the following sentences?"	Strongly disagree (%)	Somewhat disagree (%)	Somewhat agree (%)	Strongly agree (%)
com1	During my last visit to the doctor, I asked all the questions that interested me.	7.1	27.9	44.0	21.0
com2	I chat with my friends about how one can avoid unhealthy	16.4	28.8	37.1	17.7

Item	"To what extent do you agree with the following sentences?"	Strongly disagree (%)	Somewhat disagree (%)	Somewhat agree (%)	Strongly agree (%)
	behaviour e.g., smoking, drinking alcohol over the limit				
com3	If my friends or siblings have questions about health, I can help them.	3.9	17.3	53.5	25.3
com4	It is easy for me to talk with my parents about health topics.	11.1	21.7	40.6	26.7

As shown in Table 5.8, the mean value for Scale B was 2.79 (SD = 0.61, 95% CI = 2.74 - 2.85). This dataset approximated a normal distribution.

Table 5.8 Descriptive statistics – Scale B

Scale B	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
	com1	434	2.79	.85	2.71 - 2.87	-.27	-.56
	com2	434	2.56	.96	2.47 - 2.65	-.13	-.94
f3	com3	434	3	.76	2.93 - 3.07	-.53	.12
	com4	434	2.83	.95	2.74 - 2.92	-.44	-.70
	Total	434	2.79	.61	2.74 - 2.85	-.08	-.33

5.3.3.3 Scale C: Attitudes toward One's Own Health and Health Information

As shown in Table 5.9, few students reported paying no or little attention (15.6%) to their health (att1). However, many students reported not seeking advice from others when ill (19.4%; att2), or being neutral about it (21%); not acknowledging their responsibility in protecting themselves from diseases (11.3%; att3), or being neutral about it (21.7%); not knowing how to make themselves feel comfortable (9%; att4), or being neutral about it (13.8%); and not

considering it important to inform themselves about health-related topics (9.7%; att5), or being neutral about it (25.6%).

Table 5.9 Frequencies of responses on Scale C – affective/conative factor (f4) (n = 434)

Item	Question	Not at all (%)	Little (%)	Moderate (%)	Strong (%)	Very Strong (%)
att1	How much in general do you pay attention to your health?	3.2	12.4	41.5	32.0	10.8
Item	To what extent do you agree to the following sentences?"	Strongly disagree (%)	Somewhat disagree (%)	Neither agree or disagree (%)	Somewhat agree (%)	Strongly agree (%)
att2	I seek advice from others when I am ill.	3.7	15.7	21.0	41.0	18.7
att3	It is up to me to protect myself from diseases.	3.2	8.1	21.7	38.0	29.0
att4	I know what I have to do to make myself feel comfortable.	2.8	6.2	13.8	42.9	34.3
att5	It is important to me to inform myself about health-related topics.	1.6	8.1	25.6	41.5	23.3

As shown in Table 5.10, the mean value for Scale C was 3.7 (SD = 0.62, 95% CI = 3.64 - 3.75). This dataset approximated a normal distribution.

Table 5.10 Descriptive statistics – Scale C

Scale C	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
f4	att1	434	3.35	.94	3.26 - 3.44	-.20	-.10
	att2	434	3.55	1.08	3.45 - 3.65	-.51	-.49

Scale C	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
	att3	434	3.82	1.04	3.72 - 3.91	-.74	.43
	att4	434	2.83	.99	3.9 - 4.09	-1.07	.89
	att5	434	3.77	.95	3.68 - 3.86	-.54	-.09
	Total	434	3.7	.62	3.64 - 3.75	-.42	.19

5.3.3.4 Scale D: Health-Related Knowledge

The findings indicated that the students had poor knowledge in reference to the health risks of alcohol use (know2; 33.2% answered correctly) and smoking (know4; 37.3% answered correctly); how much physical activity they should do (know1; 36.4% answered correctly); and their rights as a patient (know7; 35.5% answered correctly) (Table 5.11). The question with most correct answers was related to nutrition labels (know6; 64.1% answered correctly). However, more than one fifth of students reported not knowing the answer, whilst 14.3% demonstrated inability to read nutrition labels effectively. Similarly, more than half of students knew what to do in case of skin burns (know5; 57.8%), and the health risks of cannabis use (know3; 55.8%), whilst more than one fifth reported not knowing the answers and answering incorrectly. Further, less than half of students understood ways of transmitting HIV/AIDS (know8; 45.9% answered correctly), whilst almost one fifth did not know the answer and around one third answered incorrectly.

Table 5.11 Frequencies of responses on Scale D – cognitive factor (f5) (n = 434)

Item	Question	a (%)	b (%)	c (%)	d (%)	e (%)
know1	How often should a young person at your age be physically active?	Up to two hours of sport per week is sufficient (9.2)	Physical education lessons at school are sufficient (3.9)	*About an hour every day while one's works up a sweat, is sufficient* (36.4)	Three times a week exercise is sufficient (41.5)	Do not know (280)

Item	Question	a (%)	b (%)	c (%)	d (%)	e (%)
know2	How does it affect the body if you regularly drink a lot of alcohol?	*Almost all organs are damaged* (33.2)	Only the liver and brain are damaged (32.9)	It depends on how much the body can tolerate (16.8)	The lung volume decreases (0.7)	Do not know (16.4)
know3	What are the health effects for young people of consuming cannabis (marijuana, hashish) often?	*Poorer learning and memory skills* (55.8)	Permanent brain damage (16.4)	Hair loss (1.2)	Only physical dependence (3.2)	Do not know (23.5)
know4	What is NOT one of the possible effects of smoking?	Tooth loss (11.3)	Skin aging (4.1)	*Near-sightedness* (37.3)	Decreased muscular strength (18.2)	Do not know (29)
know5	How can small burns be treated?	Sprinkle flour on the wound (1.6)	*Cool for 10 minutes under lukewarm water* (57.8)	Always pierce blisters from burns (1.2)	Cool only with sterile saline solution (18.9)	Do not know (20.5)
know6	Which ingredient is contained in the highest amount in a cocoa drink powder with the ingredients listed on the package as follows: sugar, dextrose, low-fat cocoa powder, emulsifier agent (lecithin), salt?	Salt (2.3)	Dextrose (3.9)	*Sugar* (64.1)	Cocoa powder (8.1)	Do not know (21.7)
know7	We want to know if you know what your rights are. One of the following sentences is WRONG. Which sentence is that?	I can disagree to a major medical surgery, even if	I have to agree before my doctor will inform my parents about my	I have the right for the doctor to inform me about the advantages	*I have no rights.* (35.5)	Do not know (20.7)

Item	Question	a (%)	b (%)	c (%)	d (%)	e (%)
		my parents have agreed. (15.2)	treatment. (9.9)	and disadvantages of my treatment. (18.7)		
know8	How can HIV/AIDS be transmitted?	Kissing (26)	Skin contact such as shaking hands (2.5)	Insect bites (7.1)	*None of the given answers is correct* (45.9)	Do not know (18.4)

Note: correct answers are highlighted in italics.

As shown in Table 5.12, the total mean score for Scale D was 3.66 (SD = 1.81, 95% CI = 3.49 - 3.83). Some items had a peaked distribution. However, overall, with visual inspection, this dataset approximated a normal distribution.

Table 5.12 Descriptive statistics – Scale D

Scale D	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
f5	know1	434	.36	.48	0 - 1.00	.57	-1.69
	know2	434	.33	.47	0 - 1.00	.72	-1.49
	know3	434	.56	.50	0 - 1.00	-.23	-1.95
	know4	434	.37	.48	0 - 1.00	.53	-1.7
	know5	434	.58	.49	0 - 1.00	-.32	-1.91
	know6	434	.64	.48	0 - 1.00	-.59	-1.66
	know7	434	.35	.48	0 - 1.00	.61	-1.64
	know8	434	.46	.50	0 - 1.00	.17	-1.98

Scale D	Item	n	Mean	SD	95% CI (upper - lower)	Skewness	Kurtosis
	Total	434	3.66	1.81	3.49 - 3.83	-.03	-.65

5.3.4 Multivariate Analysis

The MANCOVA test was performed to examine the main and interaction effects of the subgroup variables (gender, study level, school decile, and prioritised ethnic group) and on the average subscale scores. As shown in Table 5.13, students from low-decile schools presented a significantly higher score in Scale A than students from high-decile schools, $F(1,389) = 4.34$, $p<.05$, partial eta squared = 0.01. However, in Scale D the result was the opposite from Scale A, with students from low-decile schools presenting a lower score, $F(1,389) = 6.08$, $p<.02$, partial eta squared = 0.01 (Table 5.13).

Table 5.13 Scales A and D per school decile

Measure		*M (SD)* *n*
Scale A	High-decile school	2.94 (.38) *278*
	Low-decile school	3.16 (.45) *137*
Scale D	High-decile school	4.15 (1.62) *278*
	Low-decile school	2.77 (1.74) *137*

In Scale B, female students presented a significantly higher score (M = 2.86, SD = .54, *n* = 148) than male students (M = 2.77, SD = .61, *n* = 267), $F(1,389) = 4.47$, $p<.05$, partial eta squared = 0.01. In Scale C, ethnicity interacted with the school decile, as shown in Figure 5.2 and Table 5.14, $F(4,389) = 3.58$, $p<.01$, partial eta squared = 0.03.

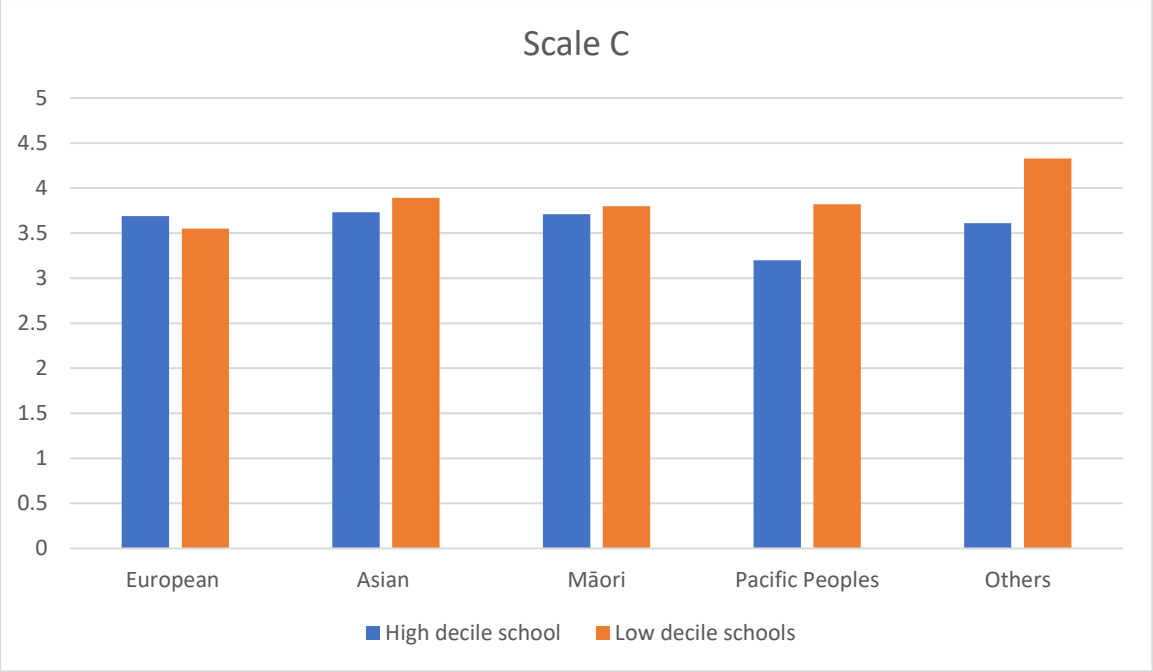


Figure 5.2 Average Scale C score as a function of school decile and ethnicity

Table 5.14 Interaction between ethnicity and school decile in Scale C

Measure		European	Asian	Māori	Pacific Peoples	Others
		M (SD) *n*	M (SD) *n*	M (SD) *n*	M (SD) *n*	M (SD) *n*
Scale C	High decile	3.69 (.64) *124*	3.73 (.49) *95*	3.71 (.65) *30*	3.20 (.88) *7*	3.61 (.63) *22*
	Low decile	3.55 (.59) *41*	3.89 (.77) *9*	3.80 (.61) *56*	3.82 (.58) *28*	4.33 (.46) *3*

5.3.5 Comparison with the German Sample

To investigate the differences between the New Zealand and German cohorts, the MOHLAA-Q results of this study with senior high school students were compared with a German sample equivalent (264). Initially, mean total scores for the four scales were compared between groups. German adolescents scored significantly higher on Scales B, C, and D than the sample of this study, with small effect sizes (Table 5.15). There were no statistically significant differences on Scale A (Table 5.15).

Table 5.15 Comparison between the New Zealand and German cohorts in the four MOHLAA-Q scales

MOHLAA-Q Scale	Present study (*n*=434) *M (SD)*	German study (264) (*n*=1,202) *M (SD)*	t-value	Degrees of freedom	Cohen's *d*	95% CI for Cohen's *d*
Scale A: Dealing with health-related information	3.01 (.43)	3.03 (.43)	-.83	766	-.05	(-.16, .06)
Scale B: Health-related communication skills	2.79 (.61)	2.94 (.7)	-4.22*	871	-.22	(-.33, -.11)
Scale C: Attitudes toward one's own health and health information	3.70 (.62)	3.84 (.74)	-3.82*	906	-.20	(-.31, -.09)
Scale D: Health-related knowledge	3.66 (1.81)	4.58 (2.21)	-8.54*	927	-.44	(-.55, -.32)

*p<.001

Given possible problems with multiple comparisons and the increased likelihood of type one error or a false positive, the Bonferroni correction adjustment was implemented (279). In the behavioural factor of Scale A, German adolescents scored significantly higher than the sample of this study on info1 (finding information about what to do when ill to get better), with a small effect size (Table 5.14). New Zealand adolescents scored significantly higher than the German group on info8 (implementing recommendations to protect oneself during sport, leisure time and in traffic), with a large effect size (Table 5.16). There were no statistically significant differences noted in reference to the other items.

Table 5.16 Comparison between the New Zealand and German cohorts in Scale A – behavioural factor

Scale A – behavioural factor	**Present study (*n*=434)** *M (SD)*	**German study (264) (*n*=1,202)** *M (SD)*	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
info1	3.10 (.64)	3.25 (.6)	-4.25*	725	-.25	(-.36, -.14)
info5	2.76 (.82)	2.81 (.96)	-1.04	889	-.05	(-.16, .06)
info8	3.28 (.65)	3.06 (1.12)	4.90*	1314	.46	(.35, .57)
info9	3.35 (.67)	3.35 (.77)	0	872	0	(-.11, .11)
info12	2.70 (.78)	2.74 (1.16)	-.80	1138	-.04	(-.15, .07)

*p<.001

In the cognitive factor of Scale A, German adolescents scored significantly higher than the sample of this study on info6 (understanding how to protect oneself from sexually transmitted diseases), with a small effect size (Table 5.17). Two items – info4 (following the instructions of the doctor or pharmacist) and info7 (judging whether to trust media warnings of health risks) – presented a statistically significant difference at the .05 level – the former favouring the German group, and the latter the New Zealand cohort. However, with the Bonferroni correction (p<.007), these differences were non-significant (Table 5.17).

Table 5.17 Comparison between the New Zealand and German cohorts in Scale A – cognitive factor

Scale A – cognitive factor	**Present study (*n*=434)** *M (SD)*	**German study (264) (*n*=1,202)** *M (SD)*	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
info2	2.82 (.73)	2.89 (1.00)	-1.54	1045	-.08	(-.18, .04)
info3	2.59 (.74)	2.59 (.77)	0	793	0	(-.11, .11)
info4	3.45 (.59)	3.53 (.66)	-2.34**	850	-.12	(-.23, .01)
info6	3.25 (.73)	3.40 (.81)	-3.56*	843	-.19	(-.30, -.08)

Scale A – cognitive factor	**Present study (*n*=434)** ***M (SD)***	**German study (264) (*n*=1,202)** ***M (SD)***	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
info7	2.74 (.73)	2.66 (.75)	1.94**	784	.11	(0, .22)
info10	3.00 (.80)	3.06 (1.04)	-1.23	989	-.06	(-.17, .05)
info11	3.13 (.77)	3.05 (.99)	1.42	800	.09	(-.18, .04)

*p<.001, **p<.05

In Scale B, German adolescents scored significantly higher than the sample of this study on com2 (chatting with friends about avoiding unhealthy behaviours), and com4 (easily talking with parents about health topics), with small effect sizes (Table 5.18). One item (com3 - helping friends or siblings with questions about health) presented a statistically significant difference at the .05 level favouring the German group. However, with the Bonferroni correction (p<.01), this difference was non-significant (Table 5.18).

Table 5.18 Comparison between the New Zealand and German cohorts in Scale B

Scale B – behavioural/ communicative factor	**Present study (*n*=434)** ***M (SD)***	**German study (264) (*n*=1,202)** ***M (SD)***	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
com1	2.79 (.85)	2.83 (1.16)	-.76	1041	-.04	(-.15, .07)
com2	2.56 (.96)	2.78 (1.23)	-3.78*	974	-.19	(-.30, -.08)
com3	3.00 (.76)	2.90 (.78)	2.33**	784	.13	(.02, .24)
com4	2.83 (.95)	3.26 (1.14)	-7.65*	911	-.39	(-.50, -.28)

*p<.001, **p<.05

In Scale C, German adolescents scored significantly higher than the sample of this study on att2 (seeking advice from others when ill), att3 (understanding one's responsibility in protecting oneself from diseases), and att4 (knowing what to do to make oneself feel comfortable), with small effect sizes (Table 5.19). These differences were statistically significant at the Bonferroni correction level (p<.01).

Table 5.19 Comparison between the New Zealand and German cohorts in Scale C

Scale C – affective/ conative factor	**Present study (*n*=434)** ***M (SD)***	**German study (264) (*n*=1,202)** ***M (SD)***	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
att1	3.35 (.94)	3.43 (1.12)	-1.44	904	-.07	(-.18, .04)
att2	3.55 (1.08)	3.78 (1.39)	-3.51*	979	-.17	(-.28, -.06)
att3	3.82 (1.04)	4.05 (.98)	-4.01*	728	-.23	(-.34, -.12)
att4	2.83 (.99)	4.20 (1.05)	-24.31*	808	-1.32	(-1.44, -1.20)
att5	3.77 (.95)	3.72 (1.24)	.86	993	.04	(-.07, .15)

*p<.001

In Scale D, a significantly higher proportion of German adolescents got the right answer in comparison to their New Zealand peers on almost all items, with small effect sizes: know2 (knowledge about the health risks of alcohol use), know4 (knowledge about the health risks of smoking), know5 (knowledge about first aid measures in case of skin burns), know6 (knowledge about nutrition labels), know7 (knowledge about patient rights), and know8 (knowledge about ways of transmitting HIV/AIDS) (Table 5.20). One item (know1 - knowledge about physical activity) presented a statistically significant difference at the .05 level, also favouring the German group. However, with the Bonferroni correction (p<.006), this difference was non-significant (Table 5.19). A significantly higher proportion of New Zealand adolescents attained the right answer than the German cohort on know3 (knowledge about the health risks of cannabis use), with a large effect size (Table 5.20).

Table 5.20 Comparison between the New Zealand and German cohorts in Scale D

Scale D – cognitive factor	**Present study (*n*=434)** ***M (SD)***	**German study (264) (*n*=1,202)** ***M (SD)***	**t-value**	**Degrees of freedom**	**Cohen's *d***	**95% CI for Cohen's *d***
know1	.36 (.48)	.43 (.64)	-2.37**	1016	-.12	(-.23, -.01)
know2	.33 (.47)	.52 (.68)	-6.36*	1106	-.30	(-.41, -.19)

Scale D – cognitive factor	Present study (*n*=434) *M (SD)*	German study (264) (*n*=1,202) *M (SD)*	t-value	Degrees of freedom	Cohen's *d*	95% CI for Cohen's *d*
know3	.56 (.50)	.44 (.45)	4.40*	701	.26	(.15, .37)
know4	.37 (.48)	.53 (.66)	-5.35*	1049	-.26	(-.37, -.15)
know5	.58 (.49)	.66 (.51)	-2.88*	794	-.16	(-.27, -.05)
know6	.64 (.48)	.87 (.40)	-8.93*	662	-.54	(-.66, -.43)
know7	.35 (.48)	.50 (.77)	-4.69*	1228	-.21	(-.32, -.10)
know8	.46 (.50)	.63 (.58)	-5.81*	880	-.30	(-.19, -.29)

*p<.001, **p<.05

Overall, the comparison of MOHLAA-Q scores between these adolescents living in Germany and students enrolled in senior high schools in Aotearoa New Zealand, favoured (with small effect sizes), the German cohort (264). They engaged more in health-related communication (Scale B), had more active attitudes towards their own health and health information (Scale C), and showed higher health-related knowledge (Scale D). On the other hand, both cohorts dealt with health information similarly (Scale A).

Comparisons of individual items of Scale A indicated the German cohort reported less difficulty (with small effect sizes) to find information about what to do when ill to get better (info1) and understand how to protect oneself from sexually transmitted diseases (info6). New Zealand adolescents reported less difficulty (with a large effect size) implementing recommendations to protect oneself during sport, leisure time and in traffic (info8). In Scale B, the German cohort reported chatting more with friends about avoiding unhealthy behaviours (com4) and found it easier to talk with parents about health topics (com4) (with small effect sizes). In Scale C, the German cohort demonstrated more active attitudes (with small effect sizes) in terms of seeking advice from others when ill (att2), understanding one's responsibility in protecting oneself from diseases (att3), and knowing what to do to make oneself feel comfortable (att4). In Scale D, the German cohort had better knowledge (with small effect sizes) about the health risks of alcohol use (know2) and smoking (know4), first aid measures in case of skin burns (know5), nutrition labels (know6), patient rights (know7), and ways of

transmitting HIV/AIDS (know8). The New Zealand cohort had more knowledge (with a large effect size) about the health risks of cannabis use.

5.3.6 Qualitative Analysis

Two hundred and seventy-three students answered the open-ended question on how they wanted health literacy to be taught (all responses are presented in Appendix XXIII). Twenty-eight students said they were unsure or did not know how they would like to be taught health literacy. Two students were confused with the question and the term 'health literacy'. From the thematic analysis of 243 answers, six themes emerged (Figure 5.3): 'at and outside school', 'by myself and with guidance', 'exploring topics and skills that I consider relevant', 'through fun activities and a supportive environment', 'expanding health classes', and 'I am not that interested".

Figure 5.3 Themes (in green squares) that emerged from the qualitative dataset
Figure created on Inspiration® 10 (83).

5.3.6.1 Themes

At school and outside school

The first theme captures places that the students consider ideal to learn health literacy. Schools were the most commented location. Students expressed the wish to not only work in classrooms but also utilise the whole school environment:

"…advertising activities around the school." (S79 – 17yo, male, Year 12, high decile school, enrolled in Health)

"*…outside the class activities.*" (S96 –16yo, female, European, Year 12, high decile school, enrolled in Health)

They considered health literacy a subject to be explored in health, physical education and science classes. Another popular location was online. Some students suggested they would like to learn about online information when at school, whilst others preferred to have online learning extracurricular activities so that they can complete their studies in their own time at their place of choice. A few students said they would like to learn outside the school through usual health appointments, field trips to healthcare settings and universities, and exploring the outdoors.

By myself and with guidance

Students highlighted from whom they would like to learn health literacy. Some reinforced the role of teachers and tutors as the mediator of learning:

"*Being taught by a teacher, online wouldn't be effective.*" (S427 – 17yo, male, Pacific Peoples, Year 13, low decile school)

"*To be taught it from a tutor because I'm really interested.*" (S459 – 16yo, male, Pacific Peoples, Year 12, low decile school)

Others reported being able to learn health literacy on their own through the Internet. Some students explained they wanted to learn from health professionals, who have practical expertise, and people who are willing to share their experience with health issues. Few students reported they already learn or would like to learn health literacy with their parents.

Exploring topics and skills that I consider relevant

This theme revealed the health topics that students were interested to learn. The main areas outlined were mental health (the most common topic, mentioned by 20 students), nutrition, specific health topics (such as diseases, health rights etc), drugs, wellbeing, and sexuality. They also aspired to learn skills related to help seeking, disease risk factors and management, and knowledge of health and healthcare:

"*I want to … be able to access help with easy when needed as well as know how to help myself.*" (S16 – 16yo, female, Māori, Year 12, high decile school, enrolled in Health)

"…*What you can do to prevent poor mental health.*" (S7 – female, Māori, Year 12, high decile school, enrolled in Health)

Through fun activities and a supportive environment

Students reported the types of activities that would engage them in learning about health literacy. They asked for experimental activities in which they actively engage in the learning process rather than passively taking in information:

"*In class by doing it myself rather than just being taught it.*" (S102 – 16yo, male, Asian, Year 12, high decile school, enrolled in Health)

"*I think we should be taught these things through actually experiencing them, instead of just being fed verbal information about it. In class, I feel as though I am just being spoken to and nothing is actually comprehended. By getting up and using my hands not only will I learn better but I will enjoy it*" (S294 – 16yo, female, European, Year 12, high decile school, enrolled in Health).

They suggested a preference towards fun, interactive, and engaging activities, such as hands on activities, games, quizzes, videos, group work, real-life scenarios, and presentations with guest speakers. They also expressed a wish to have technology and visual arts incorporated in class, such as using websites, apps, online articles, videos, and media. However, they still valued printed material – such as books, worksheets, posters, pamphlets, and leaflets. Further, students emphasised the need for a safe, non-judgemental, inclusive environment that makes them feel not only valued but also comfortable to ask questions and discuss sensitive health topics. They believed some topics needed to be talked about more often, so it felt common instead of unusual and embarrassing. Another aspect related to this subtheme is that students indicated an appreciation of resources that make learning easier:

"Through studies summarized into key points." (S214 – 17yo, male, Other Ethnicity, Year 13, high decile school, not enrolled in Health)

"I would like to learn by having a website to access where all the information is available." (S176 – 17yo, female, European, Year 13, high decile school, enrolled in Health)

Expanding health classes

This fifth theme complemented the former one with changes students believed were necessary in health classes to improve the teaching of health literacy. Some students felt health literacy was not taught in health classes. They also believed health classes should have more depth and frequency:

"*Not enough information is covered*." (S53 – 18yo, male, Asian, Year 13, high decile school, not enrolled in Health).

"*I think junior classes were good…, but they should be more frequent, I think. They also discussed barely any of the topics discussed here (not even our rights).*" (S206 – 18yo, female, Other Ethnicity, Year 13, high decile school, not enrolled in Health).

Some students argued that health should be compulsory in senior high school years:

"I believe if health is compulsory on to year 11 it would be extremely helpful as I took it in year 11 and learned quite a lot of useful information that others don't know concerning health issues." S232 (17yo, male, European, Year 13, high decile school, not enrolled in Health)

One student also suggested having exams about health literacy that give credits for the New Zealand's National Certificates of Educational Achievement (63).

I am not that interested

A small number of students said they were not interested in learning about health literacy. Some students indicated interest but did not consider it a priority in their tight class schedules:

"*…wouldn't want to give up one of my subjects for health literacy.*" (S210 – 18yo, male, Asian, Year 13, high decile school, not enrolled in Health)

"*During a period where it doesn't get in the way of our classes.*" (S208 – 17yo, male, Asian, Year 13, high decile school, not enrolled in Health)

5.4 Discussion

This study investigated the health literacy level of senior high school students in Aotearoa New Zealand. I conducted a cross-sectional survey with 434 senior high school students (from four

secondary schools in the North Island of Aotearoa New Zealand). Considering the paucity of health literacy measurement tools specifically designed for adolescents, I explored the suitability of the English version of the MOHLAA-Q (43) for my target population. The findings of the survey exposed a critical mass of students with poor health literacy levels in all examined health literacy dimensions. However, this survey also identified most sampled students wanted to learn about health literacy skills, and how health classes could be improved to engage them in developing these skills.

5.4.1 Reliability and Validity of the English Version of the MOHLAA-Q as Applied to the New Zealand Context

Cronbach's alpha statistic coefficients characterised Scales A, B, and C as reliable domains to measure generic health literacy. A confirmatory factor analysis of these domains also indicated the three-factor model (Scale A = behavioural and cognitive; Scale B = behavioural/communicative; Scale C = affective/ conative) had an acceptable fit. The chi-square value was inadequate. However, this index is sensitive to sample size, becoming overstated with large numbers, and represents only one aspect of model evaluation (43,275,281). Therefore, the large sample size of this study may have inflated this estimate. Overall, this analysis confirms the structural validity of Scales A, B, and C.

The low reliability estimate (Cronbach's α) of Scale D was expected, considering the intended heterogeneity of the tested knowledge, and its multiple-choice nature (43). The results for item difficulty and discrimination of Scale D supported the assertion of internal consistency (274) and indicated this set of questions was appropriate when measuring health-related knowledge of senior high school students in Aotearoa New Zealand.

Overall, the statistical analyses endorsed the robustness and applicability of the English version of the MOHLAA-Q. This study confirmed the structural validity of this tool. The internal consistency of the scales in this analysis was higher than that observed in the original German questionnaire (43). Thus, this tool is suitable (reliable and valid) for use in practice and research to measure generic health literacy and health-related knowledge of senior high school students in Aotearoa New Zealand.

5.4.2 Health Literacy Levels of Senior High School Students in Aotearoa New Zealand

This study confirmed the comparative health literacy deficit of a critical mass of young people in Aotearoa New Zealand identified in the Adult Literacy and Life Skills Survey 2006 (17). This is concerning, as health literacy amongst this population has been associated with better health behaviours and health outcomes (40,282,283), as well as academic outcomes (39). The results demonstrated that the New Zealand sample scores were lower than the generic health literacy levels presented by adolescents in Germany (264). This is particularly problematic because the German cohort was younger than the New Zealand cohort (14 to 17 years old versus 16 to 20 years old). Moreover, Germany has been cited as one of the countries with the highest prevalence of poor adolescent health literacy skills in the European 2017/2018 Health Behaviour in School aged Children survey (51)

However, the findings of the present survey are not able to definitively determine that the health literacy skills of adolescents in Aotearoa New Zealand are below those of adolescents in Germany. First, the sampling strategy of this study was not random. Secondly, the questionnaire was developed in Germany. Therefore, the results may reflect a difference in the health content taught in high school in Aotearoa New Zealand and Germany. Furthermore, the questionnaire and subsequent results were prone to cultural bias. It is possible that a tool developed for adolescents with a different language, ethnicity, and cultural background, may not accurately capture the true health literacy status of the New Zealand participants (284). Nevertheless, the topics and aspects covered in the questionnaire do relate to the New Zealand health and physical education curriculum (66) and the NCEA health matrix (70). Thus, the present study indicates that the sampled senior high school students did not achieve the learning envisioned by the government in terms of health-related knowledge. Furthermore, this unsatisfactory level of health-related knowledge presented by the sampled students is particularly concerning because Scale D of the original MOHLAA-Q was shown to correlate with the Newest Vital Sign (NVS) test (43,285), which measures functional health literacy. Thus, this study indicates senior health students in Aotearoa New Zealand could have poor functional health literacy, which is the most basic level of health literacy. Health knowledge operates at the micro-level in the social ecological conceptual framework, both depending on health literacy and enhancing it (48).

This health literacy deficit of senior high school students follows the global scenario of a crisis (18,19) that does not spare wealthy, developed countries (14,15) that have the best ranks pertaining to the educational system. However, a survey with 114 New Zealand senior high school students aged between 16 and 18 years found that they had adequate levels of mental health literacy (286). Participants were asked to read two vignettes about adolescents with depression and schizophrenia. Most participants were able to recognise the diseases correctly (73.7% for depression, 51.8% for schizophrenia). More than half the students recommended professional help (55.3% for depression, 53.5% for schizophrenia). Most of the sample also recommended non-professional help (93.9% for depression, 74.6% for schizophrenia). These specific skills relate to mental health literacy rather than generic health literacy, which was investigated in the present study. These findings are not necessarily contradictory, given that adolescents could have adequate mental health literacy but unsatisfactory generic health literacy. This is a possibility considering that findings reported in Aotearoa New Zealand showed a high prevalence of depression and suicidality in youth (287), placing it among the top countries in the world with the highest adolescent suicide rates (288,289). Unlike health literacy, mental health is included in health promotion across educational sectors and within school curricula in Aotearoa New Zealand (290,291).

5.4.3 Subgroup Analyses

The present study examined the extent to which demographic and sociocultural factors influenced health literacy of adolescents in Aotearoa New Zealand. This could provide insights into how to best support certain subgroups (264). The current survey found results consistent with the German cohort (264), indicating that female adolescents have better health-related communication skills than males (Scale B). This aligns with New Zealand and international literature indicating female adolescents have higher health literacy than males (286,292,293). However, more studies need to confirm this. In addition, it has been reported that male students tend to be more confident compared to their female peers (294). A study measuring health literacy through self-assessment tools highlighted that males tend to overestimate their capabilities (295). Thus, despite the difference identified in the present study being little, female senior high school students could have better health literacy skills than their male peers.

The Adult Literacy and Life Skills Survey 2006 did not analyse gender differences for the 16-18 years age group (17). Nevertheless, they found that New Zealand females had higher health literacy skills than males, and that non-Māori males had higher health literacy skills than Māori

females (17). In contrast, the present study indicated no interaction between gender and ethnicity. This result could be due to females being under-represented in the Māori and Pacific Peoples groups. Alternatively, it could indicate the difference observed in adults is not yet established during adolescence. Thus, improving the health literacy of senior high school students could help diminish the effects of socioeconomic deprivation on health literacy skills.

The present study identified an interaction between ethnicity and school decile to predict adolescents' attitudes toward one's own health and health information. Across most ethnic groups, except for Europeans, students from low-decile schools demonstrated more active attitudes toward one's own health and health information (Scale C) than students from high-decile schools. Similarly, students from low-decile schools reported dealing with health-related information (Scale A) better than students from high-decile schools. However, students from low-decile schools had worse health-related knowledge (Scale D) than students from high-decile schools. The objective measurement of Scale D relates to functional health literacy (43). It is unlikely that students with less functional health literacy would have better skills to deal with health-related information (Scale A) and more active attitudes toward their own health and health information (Scale C). Thus, students from low-decile schools could have overestimated their skills in the subjective self-reports of Scale A and C or tended to choose answers that seem desirable. Alternatively, this conflicting result may further illustrate elements of cultural bias within the items structure of the questionnaire. It is important to highlight that a school's decile does not indicate education quality, but rather the socioeconomic context of a school's area. The literature associates family socio-economic status with the health literacy of adolescents, with those from wealthier families having better skills (4,293,296-298). In the German cohort, low or moderate family affluence was associated with lower scores on all scales (264).

A systematic review investigating the relationship between health literacy (functional level/ health literacy media domain) and health behaviours in adolescents supports the relationship between health literacy and family wealth but indicated inconsistency in the evidence for associations with gender and age (40). Considering that a higher education level may positively influence health literacy (292,293), students enrolled in Year 13 were expected to have stronger skills than their younger peers in Year 12. However, study level was not an associated factor in the present study. The fact that Year 13 students presented similar health literacy skills to those in Year 12 could be due to the lack of explicit teaching on health literacy in the New Zealand senior high school system. This finding needs to be clarified with further research.

5.4.4 How Senior High School Students Want to Learn about Health Literacy

The responses to the open-ended question in this survey indicated that students recognised the school as the main setting for them to learn about health literacy, as proposed by the literature (8,39,49,53). They noted that the whole school environment could help them promote health literacy skills, for example, through posters around the school. The literature proposes that addressing the whole school environment to sustain the efforts to improve the health literacy of adolescents (172). Thus, to support students, a school needs to improve its organisational health literacy and the health literacy of school staff and the wider school community (4,39,55,61,62,171,172). Some students also recognised that their parents influenced their application and understanding of health literacy. Indeed, the literature supports the influence of parents in the health literacy of adolescents, with higher parental education and income leading to higher parental health literacy (38,40,262). Thus, school programmes to improve the health literacy of students could involve the students' parents.

Promoting contact with people that have experienced health issues could also be another strategy to improve the health literacy of students. Health consumers (people that have experienced health issues) could help students empathise, understand health risks and consequences, and identify solutions. Although some surveyed students would like to have this contact, this area needs more investigation. School-based interventions with contact with mental health consumers have been shown to improve, compared to education-alone, both mental health literacy and attitudinal stigma (299) or only mental health literacy (300). However, this strategy has also been shown to have no impact in either of these outcomes (116). Adolescents conceive mental health issues differently and may be confused by this contact (116). However, these studies had small samples and investigated short interventions (one or two days). Furthermore, the participants in the present survey referred to health consumers of any type. The effects of contact with health consumers in health literacy school programmes need to be further investigated.

The surveyed students also said they would like to learn about health literacy outside the school. This could be in their usual health appointments with healthcare professionals, or through school fieldtrips to healthcare settings and universities to develop these skills. US American high school students reported that a university anatomy laboratory tour programme they participated in was interesting, engaging, educational, and informative (301). They considered the programme increased their anatomical knowledge and interest in pursuing a

healthcare career (301). A similar hands-on, inquiry-based learning programme in the USA taking high school students on fieldtrips to universities to promote interaction with real-life issues, scientists, and laboratory tests, expanded the programme to include health literacy, as it was noted how it directly connected to STEM (science, technology, engineering, and mathematics) concepts (302). Fieldtrips can introduce students to unfamiliar settings and concepts, potentially increasing their health literacy and interest in science through interactive and impactful experiences (301,302).

Another setting that students mentioned (besides healthcare settings and universities) was the outdoors. Exploring the outdoors could improve the physical and mental health of students (especially those in urban areas) and promote social interaction, which could catalyse engagement with health literacy (303). This could increase their environmental health literacy and the environmental health literacy of their communities, which could lead to better health outcomes and action towards environmental injustices (304). Being digital natives and one of the world's biggest Internet users (305), the students also indicated they want to learn about health literacy online. Indeed, digitalisation is a concept relevant to adolescent health literacy (35). Despite their familiarity with digital settings, adolescents need to develop competencies to navigate these settings, which implies schools need infrastructure (such as Internet access and professional capacities) to address digital health literacy and critical media health literacy (172). Nevertheless, the students that participated in the present study also wanted to learn health literacy through printed materials (such as books, worksheets, posters, pamphlets, and leaflets) and resources that make learning easier for them (e.g., summary points of scientific studies).

Students regarded enjoyment as an important aspect of learning about health literacy. They would like interactive and engaging activities based on active learning. Using active learning in health literacy interventions is also supported by the literature as a more effective method of learning compared to traditional classes (where the teacher gives the content and students passively receive it). This method of teaching increases engagement, motivation, and critical thinking (92,93,146,147,160). The surveyed students would also like structural changes in the curriculum, i.e., they believed the health classes needed to be more frequent and have more depth. It is problematic that, in addition to showing lower scores (compared with their German peers) in the related knowledge and competencies, students believed they were not learning enough about the topics covered in the MOHLAA-Q. As mentioned before, these topics are included in the New Zealand health and physical education curriculum (66) and the NCEA

health matrix (70). In fact, some students suggested the NCEA could include health literacy in their assessments. This finding of high school students not believing they are learning enough about relevant health topics which are included in the New Zealand health and physical education curriculum was also revealed by the Youth19 Rangatahi Smart Survey (280).

Although a few students suggested health should be included as a compulsory subject at the senior level to address this gap, others indicated they would not give up one of their chosen school subjects to take health classes. This indicates health literacy could be explored in conjunction with other subjects, as noted by some students (e.g., physical education and science), considering the multidimensional and interdisciplinary nature of health literacy (35,306-308). Furthermore, extracurricular activities could also be beneficial, as indicated by some students who would like to have the option of doing online activities that they could complete at the time of their preference. Giving extracurricular activities to students to complete in their own, at the time of their preference, and on the topic of their choice, would provide a sense of autonomy and control over learning to students. This could increase engagement and student achievement (199,200). Besides that, as health literacy requires students to be able to make health choices on their own (53), giving them space to develop their independence could further benefit their health literacy skills.

Despite the brief description provided with the question (e.g., the ability to access, understand, appraise, and use health information), some students still could not understand the concept of health literacy. The difficulty comprehending and interpreting this term indicates they may lack direct experience with health literacy. Interviews with 14-17-year-old German adolescents indicated that unfamiliarity with terms used in the European Health Literacy Survey Questionnaire (such as symptoms of illnesses, health risks, housing conditions, living conditions, health-related tasks, and efforts to promote health) was indicative of the comprehensibility of the questions (309). Thus, establishing health literacy as a school key competency in the New Zealand national curriculum will make students more familiar with this term.

Whilst some students did not understand the concept, a few demonstrated no interest in health literacy. Having little interest in health literacy could be a consequence of limited knowledge on this topic (310). Instead of considering students as deficient or uninterested, schools need to be health literacy responsive and change their system to engage and empower children and adolescents with health literacy skills (4,36,55,62,311). Implementing some of the teaching

strategies proposed by the surveyed students (e.g., school fieldtrips, active learning, guest speakers) could make adolescents more interested in learning about health literacy.

5.4.5 Strengths and Limitations

This is the first study to measure the generic health literacy of senior high school students in Aotearoa New Zealand using a multidimensional measurement tool specifically designed for adolescents. Using this tool allowed me to compare the New Zealand cohort with an international cohort across the same age group. The added qualitative question also enabled students to voice their preferences about how they would like to develop their health literacy.

Despite the negative impact of the COVID-19 pandemic on the recruitment process, a large sample size was obtained. However, some caution in generalising the study's findings may be linked to the usage of a convenience sampling technique (164). This study sample may not accurately represent senior high school students in New Zealand. Furthermore, non-probability sampling is linked to volunteer bias (312). People that volunteer to participate in research may be different from those who choose not to take part. Although the present study included slightly more Asian and Other Ethnicity students than the whole adolescent student population in New Zealand in 2021 (313), the representation of the wider population was reasonable.

Other characteristics that should be considered are gender and school decile. Males are slightly (10%) over-represented in this study. Students from high decile schools are also over-represented as only one low decile school participated in the study, and none from the medium decile group. Furthermore, despite indicating how many students within a school come from low socio-economic communities, the decile rating might not definitely represent the overall socio-economic mix of a school, nor its context (314). This study used this rating rather than migration background, parental education, and family income, as seen in other studies (51,264).

In addition, there may be inherent cultural bias in the questionnaire, given it was designed and developed in Germany. Alternatively, students may have overestimated their health literacy in the self-reports, or simply chosen the answers that they felt were the desirable ones. For these reasons (overestimation and desirability bias), it has been proposed that task-performance assessments could be more precise measures of health literacy than self-reports (57). The measurement tool used in this study included both subjective and objective assessments to address this potential bias (43).

5.4.6 Implications for Practice

New Zealand schools need to address the relative health literacy deficit of senior high school students identified in this study, especially their low health-related knowledge. Thus, following the example of other countries such as Australia (62,311,315), Canada (102), Finland (55,58), and the USA (53,316), Aotearoa New Zealand should include health literacy in school health curricula. Although Germany has not yet done so, this country has established a research consortium into health literacy school-based interventions, surveys, and policies (317), proposing strategies to integrate health literacy into existing curricula (318).

Low-decile schools in Aotearoa New Zealand may need more support than high-decile schools to improve the health literacy of students. Consistent with the literature (92,93,146,147), the surveyed students asked for active learning methods in health literacy learning. Health classes should explore topics and skills that are relevant from the students' perspectives, embrace technology but also use printed materials, and promote person-to-person interaction. Health teachers could partner with teachers of other subjects to implement interdisciplinary projects that promote health literacy skills. They could also explore outdoor learning, invite guest speakers, and plan fieldtrips to healthcare settings and universities to increase student engagement (301,302).

5.4.7 Implications for Research

This study provides current and age-specific insight into the health literacy of senior high school students in Aotearoa New Zealand. The extent of poor health literacy and its associated factors for this population are yet to be established. Future studies should investigate how self-assessment of adolescent health literacy relates to other objective measurements (such as health-related knowledge, as evaluated in this study) to provide more precise measures of health literacy (57). The MOHLAA-Q may provide a base for an adapted tool with culturally and locally relevant topics. The present survey also calls for further research on the conceptual model of health literacy relevant to adolescence.

Primary studies assessing the effectiveness of school-based interventions to improve the health literacy of senior high school students could use several comparison groups. These include different active learning methods; classroom only versus other settings as well (e.g., outdoor learning, fieldtrips to universities and healthcare settings); contact with guest speakers (such as health experts or health consumers) versus no contact; and mono versus interdisciplinary

components (exploring health literacy skills through projects that involve more than one school subject). It is also important to investigate why the students in this study and in the Youth19 Rangatahi Smart Survey (280) believed they were not learning enough about topics that are included in the New Zealand health and physical education curriculum (66) and the NCEA health matrix (70). Further skills development in enhancing health literacy can be focussed on using digital devices and the Internet, with a critical mind (35,172,303). Finally, the feasibility of including health as a compulsory subject in senior high school in Aotearoa New Zealand needs to be investigated, as proposed by a few adolescents who noticed students who take health classes at the senior level are advantaged compared to those who have not continued their study in this subject. This strategy has shown to be effective in enhancing the health literacy of adolescents in Finland (51), where health literacy competencies are a primary goal of school education (4).

5.5 Conclusion

This study is the first to assess the health literacy of senior high school students in Aotearoa New Zealand through an age-appropriate validated measure. Psychometrics analysis indicated the English version of the MOHLAA-Q is likely a valid and reliable tool to measure generic health literacy of adolescents in Aotearoa New Zealand, although development of a more culturally appropriate questionnaire is mandated. The sampled senior high school students presented unsatisfactory generic health literacy, with worse levels than a cohort of adolescents in Germany aged 14 to 17 years. Subgroup analysis demonstrated that New Zealand girls had better health-related communication skills than their male peers. Students from low-decile schools reported dealing with health-related information better than students from high-decile schools but demonstrated worse health-related knowledge. School decile interacted with ethnicity to predict participants' attitudes toward one's own health and health information. In terms of learning about health literacy, the sampled adolescents would like to visit healthcare settings and universities, have contact with health consumers, explore the whole school environment and the outdoors, participate in interdisciplinary projects, use online and printed resources, engage with active learning, and study topics relevant from their perspectives.

6 General Discussion

"I want to know stuff to do with like, our body, like physical body. What's good for you and what's not, and effects of drugs and stuff. And about people's different beliefs, viewpoints, situations around the world and everything." Juan Carlos, 17 years old, Year 13.

This thesis provides an original contribution to extend the knowledge in this area as it presents the first in-depth exploration into the health literacy of senior high school students in Aotearoa New Zealand. This research also evaluated how health classes may further contribute to the development of health literacy skills among these students. With the last component of my mixed methods research presented in the previous chapter (Chapter 5), this chapter triangulates the findings of this thesis and discusses the overall results. Table 6.1 presents the main findings to the research questions that guided each of my studies.

Table 6.1 Research questions and main findings of the thesis

Research Question	Main Findings
Study 1: What are the characteristics of educational programmes developed and implemented in schools to improve the health literacy of senior high school students?	The scoping review revealed that programmes investigated a curriculum already in place, a short intervention delivered by teachers or health experts, or modifications in the school health services, either aiming to improve generic or domain-specific health literacy, mostly at the communicative level. The interventions explored interactive lectures based on active and interactive learning, hands-on activities, group discussions, student-led presentations, real-life scenarios, and ludic activities (role-playing, quizzes, music, and games). The content related to health knowledge and critical thinking, problem solving, and communication skills. Materials required for class activities included stationery, computers with Internet access, and multimedia (films, stories, and interviews). Some programmes engaged students in projects to promote health in their schools or communities and allowed them to choose topics. A few had an interdisciplinary nature (health with arts or geography classes).
Study 2: What pedagogical strategies do health teachers in Aotearoa New Zealand	The observation study indicated that the strategies teachers used in the observed classes aligned with principles of effective learning and health literacy education. These strategies included describing class goals and activities; providing clear instruction, guidance, individualised feedback, on-the-spot feedback, and choices; establishing an interactive classroom setting and a supportive environment; demonstrating availability

Research Question	Main Findings
secondary schools employ in senior classes?	to help students; using active learning; asking questions to the group; promoting critical thinking, the student voice, and responsibility; proposing writing tasks; revising topics; exploring multimedia, statistics, stories, technology, and topics relevant to students; and giving rewards to students.
Study 3: What are the experiences of senior high school health teachers in Aotearoa New Zealand and their students regarding how health is taught, and what are students' perceptions of their health literacy?	The interview study identified that teachers considered building a relationship with students as the main teaching strategy. They also used various teaching methods, created supportive environments, listened to the student voice, and provided individualised instruction. Besides following the New Zealand Curriculum framework and the NCEA standards, they ensured class consistency across the school, used external marking moderation, communicated with other teachers around the country, and incorporated feedback from students. However, teachers posed concerns about the excessive focus on summative assessments and the time constraints that both teachers and students face. Further interviews revealed that senior high school students taking health classes considered this subject unique and valuable because it explored relevant topics and promoted life skills. They appreciated the supportive environment of health classes but would like to have more options on topics and experience more active learning. All interviewed students lacked confidence and the skills to assess the reliability of health information.
Study 4:	
What are the levels of generic health literacy among adolescents enrolled in senior high school in Aotearoa New Zealand?	The sampled senior high school students in Aotearoa New Zealand presented unsatisfactory generic health literacy, with worse levels than a comparable German cohort. This study measured four dimensions of generic health literacy: dealing with health-related information, health-related communication skills, attitudes toward one's own health and health information, and health-related knowledge. The latter was the most unsatisfactory dimension. Female students had better health-related communication skills than their male peers. Students from low-decile schools reported dealing with health-related information better than students from high-decile schools but demonstrate worse health-related knowledge. School decile interacted with ethnicity to predict participants' attitudes toward one's own health and health information.

Research Question	Main Findings
How do senior high school students in Aotearoa New Zealand want to be taught about health literacy?	The sampled adolescents would like to visit healthcare settings and universities, have contact with health consumers, explore the whole school environment and the outdoors, participate in interdisciplinary projects, use online and printed resources, engage with active learning, and study topics relevant from their perspective.

Study 1 supported the feasibility of including health literacy in school health curricula and outlined the importance of using active and interactive learning, technology, and school/community and interdisciplinary projects. In my observation of classes in Study 2, I noted health teachers in Aotearoa New Zealand already applied these pedagogical strategies that may facilitate health literacy in senior level classes. Although there were no school/community and interdisciplinary projects in the observed classes, the topics explored could facilitate such initiatives. Study 3 indicated that senior high school students perceived and felt motivated by the pedagogical strategies that health teachers applied in class, although students expressed a desire for enhancement of these strategies. Furthermore, the reports of both students and teachers in Study 3 supported my Study 2 observations. Similarly, the results of Study 4 reinforced the claims of students in Study 3 that they have limited health literacy skills and would appreciate enhancement of pedagogical strategies. Thus, the findings of Studies 2, 3, and 4 support the implementation of the international strategies to improve the health literacy of senior high school students identified in Study 1. These strategies also align with the characteristics of a health-literate school proposed in the literature (61).

The unsatisfactory level of senior high school students in Aotearoa New Zealand demonstrated in Studies 3 and 4 could be due to the fact that senior high school health classes are not teaching health literacy skills explicitly. A systematic review published in 2021 found a similar result, concluding that school students aged from 6 to 18 years have inadequate levels of health literacy (319). This review included studies with high school students from Brazil, China, Finland, Iran, Lao PDR, Nigeria, and the USA (319). Other studies conducted in Europe (51) and Australia (73) also indicated limited health literacy skills of adolescents. Considering this global deficit of strong adolescent health literacy, added to previous research on the health literacy levels of New Zealanders aged over 16 years (17), the limited health literacy of

adolescents in Aotearoa New Zealand was expected. I further noted in the current research that the New Zealand sample scored lower than the German comparative sample, indicating critical concern for their levels of health literacy.

The findings of this thesis highlight a public health problem that needs to be tackled in Aotearoa New Zealand because low health literacy has been associated with unfavourable health indicators in adolescents (320). On the other hand, higher levels of health literacy skills in adolescent populations have been linked, in recent studies, to lower obesity rates (321), healthier food intake (296), better lipid profiles (322), less negative outcomes related to body image (91), more utilization of reproductive health services (323), better mental health outcomes (such as reduced depressive symptoms and suicide-related outcomes) (324), and lower frequency of unhealthy behaviours such as skipping breakfast, suboptimal physical activity (325) and risky behaviours such as consuming alcohol, tobacco, and marijuana, and early sexual activity (325,326). These data confirm the role of health literacy as a critical determinant of adolescent health (327). However, socioeconomic, material, psychosocial, and health-related factors have been noted to interact with health literacy towards health outcomes in young adults (328). Nevertheless, all these health outcomes are relevant for New Zealand adolescents, who are in dire need of improvements in health status and risks (287).

But rather than aiming for students to avoid illness and disease, school health education in Aotearoa New Zealand takes a socio-critical model that aims to build action competencies (223). This approach aligns with critical health literacy. Thus, this thesis supports the implementation in New Zealand schools of the framework proposed by Paakkari and Paakkari (4) that establishes health literacy as a learning outcome. In the following sections, I will outline the main findings of this thesis and link them to the wider literature. First, I will discuss the perspectives of senior high school students and health teachers presented in Studies 3 and 4. Then, I will explain the implications of the findings of this thesis in terms of school education policies, teaching practices, and research development. Before presenting the thesis conclusion, I will describe the strengths and limitations of this thesis.

6.1 Personal Expectations of Key Stakeholders

6.1.1 Senior High School Students

Studies 3 and 4 indicated that the sampled senior high school students in Aotearoa New Zealand wanted to improve their health knowledge and health literacy skills. They were interested in

mental health, nutrition, diseases, health rights, drugs, wellbeing, and sexuality. These topics that students considered relevant are aligned with the seven key areas of learning of the New Zealand Health and Physical Education curriculum (mental health, sexuality education, food and nutrition, body care and physical safety, physical activity, sport studies, and outdoor education) (66). Nevertheless, the students sampled in this thesis research were asking for more learning opportunities on these topics. These findings agree with the results of the Youth19 Rangatahi Smart Survey, in which secondary school students in Aotearoa New Zealand also asked for more teaching on these topics to face their generation's biggest problems (280).

Study 3 also demonstrated that students believed health classes promoted life and empathy skills, helped them understand global and personal issues and communicate more assertively, and allowed them to participate in the "adult world". These aspects of health classes that students valued align with the benefits of health literacy proposed by Nutbeam (4,8) and Paakkari and Paakkari (4,8): greater autonomy and personal empowerment towards citizenship and ethical responsibility. Another interview study conducted in Aotearoa New Zealand found that adults who had taken health classes at the senior level reported similar experience and learning outcomes as the sampled students in Study 3 (68). The interviewed adults (68) considered that senior health classes helped them not only to understand social and health issues, which increased their recognition of the value of respect and social justice, but also to develop interpersonal skills such as assertive communication and awareness of others. Thus, the report of adults supports the statement of the sampled students in Study 3 that senior health classes promoted life skills that they considered relevant for their future.

One of these knowledge domains relating to health literacy is understanding sexuality and the effects of drugs and alcohol. In the Youth19 Rangatahi Smart Survey, high school students reported dealing with peer pressure to engage in sex and use of potentially harmful substances (329). Study 3 indicated that senior high school students are going to parties where people are drinking alcohol. But understanding the consequences of drinking alcohol, which were learned in health classes, empowered students to make their own decisions instead of being pressured to engage in this activity. This aligns with the New Zealand curriculum in terms of health and physical education encouraging students to take a responsible attitude towards their own wellbeing (65,66). Nevertheless, Study 4 indicated only one third of respondents were aware that alcohol affects almost all organs of the body, only 37.3% knew the possible effects of smoking, and 55.8% identified the health effects for young people consuming cannabis on a regular basis. Thus, students not only need to learn more about drugs and alcohol, but they also

indicated in Studies 3 and 4 that they wanted to learn more about this topic. The students' requests for more frequent and greater depth in health classes also agreed with the high school student sample of the Youth19 Rangatahi Smart Survey, who stated that schools need to update and offer more learning opportunities for relevant life skills (280).

This is particularly relevant considering that although New Zealand high school students have been binge drinking less in the past 20 years (from 36% to 22%), they still drink more alcohol than their international peers in Australia, England, and the USA (330). A sharp decline in the past years in the use of cigarettes among New Zealand high school students has led to cannabis use to be more prevalent than smoking (330). However, there has been a sharper increase in the use of e-cigarettes (vaping) (330). Study 3 indicated that improving health literacy of senior high school students may empower them with knowledge and tools to make informed choices and act responsibly, even when pressured by peers.

Studies 3 and 4 also indicated that the sampled senior high school students would like hands-on, interactive, and fun active learning activities with real-life examples. This was supported by Study 1, that indicated these were the main characteristics of international school-based interventions to improve the health literacy of senior high school students. This finding was also consistent with results from a co-design study conducted in Ireland with socioeconomically disadvantaged adolescents, in which students also asked for hands-on and interactive activities in a health literacy intervention to make it more engaging (168). Similarly, a study conducted in Canada indicated that the one-year school health curriculum was perceived by senior high school students (Year 11) as not beneficial to their health literacy because it was "boring and passive", with a lot of "teacher talk" (102). However, another group of Year 11 students reported the same one-year curriculum provided them with information they needed to make healthy decisions (48). This indicates that, although adolescents may perceive school health education as important, they may not feel motivated to learn unless it is taught in an engaging way, as highlighted by the sampled students in Study 3. Indeed, studies conducted with high school students in Aotearoa New Zealand (331) and the United Kingdom (147,332), as well as information cited in other literature reviews (92,146), have indicated contextualised and interactive learning activities engage adolescents with critical thinking and scientific knowledge, improving their health literacy skills and health-related attitudes, potentially leading to healthy lifestyle behaviours. Exploring real-life examples can optimise learning by making it more memorable, meaningful, and interesting (216).

Furthermore, the above mentioned studies also support the sampled students' requests (Studies 3 and 4) to explore other settings beyond the school classroom (i.e., healthcare settings, universities and the outdoors), which have been suggested to facilitate memorable and impactful experiences that can have long-term effects on present and future health behaviours (92,146,147,168,331,332). This would also give opportunities for students to interact with health professionals, which was also requested by the sampled students in Studies 3 and 4, and Canadian senior high school students (102). This could not only help students improve their health literacy skills and health-related knowledge, but also encourage them to follow a career in science and healthcare (146,301). Forming a collaboration with health professionals is in fact considered a characteristic of a health-literate school (61).

Finally, similar to Canadian senior high school students (102), the New Zealand cohort surveyed in Study 4 would like to have contact with health consumers (people that have experienced health issues). Although direct social contact with consumers of mental health issues has been investigated in mental health literacy interventions for adolescents, this area requires further investigation (333). Considering the extent of the mental health issue in New Zealand adolescents (286,329), this strategy of promoting social contact with health consumers in schools should be further investigated. This experience could be an effective and affective pedagogical strategy (216) to help students understand the value of health and develop empathic skills, which the students interviewed in Study 3 considered a main learning outcome of health classes.

6.1.2 Health Teachers at the Senior High School Level

The sampled group of New Zealand health teachers in Study 3 outlined two main areas that created obstacles in their teaching practice and could potentially compromise interventions to improve the health literacy of senior high school students. First, they believed the excessive focus on summative assessments restrained them of covering topics of interest to students. Moreover, they felt the teaching was focused on the assessments, which were not integrated. However, a national survey in Aotearoa New Zealand indicated that secondary school teachers considered that involvement in assessment practices helped students develop responsibility in the learning process (334). Indeed, I noted this responsibility-building aspect of assessments through my class observations in Study 2. Nevertheless, a national survey also found identified a decline from 2018 to 2021 in the percentage of teachers that reported involving students in assessment practices (334), and this could indicate the teachers from this survey agreed with

the sampled health teachers in Study 3 that learning should not be solely focused on assessments.

The second aspect that the sampled health teachers in Study 3 considered relates to not having enough time to cover health topics comprehensively, to enhance their relationship with students and support them individually, and to upskill themselves. Another interview study indicated that students also acknowledge that their health teacher had to be aware of contemporary and topical topics related to health (216). However, a national survey of secondary school teachers in Aotearoa New Zealand, almost one third (27%) of respondents stated that their high workload compromised their teaching and their ability to support all their students, especially those with larger class sizes (334). Similarly, secondary science teachers who objected to including Māori knowledge in NCEA Science reported not having enough time for an extra component in the curriculum, and lacking competence or confidence to teach Māori knowledge (335). Thus, secondary health teachers may also face these barriers when cultivating health literacy skills as part of the school curricula.

Indeed, it has been proposed that health literacy should not only be included in school curricula but also in teacher training (39,55,171), as improving teacher health literacy is a key strategy to improving student health literacy (336). This is also supported by Freire (251), who argues a teacher must be committed to staying up to date with scientific, technological, and social innovations. However, not enough attention is given to improve the health literacy and health competencies of teachers in training, and the low health literacy of insufficiently trained teachers undermines student health literacy (337). For example, a study in Australia found that primary school teachers believed they were teaching health literacy skills but did not understand the concept of health literacy and were not teaching towards development of health literacy, but rather teaching health in a broad manner (338). Schools must support teachers in their continuous education and in the development of a curriculum that encourages autonomy (244) and health literacy skills. Thus, changes in the educational sector in Aotearoa New Zealand are necessary to support senior health teachers in educating for health literacy and ensuring the curriculum aligns with expected outcomes. The proposed changes will be discussed in the next section.

6.2 Implications for Policy Change within the System

The findings of this thesis suggested that, to improve the health literacy of senior high school students in Aotearoa New Zealand, health literacy must be included as a key competency in the existing health curriculum national guidelines. By creating specific learning conditions, schools can improve the health literacy of students (4,39,44,54,55,172,258). Indeed, adolescents from Finland, where health education is a compulsory school subject throughout school years that teaches health literacy competencies as a primary goal (4), demonstrated higher health literacy levels than adolescents from nine other European countries (51). A few sampled students in both Studies 3 and 4 have suggested including health as a compulsory subject at the senior high school level in Aotearoa New Zealand, which is the case in Finland.

Although it is beyond the scope of my thesis to evaluate the feasibility of making health a compulsory subject in senior high school, the findings indicate the sampled students in Studies 3 and 4 were not satisfied with the frequency and depth of senior health classes. Similar to adolescents that participated in the national Youth19 Rangatahi Smart Survey (329), they wanted to learn more about the topics that are covered in the New Zealand health and physical education curriculum (65,66), which were observed in Study 2 (i.e., diseases and sexuality). Thus, indicating adolescents in Aotearoa New Zealand are interested in learning more about health and wish to dive deeper into the learning of topics already covered in the national curriculum. School programmes aiming for health literacy can take advantage of this. Another aspect to be considered is that the sampled students in Studies 3 and 4 asked for more active learning opportunities. Study 2 indicated that the observed senior health classes already involved active learning and stimulated critical thinking. The socio-critical approach of the New Zealand health and physical education curriculum supports further incorporating these requests from students (i.e., more relevant topics and active learning).

The sampled students in Studies 3 and 4 also considered they are not learning enough about health literacy. Including health literacy within national school curricula is a key strategy to strengthening the health literacy of school-aged children (258,327). The Shanghai declaration (327) emphasises that the school curriculum is the main avenue through which health literacy skills should be promoted. However, few countries have policies and practices that support health literacy in schools (316). Furthermore, insufficient research has investigated how to promote health literacy skills in schools (68,108). Aotearoa New Zealand could be one of the

pioneer countries to include health literacy as a school learning outcome and research the effectiveness of this strategy.

However, the concept of adolescent health literacy is still evolving. The lack of a consensus regarding its main component, associated factors, and learning objectives (4,10,339) may hinder the effort of making it an explicit learning outcome for secondary schools. This research gap is also characterised by little implementation of the voice and perspectives of children and adolescents in the conceptual development of health literacy definitions and models (10). As health literacy is an asset, research focused on children and adolescents should include their experiences to comprehensively understand their needs, interests, and preferences (339). This thesis also highlights the need to incorporate the student voice. Studies 1, 2 and 3 demonstrate the importance of a student-centred approach. Study 4 used a tool developed with feedback from adolescents and invited students to express their preferences. Further research could reveal the perspectives of adolescents living in Aotearoa New Zealand regarding the main components and associated factors of adolescent health literacy.

As proposed by Paakkari and Paakkari (4), teachers can create learning conditions that build complexity moving from theoretical knowledge toward citizenship (4), which is similar to the hierarchical process of building critical health literacy from the basic and functional levels, as proposed by Nutbeam (8). But rather than a fixed procedure, this is a suggestion of how to create teaching conditions to address the different components and levels of health literacy (4). As each level or component englobes its precedent (i.e., citizenship includes all components but theorical knowledge stands by itself, and critical health literacy requires basic and functional skills), educational activities can focus on one or several aspects of health literacy, as demonstrated in Study 1. Although this thesis focuses on senior high school students, ideally learning for health literacy would start in primary school so that students can work at a deeper level in senior high school (4,38). Australia has been implementing school-based strategies (including professional development for teachers) to improve the health literacy of primary and secondary school students (62,108,254,340,341). School leaders found these strategies not only helped students, staff, and the wider school community to be familiar with the concept of health literacy, but also encouraged them to develop their understanding engaging in healthy behaviours (342).

The New Zealand school health curriculum strongly relates to the learning outcomes of critical health literacy because it envisions students to understand population health concepts from a

socio-critical perspective (68,69). The present thesis confirms the observations from Fitzpatrick and Burrows (69) that the holistic and critical philosophical premises of the official school health education curriculum does not always reflect in teaching practices and learning experiences. With health literacy not mentioned in the curriculum nor in resources to facilitate its implementation (68), it is not surprising that Studies 3 and 4 revealed a deficit of health literacy skills in the sampled studies. Aotearoa New Zealand should follow the example of Australia, Canada, Finland, and the USA (4,60,329) and update the health curriculum to include health literacy as a key competency. Nonetheless, these countries are also experiencing issues suggesting further development in their dissemination of health literacy skills (319). This would lead to senior high school health classes explicitly improving the health literacy of students. Figure 6.1 illustrates this process.

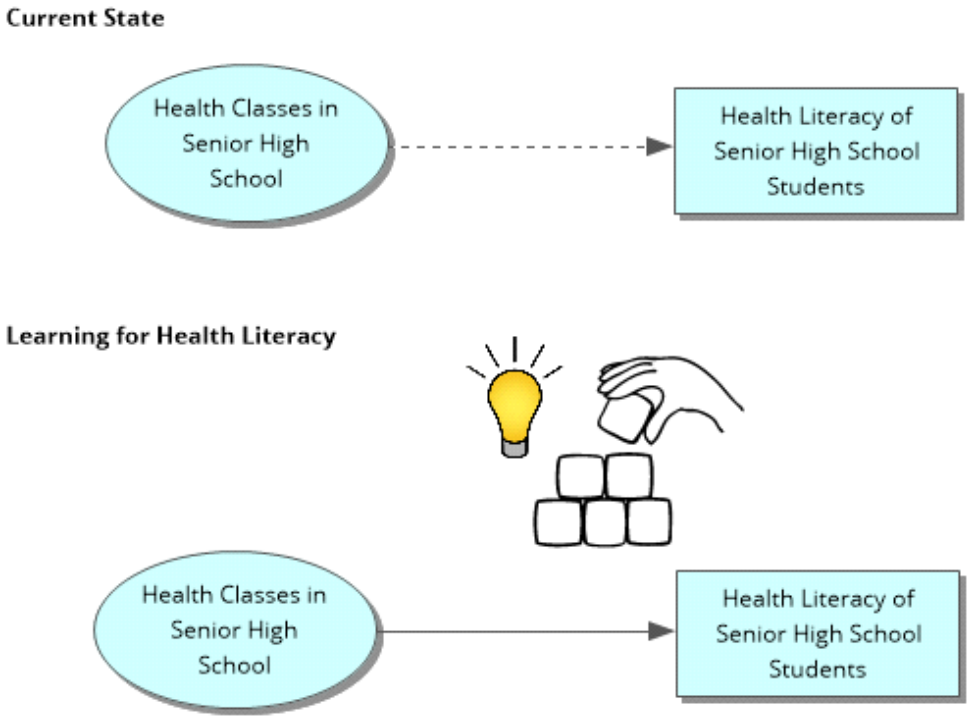


Figure 6.1 Health literacy as a key competency in senior high schools in Aotearoa New Zealand
Figure created on Inspiration® 10 (83).

Currently, reviews of the national senior high school curriculum and assessment in Aotearoa New Zealand are underway (63,343). Dixon, Abel, and Burrows (68) support the findings of this thesis by agreeing that the concept of critical health literacy should explicitly frame senior high school health education. However, this thesis suggests Aotearoa New Zealand could go a step further into the fourth level of holistic health literacy. This health literacy model based on

a school health education approach was proposed by Rask, Uusiautti, and Määttä (344) after evaluating the answers of senior high school students in the Finnish Matriculation Examination that, similar to the NCEA, assess their ability in defining the core concepts learned at school for each subject. The authors analysed whether students' answers to health questions reflected the three levels of health literacy (344). At the basic level, students were able to recognise and describe a health issue and its related factors; reflecting the communicative level, students wrote about the impact of lifestyles on health, and the motivation to lead a healthy life and engage with health information; and at the critical level, students' aspired to promote health in their communities (344). However, the authors noted the depth of students' answers in terms of health literacy was not fully captured by these three levels (344). Thus, they proposed a fourth level, holistic health literacy, which has four dimensions: tolerance, cultural and environmental awareness, and interest in the state of the world (344). This fourth level of health literacy was also present in the narratives of the sampled students in Study 3, as captured in the theme 'Developing life skills though health classes'. Students considered health classes enabled them to develop unique life skills, including empathic and communication skills, which allowed them to understand and treat other people better.

The holistic level of health literacy aims for engaged citizenship from a cosmopolitan perspective (344) that involves reflecting on the national and global society, being humanistic towards others, cooperating to solve problems, and aiming for peace, democracy, and respect of human rights (345). This fourth level educates students to be tolerant and accepting towards other people and cultures, acknowledge different worldviews, understand that culture shapes health, recognise the value of art for health promotion, be environmentally conscious and concerned about local and global natural environments, take a sociohistorical perspective to understand socioeconomic differences around the world, and want to improve the health of the world (344). This is particularly relevant for the multicultural context in Aotearoa New Zealand, considering its history and the extent of immigration. Furthermore, students need to take this perspective towards the natural environment to tackle challenges of this century.

These features of holistic health literacy relate to understanding ethical issues, rights, and responsibilities of the citizenship component of health literacy that moves the students from the individual perspective to actively participating in their communities and societies and advocate for health (4,13). Paakkari and George (217) discussed the research by Haydon, as well as Alexander, affirming that schools should encourage students to understand and respect difference and acknowledge that they are different themselves instead of seeing their own

cultural context as the norm. Thus, the concept of holistic health literacy also relates to the component of critical thinking, which requires looking at alternative world views with awareness and empathy, tolerating ambiguity, appreciating different forms of knowing, and acknowledging human issues are complex (221). As secondary school students are expected to delve into ethical considerations (4), this holistic level could help them strengthen their health literacy skills related to critical thinking and citizenship.

Study 1 demonstrated that educational activities can aim for a specific level of Nutbeam's health literacy hierarchy. This was also noted in an Australian study evaluating curricular learning activities of a school health literacy programme (108). Nutbeam (8) proposed that the progressive development of health literacy skills over its different levels allows for greater autonomy and personal empowerment. Health is not a compulsory school subject at the senior level in Aotearoa New Zealand. Thus, I suggest that junior high school health classes should enable students to develop critical health literacy skills. This would ensure that those who stop studying health at this level finish high school with the skills that empower them to take responsible actions to promote their own and others' health (8). Students who choose to continue studying health at the senior level would then be able to strengthen their critical health literacy skills and develop holistic health literacy skills.

Researchers in Canada also valued this holistic level of health literacy as, by embracing indigenous perspectives and worldviews, it strengthens the cultural identity and heritage of indigenous high school students (346). Thus, this level is also particularly relevant to Aotearoa New Zealand. To honour Te Tiriti o Waitangi, the foundational document of this country that promises dual governance, educational institutions should enroot curriculum design and implementation on Indigenous Māori knowledge, values, and belief systems, i.e., Mātauranga Māori (347). Mātauranga Māori has been included in the New Zealand secondary science curriculum and NCEA achievement standards in the past years (348). The health curriculum also incorporates Mātauranga Māori by including haoura (Māori philosophy of health and well-being) as one of its four underlying concepts. However, health education still needs to reduce the tensions between Western science and traditional indigenous knowledge (223). Thus, I propose the senior high school health curriculum should aim for the holistic health literacy model to further incorporate and adequately represent Mātauranga Māori.

With support from health literacy national policies and guidelines, schools can optimise their role as educational institutions to enhance the health literacy skills of senior high school

students, which could lead to a reduction of both health and educational disparities in society (258,282). Teaching health literacy also requires a whole-school approach in which the school environment and ethos support the health curriculum, as proposed by the WHO's Health Promoting Schools framework (49,257). Through this holistic approach schools can promote the health literacy of students, school staff, and students' whānau (extended family) and communities, which in turn develops the organisational health literacy of schools (61,258). Including health literacy in the national curriculum is only the first step. Schools also need to support teachers through continuous professional learning and development that will allow them to teach for health literacy (68).

6.3 Strengths and Limitations of the Thesis

Each of the four studies in this thesis addressed their inherent strengths and limitations in their individual chapter. In this section, I discuss the strengths and limitations of my mixed methods research. The first aspect that indicates its strength is that this thesis explored the perspectives of key stakeholders – senior high school students and health teachers. Second, the robust methodologies and the variety of the designs of the different studies of this thesis strengthened the credibility of my findings. The studies provide different viewpoints of senior health classes in Aotearoa New Zealand and the health literacy of senior high school students. By triangulating findings to analyse complementary data, the studies interlinked and validated each other.

The studies were sequential but the disruptions throughout the educational system caused by the COVID-19 lockdowns (349) delayed some stages. The mandatory closure of schools negatively impacted secondary student learning and exacerbated educational disparities (349). Furthermore, despite Aotearoa New Zealand managing the pandemic well compared to other countries, the complete lockdown culminated in young people dealing with more psychosocial difficulties than usual (350). Following the international trend in the educational sector across all levels to shift to online teaching (349), I changed my face-to-face approach during lockdown periods and scheduled online interviews with teachers and students (Study 3). Nevertheless, as soon as I could, I returned to my initial strategy. Most interviews were in person. In addition, COVID-19 has created a history effect suggesting this event could change the nature of this research, thus compromising aspects of internal validity, and thus affecting the survey results in study 4 (351).

However, a limitation of this thesis is that conducting research using self-report questionnaires in schools may have led participants (teachers in Studies 2 and 3, students in Studies 3 and 4) to provide socially desirable answers or act accordingly (in Study 2 when I observed teachers). Social-desirability bias indicates the tendency of participants to self-present too favourably, either in an honest way (self-deception) or due to the desire to give a good impression (352). Thus, this bias may restrict the validity of results and conclusions based on questionnaires and interviews, especially when participants feel they should avoid describing or demonstrating attitudes and behaviours that would be, in their opinion, socially undesirable (353-355). The questionnaires used in this mixed methods research (Study 4) were anonymous, reducing the social-desirability bias. However, participants may have been inclined to change their responses and behaviour in the interviews and observations (Study 2 and Study 3) to avoid feeling embarrassed or having to deal with repercussions (356), even though confidentiality was assured. Nevertheless, students were comfortable to report difficulties and lack of understanding (Study 3), and teachers did not hesitate to state difficulties they faced upskilling themselves (Study 3). Teachers also appeared to conduct their classes as usual (Study 2).

A further issue that was highlighted in Study 4 revolved around the notion of cultural bias. Using a questionnaire that was designed in Germany, even though it was translated into English, on a New Zealand sample was likely to create issues linked to cultural bias. It has been stated (357) that the respondents' culture is likely to affect the way they understand and perceive the questions being presented to them. Therefore, it is critical that an instrument designed to measure facets of health literacy be appropriately developed for the New Zealand cultural landscape.

Another limitation is that Year 11 students and health classes were excluded from the research. If I were to have included students under 16 years of age in my research, who are not legally able to provide consent, I would have needed to seek consent from their parents or legal guardians. However, I decided to exclude students under 16 years of age for practical reasons, added to the fact that the COVID-19 pandemic had already negatively impacted the feasibility of my research. I considered the exclusion of participants in Year 11 (the first year of senior high school) would not compromise the new knowledge created.

6.4 Implications for Teaching Practice

This thesis indicates that, to promote health literacy skills, teachers could modify senior health classes and amend the school curriculum or reinforce practices already in place. Some of the pedagogical strategies outlined in the findings of my mixed methods research could guide them in the planning of a curriculum that enables the development of health literacy skills. These strategies align with the model described by Paakkari and Paakkari (4). This model proposes that, for students to develop health literacy skills, teachers must create conditions for the learning of theoretical knowledge, practical knowledge, critical thinking, self-awareness, and citizenship (the five components of health literacy). Senior health teachers in Aotearoa New Zealand should consider complementing this student-centred framework with the locally relevant pedagogical strategies identified in this thesis to improve the health literacy of students. As described below, these include building a strong relationship with students; exploring topics that are relevant from the students' perspectives; creating the space for student voice in the classroom; using active learning and interactive activities; teaching health literacy through collaboration between teachers of different subjects; and improving the health-related knowledge of students and their skills to assess the reliability of health information and claims.

The first aspect that senior health teachers should consider is building a strong relationship with students, which was supported by Studies 2 and 3. This aligns with the student-centred pedagogical models of Freire (178) and Ramsden (177), who propose a student-teacher relationship based on collaboration, dialogue, and mutual participation brings a sense of freedom and autonomy for students. It also allows teachers to know their learners, build meaningful classes from students' perspectives, and guide them in the learning process. Indeed, the student-centred approach and the establishment of a non-judgemental and supportive learning environment were not only valued by teachers and students, but also by adults that took health classes at the senior high school level (216). This indicates these related strategies have short- and long-term positive impacts.

The next aspect proposed method to improve senior health classes towards cultivating strong health literacy of students is to explore topics that are relevant from the students' perspectives. As suggested by Freire (178) and Ramsden (177) and supported by the students sampled in Study 3, students dedicate themselves to learning only when the content explored in class is part of their reality. Students need to perceive the learning content as meaningful, valuable, and applicable to their lives to increase their engagement in the learning process (168). Thus,

incorporating more topics that students consider relevant and interesting is vital to promote transformative learning that allows them to transcend their social condition (178), which is a key feature of critical health literacy (154,225). In Study 2, I noted students were allowed to make choices in terms of which aspect of a broader area they were going to discuss in their writing assignments. In Study 3, teachers reported including feedback from students when planning school curricula. However, the students that participated in Studies 3 and 4 reported not learning enough about the topics of their interest, which is consistent with the results from the Youth19 Rangatahi Smart Survey (329). Thus, teachers could reflect on how to further tailor the teaching to students' contexts, which could also include ways to deal with and improve health inequities in their communities (168). Indeed, Study 1 demonstrated the feasibility of implementing personalised health literacy programmes in schools to address the needs of their students and communities.

The third aspect relates to the student voice, i.e., incorporating in the classes the preferences of students (beyond including topics that are relevant from their perspectives). Study 1 demonstrated that giving autonomy to students to choose which topic or aspect to focus on is one of the facets of school-based programmes to improve the health literacy of senior high school students implemented around the world. Furthermore, as raised by students in Studies 3 and 4 and supported by Study 1, teachers could consider inviting guest speakers to talk to students, such as health consumers (299,300,333) or health professionals (113-118,333). Teachers could also explore learning environments outside the classroom such as universities, healthcare settings, and the outdoors (92,146,147,168,301,331,332). Overseas fieldtrips have shown to be a life-changing and eye-opening experience to New Zealand senior high school students with positive impacts on their health learning and personal development (216). Campbell-Price's study cited in Dixon, Abel, and Burrows (216) demonstrates that, although this strategy needs more investigation in terms of long-term impacts and feasibility, it enables a unique and active experience for teenagers that promotes powerful and deep learning and strengthens the relationship between the teacher and students. However, only a minority of students would have financial support for this. On the other hand, if funding is available, this strategy could provide a once in a lifetime opportunity to students who would otherwise never travel abroad during their adolescence.

The New Zealand Ministry of Education indeed encourages providing learning opportunities to students outside the classroom (358). Providing learning opportunities beyond the school classroom promotes engagement with the community, advocacy and health promotion skills,

and comprehension of social and political structures in society (68), which facilitates critical health literacy skills that can promote health equity (4,18,154). Although Dixon, Abel and Burrows (68) provided evidence that senior high school health classes in Aotearoa involve community connections, they also noted further research needs to investigate how to facilitate and enhance opportunities for partnerships. Teachers would need support from the school for activities outside the school, but they could also explore the whole school setting as suggested by students sampled in Study 4 and supported by Study 1 (e.g., creating posters with students and placing them around the school) and the outdoor area of the school.

The fourth aspect, which also relates to listening to the student voice of the sampled senior high school students and was supported by all studies of this thesis, is that health literacy interventions for adolescents should use active learning and interactive activities. This strategy is also regarded in the wider literature as vital towards the development of health literacy skills (92,102,146,147,168,331,332). Alongside curriculum content and integration, active learning is a critical success factor for health literacy programmes (93). Interventions with hands-on or practical learning activities are more effective than the traditional didactic learning method (92) and increase students' perception of autonomy and support from the teacher (203). Through active learning and interactive activities, classes can progressively build complexity to address the five components of health literacy (4). As shown in Study 1, engaging students in health communication across the school and the wider community could provide a supportive environment for students to expand their health literacy skills. Problem-based learning also aligns with higher-order skills required for health literacy (168), such as reasoning and critical thinking (8). This method explores real-world health-related situations (8,168), which were also valued by the sampled students cited in Studies 3 and 4. Despite being challenging, senior high school teachers could align cross-curricular problem-based learning projects with NCEA standards (359). Teachers would need guidance on how to implement curriculum integration (360), which relates to the next strategy.

The fifth aspect is that health literacy skills can be promoted through an interdisciplinary approach. The cross-curricular nature of health literacy was raised by students in Studies 3 and 4 and supported by Study 1. Health issues, interdisciplinary by nature, are getting increasingly complex, especially with the ecological challenges posed by environmental disruptions and climate change (361-363). Interdisciplinary approaches and cross-curricular collaboration can prepare students to become citizens who critically respond to challenges of our societies and promote health, sustainable development, and social and environmental justice by addressing

structural inequality (361,364-368). Considering the subject-specific nature of the NCEA qualifications, Aotearoa New Zealand slowly embraced (369) international recommendations to build cross-curricular key competencies in school curricula (370). However, a national survey with secondary school teachers in Aotearoa New Zealand found a 30% increase in the percentage of teachers involved in projects that integrated two or more learning areas compared to 2018 (334). Furthermore, among the 44% of teachers who reported being involved in these projects, two thirds (66%) considered them successful or very successful (334). Thus, interdisciplinary projects based on cross-curricular collaboration could contribute to building a whole-school approach towards the health literacy of students and the organisational health literacy of schools (61,258). However, the lack of time raised by teachers in Study 3 indicates that implementing cross-curricular projects would be difficult. Teachers need support from school leaders, including flexible timetables (that allow time for planning) and professional development, to integrate curricula of different subjects successfully (360).

Finally, educational agents should consider that, as highlighted in Studies 3 and 4, senior high school students need to improve their health-related knowledge and critical thinking skills thus likely raising their levels of health literacy. Study 3 indicated that students had difficulty evaluating health practices, which is a skill included in the NCEA Health Matrix (70). Students did not feel confident and capable to judge the reliability of health claims on their own. Study 4 revealed that senior high school students in Aotearoa New Zealand need to improve their health-related knowledge, which is a key requirement in the development of health literacy (371). Furthermore, Study 1 revealed that multifaceted health literacy programmes that facilitate the development of various skills and health-related knowledge can be embedded within the school curriculum. Thus, schools can help adolescents develop health literacy skills to make informed health choices even when bombarded with disinformation which pervades our digital society (76,316).

6.5 Implications for Research Development

The findings of this thesis suggest important aspects to be considered in the development of future research. These include involving key stakeholders as co-designers of the research; including students' and communities in the interventions; determining the most appropriate measurement tools and health literacy models to the New Zealand context; and conducting both observational and intervention studies. This section describes these aspects in detail.

The first aspect to consider for future school-based interventions, to improve the health literacy of senior high school students in Aotearoa New Zealand, is that key stakeholders should be actively involved in the research decision making regarding the methods. Students and school staff should advise the learning activities and overall intervention as their feedback is crucial for the success of the intervention (168). A co-design process will increase the relevance, contextuality, feasibility, and sustainability of the research, leading students and school staff to perceive the research as meaningful and valuable, and thus engage better (141,168,372,373). This participatory approach allows for contextualised interventions that have greater acceptability because they are driven by equity and provide a sense of leadership (168,327). Indeed, a study in Aotearoa New Zealand indicated that senior high school students taking science classes preferred a student-centred classroom environment based on co-design, a participatory approach (shared control of design and tasks management), and personal relevance (by choosing topics that relate to students' daily experiences outside the school) extending their usual science class experiences (374).

Students' whānau (family) and communities should also be involved in health literacy interventions as this has been shown to enhance positive effects on adolescents' lifestyle behaviours (375). Furthermore, Studies 1 and 3 have shown that involving adolescents in the school and community encourages them to act as engaged citizens that take care of their health, the health of their whānau, and the health of their communities. Thus, embracing these aspects in school-based health literacy interventions may empower them to promote health and tackle health inequalities in their communities and society (168). Furthermore, similar to how studies 1, 3 and 4 suggested a interdisciplinary approach to teach health literacy, the literature supports intersectoral and interdisciplinary research projects that form collaborations and partnerships with communities to promote health literacy (363,365,376).

Another aspect to consider is the diversity of theoretical models and measuring instruments of adolescent health literacy (10,167), which was demonstrated in Study 1. Further research should determine which instruments and models best apply to the context of New Zealand adolescents. This will ensure the effectiveness of future interventions (167) to improve the health literacy of senior high school students throughout Aotearoa New Zealand. Furthermore, the concept of holistic health literacy needs to be investigated as the MOHLAA-Q questionnaire used in Study 4 did not include a holistic dimension. Moreover, this measurement tool lacked cultural adaptation, which could have impacted the results (377).

Future observational studies could longitudinally assess whether health classes are improving the health literacy of senior high school students in Aotearoa New Zealand. On the other hand, intervention studies could determine whether a comprehensive longitudinal curriculum for health literacy (where it is a key competency) further increases the health literacy of these students. Several research protocols are mooted. First, schools in Aotearoa New Zealand that offer senior health classes could be randomised for a controlled before-and-after study with pre and post health literacy measures of students taking senior health classes and comparing these data with senior high school students not taking health (either at the same school or at schools that do not offer senior health classes). At a second stage, schools could be randomised to implement a health literacy curriculum or keep the usual instruction in health classes (cluster-randomised controlled trial), with pre and post health literacy measures of students to compare different schools. Although the MOHLAA-Q (43) could be a valid measurement instrument, cross-cultural studies should verify the applicability and comparability of this tool across different ethnic groups in Aotearoa New Zealand (377). Researchers could consider adapting the MOHLAA-Q (43) to the New Zealand context and potentially add a holistic health literacy dimension. Qualitative research could facilitate this process and reveal how students' understanding of the concept of haoura may benefit their health literacy skills. Furthermore, as suggested by Paakkari, Torppa, Mazur, Boberova, Sudeck, Kalman et al. for the European context (51), longitudinal studies could also investigate how health literacy of senior high school students in Aotearoa New Zealand interacts with social background factors towards health behaviours and outcomes, and how it progresses into adult health literacy.

6.6 Thesis Conclusion

This thesis provided an original contribution to the existent knowledge by presenting the first in-depth exploration into the health literacy of senior high school students in Aotearoa New Zealand. Findings revealed strategies to improve senior health classes and enable the development of health literacy among these adolescents. The international literature suggested that it is feasible to use a variety of student-centred practices to embed interventions within the school curricula to improve adolescent health literacy. The classroom observations and interviews with teachers and students indicated that teachers applied student-centred pedagogy to teach health and that students and teachers would value further integration of health literacy into the school curriculum. Lastly, the survey study revealed a potential lack of strong health

literacy skills among New Zealand adolescents but identified school-based strategies proposed by them to improve these skills.

The implications of the findings of this mixed methods research evolve around explicitly including health literacy as a key competency in the New Zealand school health curriculum. Classes must follow a student-centred approach that creates conditions for health literacy learning, which will help students achieve the competencies that are already envisioned in the national curriculum. Schools need to provide support to teachers, collaborate with health professionals, universities, and communities, and listen to the student voice. Further research on the conceptual model of health literacy relevant to adolescence is needed, with input from adolescents. Lastly, the concept of holistic health literacy should be explored to address the specific needs of New Zealand society.

Appendices

Appendix I: Search strategy MEDLINE (Ovid) – Study 1

Search	Query	Number of records retrieved
#1	Health Literacy/	6587
#2	(health literacy).ti,ab,kw,kf.	10073
#3	#1 OR #2	12234
#4	Schools/	40801
#5	Students/	63011
#6	Education/	21207
#7	((secondary or high) adj school?).mp.	44595
#8	((secondary or high or school or schools) adj3 (student? or pupil? or teen* or adolescent?)).mp.	46060
#9	(school? adj3 based).ti,ab,kw,kf.	16918
#10	OR/4-9	174434
#11	#3 AND #10	838
#12	limit 11 to (English language and yr=”1998-Current” and journal article)	792

Appendix II: Search strategy Embase (Ovid) – Study 1

Search	Query	Number of records retrieved
#1	health literacy/	13550
#2	(health literacy).ti,ab,kw.	13527
#3	#1 OR #2	17382
#4	secondary education.mp.	3825
#5	((secondary or high) adj school?).mp.	60016
#6	((secondary or high or school or schools) adj3 (student? or pupil? or teen* or adolescent?)).mp.	58277
#7	(school? adj3 based).ti,ab,kw.	19749
#8	OR/4-7	110174
#9	3 and 8	1005
#10	limit 9 to (english language and yr="1998 -Current" and journal)	980

Appendix III: Search strategy ProQuest Education Database – Study 1

Search	Query	Number of records retrieved
#1	"health literacy" In Abstract (AB)	654
#2	secondary OR "high school" OR school-based OR educational In Abstract (AB)	219409
#3	#1 AND #2	146
#4	Limit 3 to: Publication date: 1998 to 2021 Source type: Scholarly Journals Language: English	127

Appendix IV: Search strategy Education Research Complete – Study 1

Search	Query	Number of records retrieved
#1	"health literacy" In Abstract (AB)	1140
#2	secondary OR "high school" OR school OR educational In Abstract (AB)	861603
#3	teenagers OR adolescents OR "young adults" OR teens OR youth OR students In Text (TX)	1868943
#4	1 AND 2 AND 3	178
#5	Limit 4 to: Published date: 1998 to 2021 Source type: Academic Journals Language: English	163

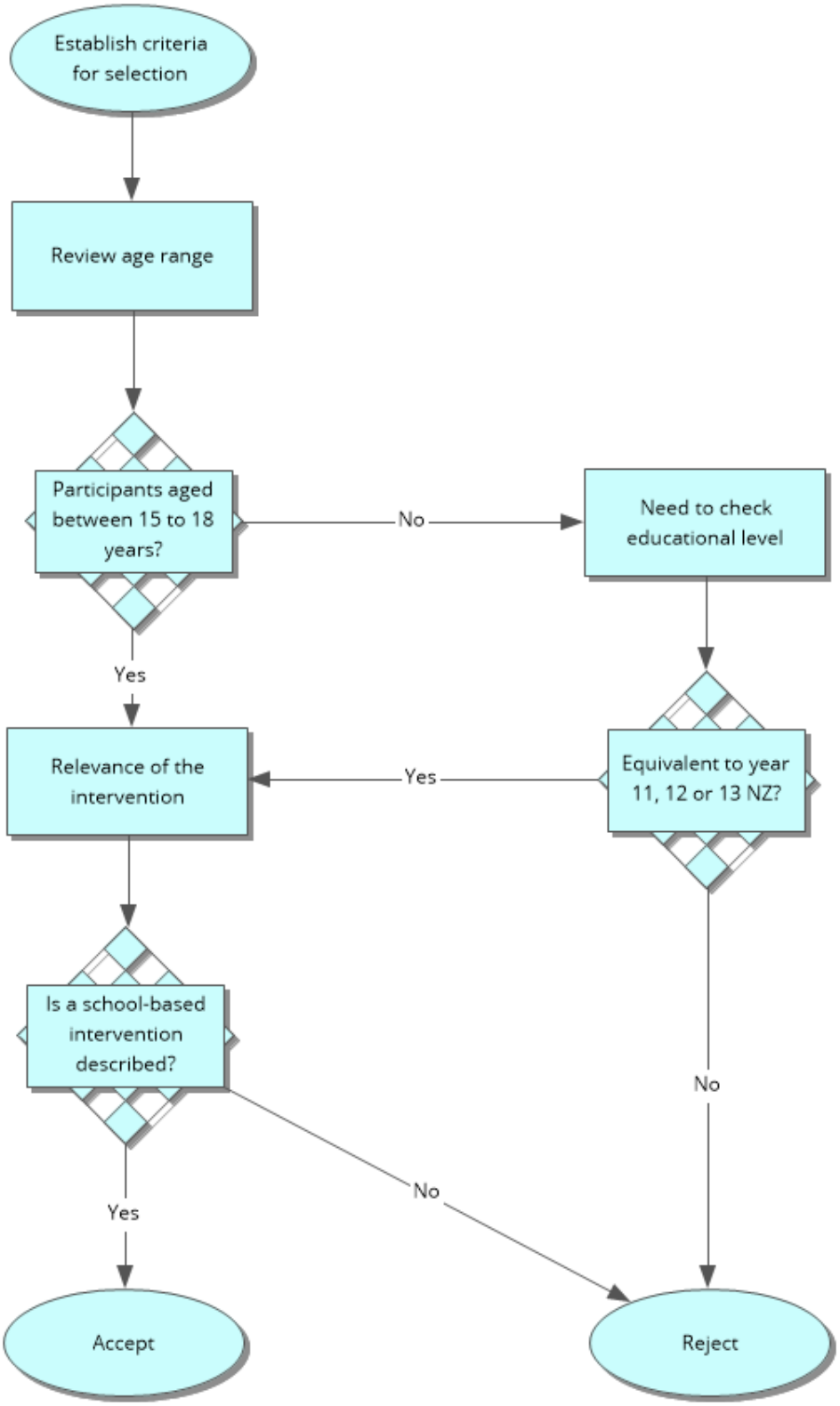
Appendix V: Search strategy SAGE Journals – Study 1

Search	Query	Number of records retrieved
#1	"health literacy" In Abstract (AB)	1069
#2	secondary OR "high school" OR school-based OR educational In Abstract (AB)	313259
#3	#1 AND #2	571
#4	Limit 3 to: Publication date: 1998 to 2021	570

Appendix VI: Search strategy Index New Zealand (INNZ) – Study 1

Search	Query	Number of records retrieved
#1	"health literacy"	2477
#2	school OR education	84909
#3	#1 AND #2	483
#4	Limit 3 to: Material type: Peer-reviewed journals Language: English Published date: 1998 to 2021	89

Appendix VII: Process map of the selection of studies – Study 1



Appendix VIII: Data extraction instrument – Study 1

Study ID (last name of first author and year of publication):	
Citation details (Vancouver style)	
Population	
Sample size	Geographic region
School grade	
Demographics (such as age and sex)	
Concept	
Intervention methodology and structure: Study design Mode of delivery Duration Health literacy domain Health literacy model (basic functional health literacy, communicative interactive health literacy or critical health literacy) Teaching models and strategies Content Related skills	
Context	

School setting: How the intervention was applied within the school environment?	
School	
Outcomes	
Outcomes related to health literacy	
Assessment tools	

Appendix IX: Table of included studies – Study 1

Study ID / Country	Study design / Participants	Intervention	Health Literacy Level/ Concept	Duration of intervention / Mode of delivery	Health Literacy Outcomes
Begoray 2009 / Canada	Case series / Year 11 students	Planning 10 curriculum: How to think critically about health issues and decisions	Functional / Health Literacy	1 year (36 hours) / Curricular	Participants' perception of the intervention effect on their health literacy (focus groups)
Begoray 2018 / Canada	Case series / Years 11 to 13 students (n = 27)	Teachers delivered lessons on critical media health literacy and graphic novels. Students created graphic novels about media influences on a health/wellness issue (of their choice) targeted to middle school readers.	Critical / Media Health Literacy	6 weeks / Curricular	Participants' overall understanding of five principles of understanding about media and media related health messages (interviews, analysis of graphic novels)
Bjørnsen 2018 / Norway	Controlled before-and after study / Years 11 to 13 students (15 to 21 years old) (n = 357)	School health services (nurses) delivered seminars and discussion groups (voluntary student participation; topics selected by students via an anonymous digital survey). Seminars included a theoretical understanding of health topics, practical age-appropriate examples and related tools	Functional / Mental Health Literacy	1 school year / Extracurricular	Positive Mental Health Literacy (10-item Mental Health Promoting Knowledge scale; score from 0 to 5, maximum) at the beginning and end of the school year and Health literacy (Health Literacy for School-Aged Children scale) at the end of the school year

Boivin 2018 / Wales	RCT / Years 12 and 13 students (16 to 18 years old) (n = 93)	The intervention group read the four-page educational material 'A Guide to Fertility' about fecundity, infertility, risk factors, signs and symptoms, reproductive options. The control group read four pages of the National Health Service (2014) booklet 'Baby Bump and Beyond' about the effects of smoking and drinking alcohol in pregnancy	Functional / Fertility Literacy	20 to 30 minutes / Extracurricular	Fertility knowledge (13-item Cardiff Fertility Knowledge Scale; range 0–100% correct). Health literacy (12-item health literacy scale; score from 0 to 60, maximum), at baseline and immediately after the intervention
Cummings 2015 / USA	Teaching protocol / Year 11 to 13 and university students	Fishbowl discussion on questions relevant to a health issue	Interactive / Health Literacy	1 class (50 minutes) / Curricular	Not applicable
Darraj 2018 / Saudi Arabia	Cluster-RCT protocol Years 11 to 13 students (aged 10 to 19 years) (n = 360)	Trained teachers will deliver two 30-minute lectures followed by 30-minute group discussion (one per week). The educational material includes brochures, posters and a video of a young man (i.e., not an actor) with depression	Interactive / Depression Literacy	8 weekly 90-minute sessions / Curricular	Depression literacy (Depression Literacy questionnaire) at baseline, immediately after the intervention and after 3 and 12 months

Ekornes 2020 / Norway	Case report / Years 11 to 13 students (16 to 19 years old) (n = 260)	Expanded student services with inter-professional collaboration among teachers, social workers and health care professionals. A community worker followed-up the students. Psychiatric nurses weekly met, at the school, specialists from the municipality's mental health and addiction care services. A job specialist monitored the students and aimed to prevent dropout	Functional / Mental Health Literacy	Unclear / Extracurricular	Mental Health Literacy (survey) after the intervention
Eschenbeck 2019/ Germany	RCT protocol / Years 7 to 13 students (older than 12 years old) (n = 420)	This study will compare StresSOS, a program that teaches about stress, coping skills and mental health literacy, delivered online, versus an active online control condition. A separate (non-randomised) school-based sample will receive the StresSOS face-to-face intervention. Experts (advanced students, mental health professionals) will deliver the program using several teaching methods (e.g., presentations, group discussion, group activities, role play, video presentations, games, quizzes, answer sheets, homework)	Interactive / Mental Health Literacy	3 months / Unclear	Mental Health Literacy (multiple-choice questionnaire about stress, coping strategies, mental health and illness, and help-seeking) at baseline and immediately after the intervention. Overall program acceptance will also be assessed (participants' overall evaluation of the program and indication whether they have learned from it and if they would recommend it for peers)

Ghorbani 2009 / Iran	Case report / Years 12 and 13 students (16 to 19 years old) (n = 639)	Health experts introduced and presented the teen health Web site to the students, which they designed to provide access to health resources and health consultations	Functional / Health Literacy	2-hour class a day, 4 days a week for 10 weeks / Curricular	Health knowledge (questionnaire) at baseline and after the intervention
Gould 2010 / USA	Case series / Year 13 students (n = not reported)	A health educator and an art instructor delivered the course "World Health and Art Activism" to Year 13 students using interactive exercises (data analysis, discussions, brainstorming, research, scholarly and news articles, books, films and the Internet). Topics on social determinants of health included population health concepts, health disparities, equity and global health issues, followed by social actions to improve health equity through advocacy. Students researched a topic of their choice, and developed and implemented an action	Critical / Health Literacy	Three 75-minute sessions across 5–8 school days, with at least 1 day between each session / Curricular	No formal assessment
Hart 2016 / Australia	Before-and-after comparison / Years 11 and 12 students	An accredited instructor facilitated the teen Mental Health First Aid training about how to recognise mental health problems and develop an action plan based on	Interactive / Mental Health Literacy	One 75-minute sessions per week for 3 weeks (both groups) / Curricular	Mental health literacy, including problem recognition and beliefs about help (survey questionnaire), at baseline, immediately after, and 3 months after the training. Participant satisfaction (multiple-choice

	(14 to 17 years old) (n = 345 at baseline and post-test, n = 241 at follow-up)	five first aid strategies. The program included a didactic PowerPoint presentation, a student booklet, video presentations, role-plays, group discussion and small group activities. Staff and parents also received the training at the school (separately).			and open-ended questions) immediately after the training
Hart 2018 / Australia	Cluster-randomised crossover trial / Year 11 students (14 to 18.92 years old) (n = 1116: intervention group n = 808 for depression or suicidality, n = 797 for social phobia/anxiety disorder; control group n = 797 for depression or suicidality, n = 784 for social	Teen Mental Health First Aid as described in Hart 2016 but with a different duration. Control group: an accredited instructor facilitated the Physical First Aid training about basic first aid, including topic content, role-plays with mannequins, bandages and splints, and group discussions	Interactive / Mental Health Literacy	One 75-minute sessions per week for 3 weeks (both groups) / Curricular	Mental health literacy, including problem recognition and beliefs about helpfulness of adult sources of help (survey questionnaire), and quality of first aid intentions (endorsing any of 12 possible actions), at baseline and after the training (up to one week after the training)

	phobia/anxiety disorder)				
Hart 2020 / Australia	Cluster-randomised crossover trial / Year 11 students (14 to 18.92 years old) (n = 1116: intervention group n = 808 for depression or suicidality, n = 797 for social phobia/anxiety disorder; control group n = 797 for depression or suicidality, n = 784 for social phobia/anxiety disorder)	This study is a sub-analysis of Hart 2018	Interactive / Mental Health Literacy	One class (30 to 45 minutes) / Curricular	Mental health literacy assessed through recognition of suicidality and adequate suicide first aid responses (survey questionnaire), at baseline and after the training (up to one week after the training)

Hudson 2020 / USA	Years 8 and 10 to 13 students (n = 349, of which: Year 11 n = 139; Year 12 n = 82; Year 13 n = 60)	A study author delivered a PowerPoint presentation about basic cancer biology principles, cancer risk factors, cancer statistics, and modifiable behaviours that can reduce the risk of cancer	Basic/Functional	One class (40 minutes) / Curricular	Cancer literacy (survey questionnaire), immediately before and after the intervention
Hudson 2020b / USA	Before-and-after comparison / Years 9 to 13 students (n = 164, of which: Year 11 n = 26; Year 12 n = 39; Year 13 n = 15)	Participants watched a presentation about basics of cancer (definition and mutations role on the development of the disease), cancer risk factors, and cancer disparities	Functional / Cancer literacy	Six weeks (35 lessons) / Curricular	Cancer literacy (survey questionnaire), immediately before and after the intervention. After the intervention, students rated how it affected their understanding of cancer (scale from 1, not affected at all, to 10, 10 extremely affected), and how likely they were to change their habits (scale from 1, extremely unlikely, to 10, extremely likely) and to encourage a friend or family member to change their habits (scale from 1, extremely unlikely, to 10, extremely likely)

Jacque 2013 / USA	Before-and-after comparison / Years 12 and 13 students (n = 115)	Teachers and experts co-developed a biology curriculum on infectious diseases based on inquiry experiences. Teachers delivered the curriculum through hands-on activities, student-led teach-backs, intensive reading and writing, lab exercises, case-based learning, and Socratic discussions	Functional / Health Literacy	Six weeks (35 lessons) / Curricular	Content knowledge (test, maximum 60 points) and infectious disease-related problem-solving abilities (test, maximum 60 points) and self-efficacy (online test survey, maximum 60 points), at baseline and after the intervention
Jacque 2016 / USA	Controlled before-and after study / Years 12 and 13 students (n = 398: intervention group n = 273; control group n = 125)	This study is a secondary analysis of data from several enactments of the curriculum presented in Jacque 2013. The control group included age- and gender-matched students who did not receive the curriculum	Functional / Health Literacy	Four 90-minute sessions (once a week) for a month / Curricular	Conceptual knowledge about infectious diseases and ability to use this information to evaluate claims about infectious diseases (online survey test; unclear maximum score), and self-efficacy (online survey test, maximum 54 points), at baseline and after the intervention
Karimi 2019 / Iran	Cluster-RCT / Years 11 to 13 students (15 to 18 years old) (n = 377: intervention group n = 183; control group n = 194)	An instructor delivered a problem-based learning health literacy curriculum to the intervention group. Students worked on real-life health-related scenarios in groups of five to six people. They had to propose hypothesis and solutions through group discussions	Interactive / Health Literacy	One 30-minute session / Curricular	Health Literacy Measure for Adolescents (0–50 = inadequate; 50.01–66 = problematic; 66.01–84 = sufficient; 84.01–100 = excellent) at baseline, after the intervention, and 3 months after the intervention

Keselman 2015 / USA	Case series / Year 13 students (n = 11)	Teen Health Leadership Program. Students identified health concerns in their community and discussed them, once a week, with a Communities in Schools youth specialist and a health sciences librarian. Students learned about reliable health information websites and used them to develop and conduct school and community outreach activities, such as mentoring peers and exhibiting at local health fairs	Interactive / Health Literacy	One weekly meeting during the school year/ Extracurricular	Individual interviews about the impact of the intervention on students' health information literacy, knowledge, and behaviour
Komolafe 2020 / Nigeria	Controlled before-and after study / Years 8 to 13 students (10 to 19 years old) (n = 1259: intervention group n = 661; control group n = 598)	Each school in the intervention group received a short lecture on stroke, its risk factors, symptoms, response and prevention (oral presentation with audio-visual materials and distribution of fliers). Schools in the control group received no intervention	Functional / Health Literacy	Four 2-hour sessions /Curricular (mental health literacy lessons) and Extracurricular (art course)	Questionnaire about knowledge on stroke, at baseline and two weeks after the intervention

Lanfredi 2019 / Italy	Controlled before-and after study / Year 13 students (n = 221: art group n = 69; group taught by mental health clinicians n = 72; group taught by Medicine students n = 80)	Two clinical psychologists delivered two lectures on mental health (symptoms recognition, psychosocial and biological pathways, sources of community mental health care, stigma and misconceptions), using slideshows and videos. Then, classes were assigned to an art course – two sessions in a lab outside the school with teachers diagnosed with stable mental illness – or a Mental Health Literacy course – two active learning lessons with stories, discussions, games, worksheets and role playing, delivered either by two clinical psychologists (group 2) or trained Medicine students (group 3)	Interactive / Mental Health Literacy	One year / Curricular	Mental health literacy (the Knowledge about Mental Illness test) at baseline and at post-intervention (after one week after the end of the intervention)
McCuaig 2014 / Australia	Case series / Year 10 and 11 students	A health literacy curriculum unit based on the principles of salutogenic health and wellbeing, approaches to health literacy, social constructivist pedagogies, recognition of student voice, and collaborative curriculum approaches. In groups, students brainstormed about healthy living and chose a healthy living challenge scenario. Individually,	Critical / Health Literacy	Six 1-hour lessons (from 4 to 8 weeks) / Curricular	Not applicable

		they created and evaluated a website page with tips and strategies to overcome barriers to the use of healthy living resources. Then, students selected the best website page of their team			
Milin 2016 / Canada	Cluster-RCT / Year 12 and 13 students (n = 465: intervention group n = 157; control group n = 308)	Schools were randomised to teaching as usual in the Healthy Living course (control), to integrate the (Mental Health and High School) Curriculum Guide in this course, or to integrate the Curriculum Guide plus follow-up eLearning modules (accessible after course completion). A research assistant trained teachers to deliver the intervention about stigma reduction, mental health and illnesses, help-seeking behaviours and self-help competencies. Lesson plans included digital stories and video interview of youth with mental illness	Interactive / Mental Health Literacy	2 weeks / Curricular	Mental health knowledge (questionnaire) at baseline and after the intervention or usual curriculum

Ojio 2020 / Japan	Teaching protocol / Year 11 to 13 students	A multi-professional team developed resources for an education programme on mental health, including: four-minute animated films of age-relevant stories on schizophrenia, anxiety and eating disorders (to promote awareness, recognition and help-seeking); filmed social contact using videos about young people with experience of mental health problems (to decrease stigma and enhance help-seeking); and educator's manuals (to improve educators' mental health literacy and guide lessons)	Interactive / Mental Health Literacy	Not applicable / Curricular	Unclear
Pais 2014 / Portugal	Case series / Years 11 to 13 students (n = 9)	Teachers and researchers guided students on a community profiling project to promote participatory citizenship. Students worked in groups to select projects. Three groups selected health rights, services, needs and resources, and presented and discussed their results with education doctoral students in a poster session at a university	Critical / Health Literacy	6 months / Curricular	Two researchers monitored and evaluated the students' work (on site participant observation and video documentation), and interviewed pupils and teachers

Peralta 2021 / Australia	Case report / Years 8 to 11 (n = one school)	Study authors deductively analysed the new (first-year delivery) health programmes for each year level	Critical / Health Literacy	Unclear / Curricular	Study authors categorised lesson plans, outcomes, learning activities and resources according to Nutbeam's health literacy hierarchy
Sangalang 2020 / Philippines	Cluster-RCT protocol / Years 6,7, 8 and 11 students (senior high school students n = 756)	For the health education component of the intervention (besides policy reinforcement, hygiene supplies, and facilities improvement), study authors delivered one-hour hygiene promotion workshops to guide teachers regarding classroom activities on health education topics. Research assistants presented interactive sessions (based on the national curriculum) to students, including a brief lecture with PowerPoint slides and visually appealing graphics, class discussion, role-playing, video, music and games. The intervention groups (two, three or four educational sessions) also participated in poster-making and school restroom-cleaning contests, as well as song writing workshops. The control group received no intervention.	Interactive / Health Literacy	From two to four 1-hour sessions during eight months / Curricular	Hygiene literacy and handwashing literacy (questionnaire) at baseline and after eight months

Steckelberg 2009 / Germany	Controlled before-and after study / Year 12 students (n = 255: intervention group n = 37; control group n = 218)	Teachers delivered an evidence-based medicine curriculum aimed at promoting the competence of acquiring and critically appraising health information. The lessons included lectures, brainstorming, class discussion, small group discussion, worksheets, flip charts, posters, overhead transparencies, Metaplan and computer projections. Students also developed, in groups, a project method to solve a practical problem on their topic of choice and presented it to the class. The control group received regular classes	Critical / Health Literacy	22 lessons for one week or longer / Curricular	Critical health competencies (the Critical Health Competence Test; unclear maximum score) after the intervention, and students' perception of the intervention
Tammen 2019 / USA	Before-and-after comparison / Years 12 and 13 students (aged 14 to 17 years) (n = 111)	Teachers, who weekly met with mentors, delivered the metabolic diseases module of the Great Diseases curriculum. Following educative materials (videos, content primer and lesson plans with activities), they led classroom discussions and engaged students in evaluating and communicating information and analysing and interpreting data. Students	Critical / Nutrition Literacy	28 lessons during six weeks / Curricular	Problem-solving skills in functional use of factual knowledge, interactive skills in seeking out information, critical interpretation and analysis, and self-efficacy (questionnaire and evaluation of a clinical case study, which required knowledge about the metabolism and physiology of glucose homeostasis), before and after the intervention. Two nutrition content graded students' responses

		received workbooks with extra readings and quizzes			
Ueno 2014 / Japan	Before-and-after comparison / Year 11 students (n = 162)	Interactive lecture (questions and answers sessions, visual media) for small groups (six to seven students) about healthy teeth and gingiva, dental caries and gingivitis, symptoms, treatment, prevention of dental diseases, and self-checking	Functional / Oral Health Literacy	One 20-minute session / Curricular	Students drew their teeth and gingiva (using a hand mirror) before and after the intervention. They were asked to compare both drawings and judge which one was better. Dentists scored the drawings by comparing them with students' intraoral photographs
Uribe Guajardo 2019 / Australia	Before-and-after comparison / Year 11 students (aged 14 to 17 years) (n = 220)	An accredited Instructor delivered the teen Mental Health First Aid training (about mental health, stigma and help) using a PowerPoint presentation, videos, role plays, group discussion, small group activities, and a student booklet	Interactive / Mental Health Literacy	Three 75-minute sessions across 5–8 school days, with at least 1 day between each session / Curricular	Mental health literacy assessed through recognition of mental health problems, adults thought to be helpful, and mental health first aid intentions (survey) at baseline, immediately after training, and after 3 months of training completion
Vamos 2008 / USA	Teaching protocol / Year 11 to 13 students	Teaching prior to this activity should prepare students to understand the need for women's health inquiry, including historical dimensions (achievements in women's health, lifespan and health issues, dimensions of health, health disparities, and legal, political, economic, and cultural facets). Students are to	Critical / Health Literacy	Unclear / Curricular	Not applicable

		create an educational and informative booklet for the public addressing health risks and concerns of women (one major relevant/current health issue for each dimension of health), providing background, prevention, treatment modalities, up-to-date facts and statistics (through visuals such as diagrams, charts and/or graphs), and useful resources (such as organizational contact information and/or website addresses). Students could also do a brief analysis of any legal, political, economic, and/or cultural influences/implications. Materials to make the booklets include library access, computer/laptop, internet access, construction paper or colour paper, string/ties/binding rings, and a rubric stating objectives to guide students			
Weinstein 2017 / USA	Teaching protocol / Year 7 to 13 students	"Adopt-a-Disease" program: student teams search and select YouTube for videos of patients or their caregivers discussing a specific disease. Then, they make a class presentation about how it is	Critical / Health Literacy	Unclear / Curricular	Not applicable

		to live the disease assigned to their team, covering aetiology, pathogenesis, pathology, clinical course, and public health implications of the disease			
Wharf Higgins 2009 / Canada	Case series / Year 11 students (aged 14 to 17 years) (survey n = 194 interviews n = 38, focus groups n = 33)	Planning 10 curriculum about healthy living, health information, healthy relationships, and health decisions	Interactive / Health Literacy	1 year / Curricular	Students' experiences with the curriculum, and its impact or influence on their understandings of health issues, as well as their health literacy (semi-structured individual interviews and focus groups)
Yamaguchi 2020 / Japan	Quasi-cluster RCT / Year 11 students (aged 15 to 16 years) (n = 899: intervention group n = 342, control groups n = 557)	School teachers and a health care teacher presented two animated films on mental health/illnesses, stigma and seeking help/helping peers to the intervention group, followed by a short class discussion and role-play (adapted from Ojio 2015). The control group received the session after the end of the study	Interactive / Mental Health Literacy	One 50-min session / Curricular	Knowledge about mental health/illnesses and recognition of the necessity to seek help (self-report questionnaire) at baseline, immediately after and two months after the intervention

Appendix X: PIS for school principals - Study 2 and 3

The Centre for Medical and Health Sciences Education
School of Medicine
Faculty of Health and Medical Sciences
The University of Auckland
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Auckland Hospital Support Bldg
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Grafton

The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand

PARTICIPANT INFORMATION SHEET – Principal

Title: ***Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project***
Researchers: ***Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)***

It is important that you read this Participant Information Sheet thoroughly so that your decision about participating (or not) is an informed one.

You have been invited to take part in this study. We are interested in understanding what aspects of a health literacy training programme could improve adolescents' ability to critically assess health information and make informed health choices. It has been noted that people are susceptible to distorted and misleading health information, restricting their ability to make informed health decisions. It is necessary to promote understanding of basic health research processes and the knowledge or skills required to assess the accuracy of health information. This study will help us to develop learning resources for New Zealand high school students that aim to enhance adolescents' ability to evaluate claims about the effects of health care interventions and to ensure they think critically about health choices.

1. Purpose of the research: In this study, we would like to observe Physical Education and Health classes (years 12 and 13) and interview teachers about the current practice at two New Zealand schools regarding the teaching of health topics and health information. You will be required to provide your informed consent by signing a Consent Form. The data collected in this research project will be used for the researcher's postgraduate PhD thesis, as well as for presentations and academic publications.

2. Your rights as a participant: We ask you for organisational consent for the research to be conducted at the school, and permission to access the school's facilities and recruit teachers and students to participate in the study. Participation in this study is entirely voluntary. Please not you cannot give permission on behalf of the teachers/students to participate, withdraw their data or be recorded. Each teacher/student has the right to decide whether to participate or not, and to have their participation kept confidential from you. Participants can change their mind at any time without giving a reason and without any negative consequences. Participation or non-participation of the school will not have any impact on your relationship with the researches. We also ask assurance that the decision of participation or non-participation of teachers and students will not affect their relationship with the school or access to its services (no impact on their employment, grades or academic/organisational relationships). Participants can request to stop the observations or interviews at any time. They can also withdraw the observation and interview data, without giving a reason, up to two weeks after the observation or after the receipt of transcript. After that data cannot be withdrawn as this may undermine the analysis process. You have the right to withdraw access to the teachers and students at any time, but do not have the right to withdraw participant data already given to researches as part of the study – this data can only be withdrawn by the participants. We offer the participants a summary of findings that is written in non-academic language. If you wish to receive a summary of findings at the end of the study, please inform your email on the consent form. Please note that the information on the summary of findings will protect the confidentiality of participants through the use of pseudonyms. You will be given a copy of this document (PIS) to keep.

3. Procedure: The research will take place in the school (in classrooms), and participants (teachers and students) will be invited to participate in the school. Teachers' participation in this study will involve having classes observed during Term 2 of 2020. The study also includes conducting one face-to-face interviews with Julia Vajda de Albuquerque (at least one teacher and 10 students, after the class observations). The interviews, lasting up to 30 minutes will be conducted at the schools and within the school hours but in periods that are not scheduled for teaching or learning. The interviews will be audio recorded and Julia Vajda de Albuquerque will do the transcriptions. Participants will be given the opportunity to review the interview transcripts up to two weeks after the receipt of transcript.

4. Risks and discomforts: There are no anticipated risks associated with participation in this study. If participants feel any discomfort in participating in this study, they can contact the counselling service at your school.

5. Benefits. There are no direct benefits for participants, however the results of our study are potentially very valuable to improve health literacy promotion in schools. The school may benefit by raising awareness around the promotion of health literacy. A further benefit is that you will have the satisfaction of knowing that your school has contributed towards research into this area.

6. Confidentiality and data storage. The participants' and schools' identity will be kept strictly confidential and no information which can be used to identify the school will be associated with the data. Procedures to ensure confidentiality will include the use of pseudonyms for all involved in all reporting and analysis. Julia Vajda de Albuquerque will preserve participants' confidentiality by removing all directly identifying information including careful use of observation notes and interview transcripts. The school and participants' names will only appear on the Consent Form, which will be coded with a pseudonym. This pseudonym is used to de-identify all other data, so that your identity is kept confidential. The interview data will only be referred to using this pseudonym. All data collected during the research will be stored securely and identifying materials (including key words and codenames) will be kept separate from the coded data. The Consent Form and interview data will only be seen by participants and the investigators and will be stored electronically (on password-protected computers) for six years. The data will then be destroyed (all data files will be deleted). Research publications and presentations of findings from this study will not contain any information that could personally identify you or any other participant.

7. Researcher contact details. If you have any queries, please contact:

The **Principal Investigator,** Associate Professor Marcus Henning
School of Medicine, The University of Auckland
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Or the **Head of the Centre for Medical and Health Sciences Education**, Professor Jennifer Weller
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Ph.: (09) 923 9459

For any queries regarding ethical issues you may contact the **Chair of The University of Auckland Human Participants Ethics Committee**
The University of Auckland Research Office,
Private Bag 92019, Auckland 1142.
Email: ethics@auckland.ac.nz
Ph.: (09) 373 7599 extn. 83711.

We appreciate the time you have taken to read this invitation.

Approved by the University of Auckland Human Participants Ethics Committee on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XI: PIS for teachers - Study 2 and 3

The Centre for Medical and Health Sciences Education
School of Medicine
Faculty of Health and Medical Sciences
The University of Auckland
RM. 12.004, Bldg. 599
Auckland Hospital Support Bldg
2 Park Rd
Grafton

The University of Auckland
Private Bag 92019
Auckland 1142
New Zealand

PARTICIPANT INFORMATION SHEET - Teacher

Title: ***Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project***

Researchers: ***Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)***

It is important that you read this Participant Information Sheet thoroughly so that your decision about participating (or not) is an informed one.

You have been invited to take part in this study. We are interested in understanding what aspects of a health literacy training programme could improve adolescents' ability to critically assess health information and make informed health choices. It has been noted that people are susceptible to distorted and misleading health information, restricting their ability to make informed health decisions. It is necessary to promote understanding of basic health research processes and the knowledge or skills required to assess the accuracy of health information. This study will help us to develop learning resources for New Zealand high school students that aim to enhance adolescents' ability to evaluate claims about the effects of health care interventions and to ensure they think critically about health choices.

1. Purpose of the research: In this study, we would like to observe Physical Education and Health classes (years 12 and 13) and interview topic teachers about the current practice at two New Zealand schools regarding the teaching of health topics and health information. You will be required to provide your informed consent by signing a Consent Form. The data collected in this research project will be used for the researcher's postgraduate PhD thesis, as well as for presentations and academic publications.

2. Your rights as a participant: Participation in this study is entirely voluntary. We ask permission to access your classrooms and interview you. If you choose to participate, you can change your mind at any time without giving a reason and without any negative consequences. Participation or non-participation will not affect your employment nor your relationship with the researchers or school in any way. You can request to stop the observations or interview at any time, or not have a specific class observed or not answer a specific question during the interview. You can also withdraw your observation and interview data, without giving reason, up to two weeks after the receipt of transcript. After that data cannot be withdrawn as this may undermine the analysis process. We offer the participants a summary of findings that is written in non-academic language. If you wish to receive a summary of findings, please inform your email on the consent form. You will be given a copy of this document (PIS) to keep.

3. Procedure: Participation in this study will involve having your classes observed during Term 2 of 2020, and participating in one face-to-face interview with Julia Vajda de Albuquerque (after the class observations). The interview, lasting up to 30 minutes, will be conducted at the schools and within the school hours but in periods that are not scheduled for teaching or learning. The interview will be audio recorded and Julia Vajda de Albuquerque will do the transcription. Participants will be given the opportunity to review the interview transcripts up to two weeks after the receipt of transcript.

4. Risks and discomforts: There are no anticipated risks associated with participation in this study. If you feel any discomfort in participating in this study, please contact the counselling service at your school.

5. Benefits. There are no direct benefits for participants, however the results of our study are potentially very valuable to improve health literacy promotion in schools.

6. Confidentiality and data storage. Your identity will be kept strictly confidential and no information which can be used to identify you will be associated with the data. Procedures to ensure confidentiality will include the use of pseudonyms for all involved in all reporting and analysis. Julia Vajda de Albuquerque will preserve participants' confidentiality by removing all directly identifying information and will ensure careful use of observation notes and interview transcripts. Your name will only appear on the Consent Form, which will be coded with a pseudonym. This pseudonym is used to de-identify all other data, so that your identity is kept confidential. Your interview data will only be referred to using this pseudonym. All data collected during the research will be stored securely and identifying materials (including key words and codenames) will be kept separate from the coded data. The Consent Form and interview data will only be seen by you and the investigators and will be stored electronically (on password-protected computers) for six years. The data will then be destroyed (all data files will be deleted). Research publications and presentations of findings from this study will not contain any information that could personally identify you or any other participant.

7. Researcher contact details. If you have any queries, please contact:

The **Principal Investigator,** Associate Professor Marcus Henning

School of Medicine, The University of Auckland
Private Bag 92019, Auckland 1142
Email: m.henning@auckland.ac.nz
Ph.: (09) 923-7392

Or the **Head of the Centre for Medical and Health Sciences Education**, Professor Jennifer Weller

School of Medicine, The University of Auckland,
Private Bag 92019, Auckland 1142
Email: j.weller@auckland.ac.nz
Ph.: (09) 923 9459

For any queries regarding ethical issues you may contact the **Chair of The University of Auckland Human Participants Ethics Committee**

The University of Auckland Research Office,
Private Bag 92019, Auckland 1142.
Email: ethics@auckland.ac.nz
Ph.: (09) 373 7599 extn. 83711.

We appreciate the time you have taken to read this invitation.

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XII: CF for school principals - Study 2 and 3

The Centre for Medical and Health Sciences Education
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The University of Auckland
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Auckland 1142
New Zealand

Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project

CONSENT FORM – Principal
THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

I have read and understood the accompanying Participant Information Sheet that explains this research project and my role as a participant. I have had an opportunity to ask questions and have had them answered satisfactorily.

- I agree that the study on the teaching of health topics and health information will take place at the school _____ (in classrooms).
- I consent to the researcher approaching teachers and students to participate in the study, which will include class observations during school term 2 of 2020 and semi-structured interviews, which will be audio recorded.
- I give my assurance that participation or non-participation will not have any impact on participants' employment, grades or academic/organisational relationships.
- I have the right to withdraw permission to access the school's facilities and recruit participants at any time without giving reason.
- Participants have the right to withdraw from the study at any time without giving reason.
- For two weeks after the observation or after the receipt of transcript, participants will still have the right to request that their data be withdrawn from the study.
- I understand that participants' and schools' identity will be kept strictly confidential and coded by pseudonyms. No information which can be used to identify the school or participants will be associated with the data.
- I understand that data will be kept for a minimum of 6 years, after which it will be destroyed.
- I wish/do not wish to receive a summary of findings, which can be emailed to me at this email address: _____

I voluntarily agree to take part in this research.

Signed: _____ Date: _____

Name: _____

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XIII: CF for teachers - Study 2 and 3

The Centre for Medical and Health Sciences Education
School of Medicine
Faculty of Health and Medical Sciences
The University of Auckland
RM. 12.004, Bldg. 599
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2 Park Rd
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New Zealand

Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project
CONSENT FORM – Teachers

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

I have read and understood the accompanying Participant Information Sheet that explains this research project and my role as a participant. I have had an opportunity to ask questions and have had them answered satisfactorily.

- I agree to participate in this study on the teaching of health topics and health information.
- I consent to the researcher Julia Vajda de Albuquerque observing my classes during school term 2 of 2020.
- I consent to the researcher Julia Vajda de Albuquerque interviewing me after the class observations. I understand that I will be audio recorded.
- I understand that the principal has given assurance that participation or non-participation will not have any impact on participants' employment or academic/organisational relationships.
- I have the right to stop participating at any time without giving reason. If I withdraw I will still receive the koha (gift card).
- For two weeks after the receipt of transcript, I will still have the right to request that my data be withdrawn from the study. I can also review the transcribed interview up to two weeks after the receipt of transcript.
- I understand that my identity will be kept strictly confidential and coded by pseudonyms. No information which can be used to identify participants will be associated with the data.
- I understand that data will be kept for a minimum of 6 years, after which it will be destroyed.
- I wish/do not wish to receive a summary of findings, which can be emailed to me at this email address: _____

I voluntarily agree to take part in this research.

Signed: _____ Date: _____

Name: _____

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XIV: Categorisation Matrix – Study 2

Categorization matrix

Categories - Codes	Meaning units
1. Interest and explanation a. Multimedia (L1 2xL2 L3) b. Stories (L1 L2 L3) c. Topics relevant to students (L1 L2 2xL3 2xL4 L6) **d.** Supportive environment (L1 2xL2 2xL3) e. Student voice (L1 2xL2 3xL3 L4 L5 L6)	Lesson 1 – The teacher: - Plays an episode of a sitcom (Brooklyn nine-nine) to introduce the class topic, presenting a situation relevant to teenagers (sexual orientation/identity and family's acceptance) a, b, c - Discusses with students differences between the reactions/posture of parents and friends of the character d, e, f, g, i
	Lesson 2 – The teacher: - Plays a video (distributed priorly) in the beginning of the class, presenting a situation relevant to teenagers (gender stereotypes and expectations, career expectations from families) a, b, c - Discusses the character's favourite activities and feelings, and gender expectations and stereotypes for each family member d, e, f, g, i - Projects photos on the board to challenge gender stereotypes a, f, g, i - Discusses feelings from pressure of the expectations d, e, f, g, i
	Lesson 3 – The teacher: - Plays a video (distributed priorly) in the beginning of the class, presenting a situation relevant to teenagers (gender stereotypes and expectations, career expectations from families) a, b, c - Asks students to share their interpretation of the social injustice portrait in the resource c, d, e, f, i - Encourages students to relate to the character's situation: "Yeah, that's a lot of pressure… what if he…?" d, e, f, g, i - Presents materials (videos, photos) to help students analyse the situation: "have a look on the photos… what are they doing in this picture? Yes, definitely… any other comments?" a, e, f, g, i

f. Active learning (L1 3xL2 3xL3 L4 L5 L6) g. Guidance (L1 3xL2 2xL3 2xL4 2xL6) h. Statistics (L4) i. Critical thinking (L1 3xL2 3xL3 L4 2xL6)	Lesson 4 – The teacher: - Presented numbers of affected people along with expressions ("huge", "that's crazy") to emphasize the impact of diseases, calling attention to differences between countries c, g, h - Asked students to imagine situations that could affect their lives/country ("what would happen if") c, e, f, g, i
	Lesson 5 – The teacher: - Reminded the students they had brainstormed some ideas in the previous class and now they have to formally present them e, f
	Lesson 6 – The teacher: - Helped students link ideas: "for example, differences between social groups – NZ provided accommodation for homeless people – you can relate that to social experience… do you see that connection?" c, f, g, i - Used the example a student gave to guide the activity: "In Nigeria, do they have healthcare? You need to explain that…" e, g
2. Concerns and respect for students and student learning a. Guidance (3xL1 L2 3xL3 3xL6) b. Active learning (4xL1 2xL2 5xL3 L4 L5) c. Student voice (4xL1 4xL2 5xL3 L4)	Lesson 1 – The teacher: - Reminds students this is the last lesson (in context) of the term, so it's important for them to focus a - Encourages students to make questions throughout the class b, c, d, e - Makes questions to students b, c, e - Stimulates students to share their ideas b, c - Goes around the class while the students do the activity to see if they need help with anything d - Asks students questions that will help them answer the activity questions ("how are her parents like? What other things could have influenced her? Do you think this is common or uncommon? Why?") a, b, c, e - Helps students identify what aspects of the discussion/resource they can use to answer each question a - Reminds students they will have to submit an assessment by the end of the first week of the next school term and tells them it's completely up to them how they want to manage their time during school break – but recommends them to work a bit during the holiday because the submission due date won't change. She tells them they will work a bit on it in the first week of the next term, but she's not sure how much time they'll have for it, so they have to be aware of the time – she advises them to enjoy their vacations but also study a bit g - Highlights that one of the questions actually involves three questions, so she tells them to keep this in mind when managing their time a

d. Teacher availability (2xL1 L2 L3 L4 L5 3xL6 2xL7) e. Critical thinking (3xL1 2xL2 4xL3 L6) f. Classroom Setting (L2 L4 L7) g. Responsibility (L1 L2 2xL4) h. Choices (L2 L4 L5 L7)	Lesson 2 – The teacher: - Before playing the video in the beginning of the class, she asks students to remind her what is it about (students had previously received the resource), and then discuss with the students the context of it (Sam's family) b, c, e - Asks the students to read resource 2 again, and then (after they read) she reads it with the group d, g - Asks the students to describe the photos projected on the board, making some questions to encourage and help students to describe the photos a, b, c, e - Encourages students to sit together in the group of their choice but respects if they want to work on their own (to one girl: "do you want to sit with these girls to discuss your ideas?" But the girl doesn't want and the teacher respects that and lets the student sit on her own c, h - After asking students to present their answers and discussing the responses, asks the class "is there anything else you want to add?" c - Organises the classroom with a group setting (some tables connected forming groups), opposite to the typical classroom setting where all students face the teacher and sit in rows f - Reminds students: "The task is due to next Friday 12 pm so you have the whole week to work on it. If you have any questions, I'm here" g, d
	Lesson 3 – The teacher: - Discusses with students important aspects of the video, guiding their analysis: "What happens in the video? What did we just watch? How did the parents react to that? What did he see his parents doing throughout the day? What happens in the end of the video?" a, b, c, e - Explains the questions to the students, gives them 5 minutes to work on their answers, and encourages them to share their ideas/answers with their colleagues a, b, c - Encourages students to reflect: "What do you guys think, why was this video discriminatory?" b, c, e - Stimulates students' reflection with specific questions: "back to the other resource, who's the star of the video? What types of roles do they play? What is his sister up to, what is she doing? What are the expectations on Sam? What does Sam really want to do? What's the issue in the resource? What do you think is unfair about the resource? What is she expected to do? Have they both been given equal opportunities? Why not? What else?" a, b, c, e - Shares her own perspective with the students: "I'm just going to show you the ideas I had… (explains her notes) – both have unfair gender expectations – do you agree?" b, c, e - Is available to help the students with any questions throughout the class, in both individual and group activities d

	Lesson 4 – The teacher: - Encouraged two-way communication; a conversation going back and forth between teacher and students b, c - Asked students to form groups of 3-4 people (of their choice) to do the class activity - "if you need help, let me know" d, e - Organised the classroom in a setting that encourages students to share their ideas (pairs or trios sitting together) f - Reminds students this is the last opportunity to work in that task g - Gives students some time to work in groups of their choice h - Encourages students to take their own notes, not necessarily following the exact phrases on the board g
	Lesson 5 – The teacher: - Encouraged students to share and discuss their ideas within their group b, c - Told the students to work in their groups but went around the class to assist them and also encouraged them to go to her table if they had any questions d - Allows students to choose the group they would work with h
	Lesson 6 – The teacher: - Shared her own ideas and perceptions with the students: "I'd study… I'd have this idea from the resource book – they're trying to give you the answer without saying it, you just need to restructure it" a - Went through the possible answers together with students: "social inclusion is… this contributes a lot to… so for example, this could be because they're socially excluded from their society because of their race" a, c, e - Sat with the groups to connect with and guide them a, d
	Lesson 7 – The teacher: - Highlighted her availability to help students: "If you need help put your hands up and I'll come to you" d - Goes around the classroom to clarify questions and sits with the groups that ask for her support, discussing their ideas with them for as long as they wish d - Organised the classroom in a setting that promotes interaction and group work (groups of 5 tables together), allowing students to choose who they would work it f, h - Emphasises students' responsibility in completing their assignments: "you need to do it, I can't do it all for you" a

4. Appropriate assessment and feedback/ Cognitive Alignment a. On-the-spot feedback (L1 L2 2xL3) b. Individualised feedback (L1 L2 L3 L4 L5 3xL6 L7) c. Questions to the group (L1 L2 4xL3) d. Writing tasks (L1 L2 L3 L4 L5 L6)	Lesson 1 – The teacher: - Gives on-the-spot feedback when asking questions to students and clarifies the topic/activity a, c - Reads and discusses the answers of each student that finished the activity earlier b, d
	Lesson 2 – The teacher: - Goes through the groups to check the writing progress of the groups and clarify any questions b, d - Asks questions to the group and gives feedback on the spot to guide students, using some expressions such as "good, I'm glad you mentioned it… yep… yeah, good… give me an example of… just like you said… don't forget the photos… look at the photos, what is she doing/wearing, what colours, where is the daughter compared to the boy… everything you put in the table (description of each family member) you can use to answer question 1… this is basically question 1… what I'd do here…" a, c
	Lesson 3 – The teacher: - Asks questions to the students throughout the class to assure they are following the intended line of thought, giving feedback on the spot "yes, yeah, basically… what else?" a, c - Goes through the groups to check their progress/answers and guide them "yeah, excellent! What about…? Make sure you… Good! What do you think about… and based on what do you get this? Yes, not necessarily" b, c, d - Gives on-the-spot feedback during discussion with the whole group: "Yeah, you're not wrong. Who else in this video was treated unfairly?" a, c - Encourages student participation throughout the class: "What is the issue we are focusing here?" c
	Lesson 4 – The teacher: - Asks groups to write about economic and social determinants of health that relate to a disease of their choice, presenting statistics to support their theory (1 page, each information on one side, to be delivered in the end of the class). d - Goes around the class during the group activity to give individualised feedback, answering specific questions of each group. For example: a group was confusing social with economic DOH, so she explained (individually for each group and also for the whole class) the differences between these concepts, giving examples and stimulating students to relate to them; she used expressions to give feedback such as "yep", "what I would do…" b
	Lesson 5 – The teacher:

	- Goes through each group to see their work and progress, and answers any questions, encouraging and helping them reflect on their ideas and improve their proposal: "but be more specific… the goal is good, but I'd be aware of the context… you need to… how will you…" b, d
	Lesson 6 – The teacher: - Gives feedback for the students who approach her table to make questions, discussing their idea and helping them reflect on the context b - Went around the classroom to check if groups were doing well "Are you sure? Is all good here? What else have you got? So, the main … is probably going to be … you could probably talk about … as well as…" b - Read the students' answers and helped them improve it by giving some structure tips and stimulating them to explain the topic in their own words: "just do the link… one of the main… could be social exclusion… makes sense? Tell me in your own words, what is social exclusion?" b, d
	Lesson 7 – The teacher: - Gives individualised feedback to groups, discussing their ideas and the structure of their answers b
3. Clear goals and intellectual challenge a. Description (L1 2xL2 5xL3 2xL4 L5 2xL6 L7) b. Critical thinking (L1 L2 L3 L4) c. Guidance (4xL1 2xL3 2xL4 2xL6 L7) d. Instruction (2xL1 3xL2 2xL3 L5 L6 L7) e. Student voice (3xL1 L2 2xL3 L4 L7) f. Revision (L1 2xL3 L5)	Lesson 1 – The teacher: - Explains in the beginning of the class that she is going to show and discuss a video as part of the lesson a - Reads the resource together with students. The she goes through the topic of the resource, asking questions about it to make sure all students understand the topic and main points c - Explains what students need to do in the assessment activity (answer some questions), going through each question with the classroom and asking if they have any questions c, d - When asking students to highlight attitudes, values and beliefs, asks them to remind her what do these concepts mean, using their answer to discuss the topic and give examples c, e, f - Guides students to identify similarities in different contexts presented in the resources, connecting topics from previous classes that can be used to answer questions of the current resource, telling them to think "outside the box" and not feel limited to use only what is in the current resource/video – she encourages them to use other things they have learned in other classes and explains this is what will make them get a merit achievement (63) b, c, e, f - Goes through the questions about the sitcom episode with the students, clarifying meaning and expectations for each question d - Is open to students' answers and ideas: "this is an assumption, but it's ok, this is what I want you to do, to think about the possibilities" b, d, e
	Lesson 2 – The teacher:

	- Explains in the begging of the class that they are going to analyse resource 2 (video, text and questions/tables to fill) in this class a - Explains the students will answer some questions and that they can share their points of view but should use the resource as a guide d - Explains what the students are expected to do in each activity (reads and explains): "Do you understand what question 1 is asking? If not, I can come to your group to explain it" d - Guides the students to discuss the context in group: "based on the first page, what stereotypes do you see? What are the expectations from his father? What if he doesn't want to, how can this affect him? Would you say they've been given the same opportunities? Did they choose their roles? Are the parents being neutral or discriminatory?" b, e - Explained at the end of the class that in the next class she is going to show a video (that will also be sent to students prior to the class) about another family and ask them (assessment activity) to think about how different this family is from Sam's, and what strategies are they using to fight gender stereotypes. She explains they will need to describe inter and intrapersonal skills a, d
	Lesson 3 – The teacher: - Explains in the beginning of the class that they'll continue working on the lesson from last class: "yesterday, what did we do?" a, f - Recaps with the students important aspects of the last class, including questions 1 and 2 from the resource, and then explains that all activities from this class will help them brainstorm ideas to answer the next questions a, f - Explains to the students the goal of the video activity is to refresh their minds on social injustice a - Clarifies to students how the activity connects to the teaching and learning goals: "Based on the question and your notes, how may this affect his later life? These are assumptions as the resource presents little information – again, we are jumping to conclusions, but it's the purpose of this analysis. What I want you to do is…" a, c, d, e - Guides students in the direction expected: "for question 2, this is exactly like… you can use… to write… like we said yesterday… Remember when you provide strategies, you're not talking about… - this is the issue you need to address and come up with intrapersonal strategies. What I'd like you to do is personalize the strategies to Sam, what could Sam do to change his situation. What you need to think for this question is… Now, this is a specific one for Sam: … For part c, you need to identify a strategy and this needs to… You need to address something you think is injustice" b, c, d, e - Keeps students aware of the class structure: "after (the brainstorming and group discussion) we'll have only two questions to go", … "alright, last thing I want to go through with you today, I'm going to give you some examples…", "next class we'll have another topic" a

	Lesson 4 – The teacher: - Described the topic of the day in the beginning of the class (infectious and non-communicable diseases) a - Projects information about some diseases on the board, highlighting most important data they should write down on their notebooks c - Stimulates students to make connections between concepts: disease – young people – productive age – economic and social implications – countries differences b, c, e - In the end of the class, described the topic of the next class a
	Lesson 5 – The teacher: - Explains in the beginning of the class that the students would continue to work on their assessment (internal NCEA assessment: proposing an action to promote health) a - Clarifies the tasks of the assessment d
	Lesson 6 – The teacher: - Describes the topic in the beginning of the class and listed on the board the learning objectives of the class a - Writes on the board the NCEA exam question and says, "if you were not here yesterday, this is the first question of the exam". f - Lists on the board some examples of sentences to guide and help students structure their answers c - Makes it clear this activity was aimed to get them ready for the NCEA external exam: "what you're doing now is practicing the structure of your answer in the test. What I'd like you to do in the exam is start with… and then explain the reason… when you start writing, present this information… how you're going to start your answer: if… you introduce the topic… then overall, … explaining… social exclusion is… for example… you can relate this to the homeless in the USA, for example this tells me these people are excluded from society… look at question 3, I'm questioning… this could be related to… and this is how you're forming your answer… I'd go to the exam with this in mind…" a, b, c, d
	Lesson 7 – The teacher: - Explains they were going to continue working in part 2 of the assignment and clarifies the goal of the activity: "I want to see you do …" a, d - Guided the students in organising the assignment answer based on their ideas c, e

5. Independence, control and active engagement a. Student Voice (L2 2xL3 L7) b. Choices (L2 3xL3 3xL4 2xL5 L6 L7)	Lesson 2 – The teacher: - Reminds students they are welcome to take notes (of the video) if they want b - Brainstorm ideas with the students before they write their answers: "let's go through this as a class group – what are the expectations from Sam based on the resource? What do you read/see? How does he feel about his family's expectations? Tell me about Sam..." a
	Lesson 3 – The teacher: - Asks students to brainstorm ideas within their groups before they discuss the question with the whole class a - Proposes activities where students must do their part to succeed: "Have a look at the '5 tips for preventing…', skim through this link and see if you can come up with strategies that will help not only Sam but anyone in the same situation – I'm going to give you 6min to skim the text and then we'll share the ideas. … Have a look on the website – what do you think, is it helpful?" a - Told the groups to discuss the diseases of their choice b - Sets the classroom according to how the students want to sit, i.e., she tells them they can sit individually or in groups (no defined number of people per group) b - Tells students: "You've done well, now you're more than welcome to finish the activity, or feel free to relax for the last 5 min of the class" b
	Lesson 4 – The teacher: - Explains with their own words how some diseases affect economic growth of a country, and what are their social implications b - Presents information about several diseases and asked groups to choose one infectious and one non-communicable disease to discuss b - Told students– "if you want to do the stats (next class in the computer room) do it – if you don't want to do it, I'll give you something else to do (in the next class)" b
	Lesson 5 – The teacher: - Encourages students to come up with their own ideas on how to promote health in the school: "the idea is up to you… you choose" b - Gives time for students to do the activity. It is an assessment each person has to hand in but then can work together if they want to b
	Lesson 6 – The teacher:

	- Provides students with the exact question of the NCEA exam and explains their achievement will vary according to their interested in analysing the question and preparing themselves. She emphasises she is there to support them b
	Lesson 7 – The teacher: - Encourages students to work in their assignments but let them decide if the work was completed to their standards in this case, they had free time) or if they should continue working in the assignment a - Allows students to choose their groups. Although the setting is for groups of 5 people, she allows the students to sit as they wish (3 pairs, one group of 3, one of 7) b
6. Learning from students a. Reward (L1) b. Technology (L1 L2 L4 L5 L6) c. Student voice (L1 L2 L3 2xL6)	Lesson 1 – The teacher: - Tells students that they have been working hard, so they will watch a movie in the last class of the term a - Allows students to work on their phones/computers, and asks for them to put the phone down on some occasions (when explaining or discussing something) b - Organises the classroom in pairs (two tables connected), but allows some students to sit on their own c
	Lesson 2 – The teacher: - Allows students to use their devices (phones, laptops) during the class so they can use the material she sent them prior to class. b - Asks if the students need more time to do the activities: "how are we doing, do we need more time or is 2 minutes enough?" c
	Lesson 3 – The teacher: - Tells students: "You're welcome to open the window if you want" c - Asks students without a device if they'd like to have the printed resource to work with c
	Lesson 4 – The teacher: - Tells students they can take photos of the board and do research on their phones b, c - Asked students if they preferred the lights on or off to better see the images projected on the board c
	Lesson 5 – The teacher: - Allows students to use their phones during the activity b
	Lesson 6 – The teacher: - Allows students to use their phones b

	- Allows students to sit as they wish – classroom was organized for group work (pairs or trios), but three students wanted to work on their own and the teacher respected their wish c - Asks students: “do you want me to read it? Tell me when you finished it and I’ll read for you. Did everyone get this? Can I erase it?” c

Appendix XV: The NCEA health matrix

Level 1	Level 2	Level 3
AS90971 **1.1** Take action to enhance an aspect of personal well-being. 3 credits Internal	AS91235 **2.1** Analyse an adolescent health issue. 5 credits External	AS91461 **3.1** Analyse a New Zealand health issue. 5 credits Internal
AS90972 **1.2** Demonstrate understanding of influences on adolescent eating patterns to make health-enhancing recommendations. 4 credits External	AS91236 **2.2** Evaluate factors that influence people's ability to manage change. 5 credits Internal	AS91462 **3.2** Analyse an international health issue. 5 credits External
AS91097 **1.3** Demonstrate understanding of ways in which well-being can change and strategies to support well-being. 4 credits Internal	AS91237 **2.3** Take action to enhance an aspect of people's well-being within the school or wider community. 5 credits Internal	AS91463 **3.3** Evaluate health practices currently used in New Zealand. 5 credits Internal
AS90973 **1.4** Demonstrate understanding of interpersonal skills used to enhance relationships. 5 credits Internal	AS91238 **2.4** Analyse an interpersonal issue(s) that places personal safety at risk. 4 credits External	AS91464 **3.4** Analyse a contemporary ethical issue in relation to well-being. 4 credits Internal
AS90974 **1.5** Demonstrate understanding of strategies for promoting positive sexuality. 4 credits Internal	AS91239 **2.5** Analyse issues related to sexuality and gender to develop strategies for addressing the issues. 5 credits Internal	AS91465 **3.5** Evaluate models for health promotion. 5 credits External
AS90975 **1.6** Demonstrate understanding of issues to make health-enhancing decisions in drug-related situations. 4 credits External		

Appendix XVI: PIS for students - Study 3

The Centre for Medical and Health Sciences Education
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PARTICIPANT INFORMATION SHEET - Student

Title: ***Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project***

Researchers: ***Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)***

It is important that you read this Participant Information Sheet thoroughly so that your decision about participating (or not) is an informed one.

You have been invited to take part in this study. We are interested in understanding what aspects of a health literacy training programme could improve adolescents' ability to critically assess health information and make informed health choices. It has been noted that people are susceptible to distorted and misleading health information, restricting their ability to make informed health decisions. It is necessary to promote understanding of basic health research processes and the knowledge or skills required to assess the accuracy of health information. This study will help us to develop learning resources for New Zealand high school students that aim to enhance adolescents' ability to evaluate claims about the effects of health care interventions and to ensure they think critically about health choices.

1. Purpose of the research: In this study, we would like to interview students about the current practice at two New Zealand schools regarding the teaching of health topics and health information. You will be required to provide your informed consent by signing a Consent Form. The data collected in this research project will be used for the researcher's postgraduate PhD thesis, as well as for presentations and academic publications.

2. Your rights as a participant: Participation in this study is entirely voluntary. If you choose to participate, you can change your mind at any time without giving a reason and without any negative consequences. Participation or non-participation will not affect your relationship with the researchers, teachers or school in any way, nor have any impact on your grades. You can request to stop the interview at any time or not answer a specific question during the interview. You can also withdraw your interview data, without giving reason, up to two weeks after the receipt of transcript. After that data cannot be withdrawn as this may undermine the analysis process. If you withdraw you will still receive the koha (gift card and booklet). We offer the participants a summary of findings that is written in non-academic language. If you wish to receive a summary of findings, please inform your email on the consent form. You will be given a copy of this document (PIS) to keep.

3. Procedure: Participation in this study will involve participating in one face-to-face interview with Julia Vajda de Albuquerque. The interview, lasting up to 20 minutes, will be conducted at the schools and within the school hours but in periods that are not scheduled for teaching or learning. The interview will be audio recorded and Julia Vajda de Albuquerque will do the transcription. Participants will be given the opportunity to review the interview transcripts up to two weeks after the receipt of transcript. To thank participants for their time and contribution to this research, you will receive a koha: a $20 Countdown gift card along with a copy of the "Healthy Eating for Young People" booklet (https://www.healthed.govt.nz/resource/healthy-eating-young-people).

4. Risks and discomforts: There are no anticipated risks associated with participation in this study. If you feel any discomfort in participating in this study, please inform your teacher so you can receive counselling service.

5. Benefits. There are no direct benefits for participants (besides the koha), however the results of our study are potentially very valuable to improve health literacy promotion in schools.

6. Confidentiality and data storage. Your identity will be kept strictly confidential and no information which can be used to identify you will be associated with the data. Procedures to ensure confidentiality will include the use of pseudonyms for all involved in all reporting and analysis. Julia Vajda de Albuquerque will preserve participants' confidentiality by removing all directly identifying information and careful use of interview transcripts. Your name will only appear on the Consent Form, which will be coded with a pseudonym. This pseudonym is used to de-identify all other data, so that your identity is kept confidential. Your interview data will only be referred to using this pseudonym. All data collected during the research will be stored securely and identifying materials (including key words and codenames) will be kept separate from the coded data. The Consent Form and interview data will only be seen by you and the investigators and will be stored electronically (on password-protected computers) for six years. The data will then be destroyed (all data files will be deleted). Research publications and presentations of findings from this study will not contain any information that could personally identify you or any other participant.

7. Researcher contact details. If you have any queries, please contact:

The **Principal Investigator,** Associate Professor Marcus Henning

School of Medicine, The University of Auckland
Private Bag 92019, Auckland 1142
Email: m.henning@auckland.ac.nz
Ph.: (09) 923-7392

Or the **Head of the Centre for Medical and Health Sciences Education**, Professor Jennifer Weller

School of Medicine, The University of Auckland,
Private Bag 92019, Auckland 1142
Email: j.weller@auckland.ac.nz
Ph.: (09) 923 9459

For any queries regarding ethical issues you may contact the **Chair of The University of Auckland Human Participants Ethics Committee**

The University of Auckland Research Office,
Private Bag 92019, Auckland 1142.
Email: ethics@auckland.ac.nz
Ph.: (09) 373 7599 extn. 83711.

We appreciate the time you have taken to read this invitation.

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XVII: CF for students - Study 3

The Centre for Medical and Health Sciences Education
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The University of Auckland
Private Bag 92019
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New Zealand

Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project
CONSENT FORM – Students

THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

I have read and understood the accompanying Participant Information Sheet that explains this research project and my role as a participant. I have had an opportunity to ask questions and have had them answered satisfactorily.

- I agree to participate in this study exploring the teaching of health topics and health information.
- I consent to the researcher Julia Vajda de Albuquerque interviewing me. I understand that I will be audio recorded.
- I understand that the principal has given assurance that participation or non-participation will not have any impact on participants' grades or academic/organisational relationships.
- I have the right to stop participating at any time without giving reason. If I withdraw I will still receive the koha (gift card and booklet).
- For two weeks after the receipt of transcript, I will still have the right to request that my data be withdrawn from the study. I can also review the transcribed interview up to two weeks after the receipt of transcript.
- I understand that my identity will be kept strictly confidential and coded by pseudonyms. No information which can be used to identify participants will be associated with the data.
- I understand that data will be kept for a minimum of 6 years, after which it will be destroyed.
- I wish/do not wish to receive a summary of findings, which can be emailed to me at this email address: _____

I voluntarily agree to take part in this research.

Signed: _____ Date: _____

Name: _____

(Researcher use only)
Participant pseudonym:

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XVIII: Interview Schedule – Students – Study 3

Date: School: Class: Student:

Thank you for agreeing to take part in this project. There are no right or wrong answers, we just want to know your honest thoughts and opinions. I will be recording your verbal responses today; however, your answers will remain confidential. Do you have any questions before we start? (response) Are you happy to answer our questions? (response) Keep in mind that you can stop taking part in this process at any time. Let's begin!

(Personal questions)

- How old are you?
- What is your ethnicity (the ethnic group or groups you identify with or feel you belong to)?
- I will record your answers with a different name to keep your identity confidential. Would you like to choose a name?

(Interest and explanation)

- Tell me what interests you about learning these health topics?
- When you're learning these health topics – What's relevant to you?
- How well do you think you understand the health topics being taught?

(Concerns and respect for students and student learning)

- How easy is it for you to learn this information? Is there anything difficult or hard for you – what would that be?

(Appropriate assessment and feedback/ Cognitive Alignment)

- How good is the feedback you are getting – tell me how it affects your motivation?
- What type of feedback do you like to get?

(Clear goals and intellectual challenge/ Cognitive Alignment)

- Tell me about how much you learn and understand when in class?
- Tell me about what you're expected to know? How can you use this information? Please explain.
- Tell me about your teachers' expectations. Do you think they are too high, just right or too low?

(Independence, control and active engagement)

- How much control do you think you have over learning these topics and could things be done differently to increase your interest? Give me some examples?
- What makes you interested in learning about health?

(Learning from students)

- How do you think the classroom could be changed to make learning better? Give me some examples?

(Health literacy)

- Tell me how you are able to find, understand and use health information. How does this help when you are making good decisions for health and wellbeing? Where did you learn how to do this?
- Tell me how you are able to identify a health issue and develop a plan to improve well-being.
- Can you give examples for yourself and others?
- I'd like you to think about a plan to improve your own well-being. What will you do?
- How do you know if a health practice is good or not? Where did you learn how to do this?

Appendix XIX: Interview Schedule – Teachers – Study 3

Date: **School:** **Teacher:**

Thank you for agreeing to take part in this project. There are no right or wrong answers, we just want to know your honest thoughts and opinions. I will be recording your verbal responses today; however, your answers will remain confidential. Do you have any questions before we start? (response) Are you happy to answer our questions? (response) Keep in mind that you can stop taking part in this process at any time. Let's begin!

(Interest and explanation)

- What strategies do you use to engage students in health topics?
- What strategies do you use to find out students' previous knowledge regarding the health topic being explored?

(Concerns and respect for students and student learning)

- What strategies do you use to connect with students and encourage learning?

(**Appropriate assessment and feedback/ Cognitive Alignment**)

- What strategies do you use to create assessments that allow you to discern how well learning goals have been achieved?
- What strategies do you use when giving feedback to students? How does this motivate them to learn more?

(Clear goals and intellectual challenge/ Cognitive Alignment)

- What strategies do you use to clearly communicate intended learning outcomes to students?
- What strategies do you use to make sure teaching and learning goals and methods are aligned?

(Independence, control and active engagement)

- How do you manage interpersonal differences and the uniqueness of individual learners?
- What strategies do you use to foster a sense of student control over learning and interest in the subject?

(Learning from students)

- How do you show students that your teaching is open to change?
- What strategies do you use to try to figure out the effects of instruction on learning? And how do you modify the instruction in the light of the evidence collected?

(Curriculum)

- What determines the curriculum? (Determined according to the NCEA? How much is it pre-determined by this?)
- How do you integrate different health topics?
- How do you use different strategies to present the topics? What influences your teaching methodology choices?

Appendix XX: PIS for school principals - Study 4

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Private Bag 92019
Auckland 1142
New Zealand

PARTICIPANT INFORMATION SHEET – Principal

Title: ***Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project***

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

You are invited to take part in this study. Please read this Participant Information Sheet thoroughly so that your decision about participating (or not) is an informed one.

We are interested in understanding what aspects of a health literacy training programme could improve adolescents' ability to critically assess health information and make informed health choices. It has been noted that people are susceptible to distorted and misleading health information, restricting their ability to make informed health decisions. It is necessary to promote the knowledge or skills required to assess the accuracy of health information. This study will help us to develop learning resources for New Zealand high school students that aim to enhance adolescents' ability to evaluate claims about the effects of health care interventions and to ensure they think critically about health choices.

1. Purpose of the research: In this study, we would like to apply a questionnaire to measure the health literacy level of senior high school students (students over 16 years old enrolled in Year 12 or 13) from Auckland. You will be required to provide your informed consent by signing a Consent Form. The data collected in this research project will be used for the researcher's postgraduate PhD thesis, as well as for presentations and academic publications.

2. Your rights as a participant: We ask you for organisational consent for the research to be conducted at the school, and permission to access the school's facilities and recruit students to participate in the study. Participation in this study is entirely voluntary. Please note you cannot give permission on behalf of the students to participate. Each student has the right to decide whether to participate or not, and to have their participation kept confidential from you. Participants can change their mind at any time without giving a reason and without any negative consequences. Participation or non-participation of the school will not have any impact on your relationship with the researches. We also ask assurance that the decision of participation or non-participation students will not affect their relationship with the school or access to its services (no impact on their grades or academic relationships). Students who decide to participate will provide consent to participating in the research by submitting the anonymous questionnaire. After that data cannot be withdrawn as the data will be anonymized. You have the right to withdraw access to the students at any time, but do not have the right to withdraw participant data already given to researches as part of the study. We offer the participants a summary of findings that is written in non-academic language. If you wish to receive a summary of findings at the end of the study, please inform your email on the consent form. Please note that the information on the summary of findings will protect the confidentiality of schools (the name of the participating schools will not be disclosed). You will be given a copy of this document (PIS) to keep.

3. Procedure: The research will take place in the school (in classrooms), and participants (students over 16 years old enrolled in Year 12 or 13) will be invited to participate in the school. Only those students over 16 years will be able to participate in this study. We will send the Participant Information Sheet for students to the school prior to data collection (one week prior). We ask you to please distribute the Participant Information Sheet for students as soon as you receive it to allow some time for the students to consider whether or not they would like to participate, and discuss this with whānau. After one week, the PhD student Julia Vajda de Albuquerque will go to your school to apply the paper questionnaire (taking around 15 minutes) to those students who wish participate. The date and time for the completion of the questionnaire will be scheduled at the end of a class (after a 5-minute window at the end of class time). The questionnaire will be anonymous, and

submission of the questionnaire will constitute consent to participating in the research. Students will return the completed questionnaire in an opaque box (to preserve anonymity), which will be collected by Julia Vajda de Albuquerque. An online version will be available if schools are in lockdown due to the COVID crisis. In this case, we will ask your school administration to send a link to students. Even if there is no lockdown, students will be able to fill in the questionnaire via an online link if they so desire (rather than the paper questionnaire). After completing the questionnaire, students cannot withdraw their data as it will be anonymized. Students that wish to participate in a draw to win a $60 Westfield gift-card (two per participating school) will be asked to complete a form (separate from the questionnaire) with their contact information (name, email address, phone number, physical address).

4. Risks and discomforts: There are no anticipated risks associated with participation in this study. If participants feel any discomfort in participating in this study, they can contact the counselling service at your school.

5. Benefits. There are no direct benefits for participants, however the results of our study are potentially very valuable to improve health literacy promotion in schools. Participants will have the opportunity to entre a draw to win a $60 Westfield gift-card (two gift-cards will be available for each participating school). The school may benefit by raising awareness around the promotion of health literacy. A further benefit is that you will have the satisfaction of knowing that your school has contributed towards research into this area.

6. Confidentiality and data storage. The schools' identity will be kept strictly confidential and no information which can be used to identify the school will be associated with the data. Procedures to ensure confidentiality will include the use of letters for all schools involved in all reporting and analysis. Julia Vajda de Albuquerque will preserve schools' confidentiality by removing all directly identifying information and referring to schools with their assigned letters rather than their name (schools will be referred to as A, B, C, D, etc, according to the order of participation). The schools' names will only appear on the Consent Form and the questionnaires, and we will refer to the schools' name with a letter. All data collected during the research will be stored securely and identifying materials (including name of the school) will be kept separate from the coded data. The Consent Form will only be seen by school principals and the investigators, and will be stored electronically (on password-protected computers) for six years. The data will then be destroyed (all data files will be deleted). Research publications and presentations of findings from this study will not contain any information that could personally identify you, your school or any participant. The participants' identity will be kept strictly anonymous and no information will be able to identify or associate the participant with the data.

7. Researcher contact details. If you have any queries, please contact:

The **Principal Investigator,** Associate Professor Marcus Henning
School of Medicine, The University of Auckland
Private Bag 92019, Auckland 1142
Email: m.henning@auckland.ac.nz
Ph.: (09) 923-7392

Or the **Head of the Centre for Medical and Health Sciences Education**, Professor Jennifer Weller
School of Medicine, The University of Auckland,
Private Bag 92019, Auckland 1142
Email: j.weller@auckland.ac.nz
Ph.: (09) 923 9459

For any queries regarding ethical issues you may contact the **Chair of The University of Auckland Human Participants Ethics Committee**
The University of Auckland Research Office,
Private Bag 92019, Auckland 1142.
Email: ethics@auckland.ac.nz
Ph.: (09) 373 7599 extn. 83711.

We appreciate the time you have taken to read this invitation.

Approved by the University of Auckland Human Participants Ethics Committee on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XXI: CF for school principals - Study 4

The Centre for Medical and Health Sciences Education
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New Zealand

Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project

CONSENT FORM – Principal
THIS CONSENT FORM WILL BE HELD FOR A PERIOD OF SIX YEARS

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

I have read and understood the accompanying Participant Information Sheet that explains this research project and my role as a participant. I have had an opportunity to ask questions and have had them answered satisfactorily.

- I agree that the study on health literacy of senior secondary students (year 12 and 13) will take place at the school _____ (in classrooms).
- I consent to the researcher approaching students to participate in the study, which will include an anonymous paper questionnaire.
- I give my assurance that participation or non-participation will not have any impact on participants' employment, grades or academic relationships.
- I have the right to withdraw permission to access the school's facilities and recruit participants at any time without giving reason.
- Participants have the right to withdraw from the study at any time (prior to the submission of the questionnaire) without giving reason.
- I understand that schools' identity will be kept strictly confidential and coded by letters, and participants' identity will be anonymous. No information which can be used to identify the school or participants will be associated with the data.
- I understand that data will be kept for a minimum of 6 years, after which it will be destroyed.
- I wish/do not wish to receive a summary of findings, which can be emailed to me at this email address: _____

I voluntarily agree to take part in this research.

Signed: _____ Date: _____

Name: _____

(Researcher use only)
School letter:

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XXII: PIS for students - Study 4

The Centre for Medical and Health Sciences Education
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Private Bag 92019
Auckland 1142
New Zealand

PARTICIPANT INFORMATION SHEET - Student

Title: ***Designing and implementing an educational intervention to improve adolescents' health literacy in New Zealand: An action research project***

Researchers: Julia Vajda de Albuquerque (PhD student), Associate Professor Marcus Henning (Supervisor), Dr Yan Chen (Co-Supervisor) and Dr Fiona Moir (Co-Supervisor)

You are invited to take part in this study. Please read this Participant Information Sheet thoroughly so that your decision about participating (or not) is an informed one.

We are interested in understanding what aspects of a health literacy training programme could improve adolescents' ability to critically assess health information and make informed health choices. People can be susceptible to distorted and misleading health information, restricting their ability to make informed health decisions. It is necessary to promote the knowledge or skills required to assess the accuracy of health information. This study will help us to develop learning resources for New Zealand high school students that aim to enhance adolescents' ability to evaluate claims about the effects of health care interventions and to ensure they think critically about health choices.

1. Purpose of the research: In this study, we would like to administer a questionnaire to measure the health literacy level of senior high school students (students over 16 years old enrolled in Year 12 or 13) from Auckland. When you complete and submit the questionnaire, this means that you are consenting to take part in this study. The data collected in this research project will be used for the researcher's postgraduate PhD thesis, as well as for presentations and academic publications.

2. Your rights as a participant: Participation in this study is entirely voluntary. Please note you need to be at least 16 years old to be able to participate in this study. If you choose to participate, you can change your mind at any time prior to the submission of the questionnaire without giving a reason and without any negative consequences. Participation or non-participation will not affect your relationship with the researchers, teachers or school in any way, nor have any impact on your grades. After that, data cannot be withdrawn as the data will be anonymized. We offer the participants a summary of findings that is written in non-academic language. If you wish to receive a summary of findings, please indicate that on the 'Entry to draw' form. You will be given a copy of this document (PIS) to keep.

3. Procedure: Participation in this study will involve completing a paper questionnaire (taking around 15 minutes) at your school. You are receiving this Participant Information Sheet one week prior to the questionnaire collection. This allows some time for you to consider whether or not you would like to participate, and discuss this with whanau. The questionnaire will be anonymous and scheduled at the end of a class (after a 5-minute window at the end of class time). You will return the completed questionnaire in an opaque box (to preserve anonymity), which will be collected by the researcher, Julia Vajda de Albuquerque. . If the school is in lockdown due to the COVID crisis, an online link to questionnaire will be provided. Even if there is no lockdown, you will be able to fill in the questionnaire via an online link if you so desire (rather than the paper questionnaire). After completing the questionnaire, you cannot withdraw your data as it will be anonymized. To thank participants for their time and contribution to this research, you will have to opportunity to participate in a draw to win a $60 Westfield gift-card (two per participating school). If you wish to participate in this draw,

you will be asked to complete a form ("Entry into the draw" form, separate from the questionnaire) with your contact information (name, email address, phone number, physical address).

4. Risks and discomforts: There are no anticipated risks associated with participation in this study. If you feel any discomfort in participating in this study, please inform your school so you can receive counselling service.

5. Benefits. There are no direct benefits for participants, however the results of our study are potentially very valuable to improve health literacy promotion in schools. You will have the opportunity to entre a draw to win a $60 Westfield gift-card (two gift-cards will be available for your school). A further benefit is that you will have the satisfaction of knowing that you have contributed towards research into this area.

6. Confidentiality and data storage. Your identity will be kept strictly anonymous and no information from the questionnaire will be able to be associated with your identity. You will provide the name of your school in the questionnaire, but Julia Vajda de Albuquerque will preserve schools' confidentiality by removing all directly identifying information and referring to schools with their assigned letters rather than their name (schools will be referred to as A, B, C, D, etc, according to the order of participation). This letter is used to de-identify all other data, so that the school's identity is kept confidential. The schools will only be referred to using the assigned letter. Your identity will be kept strictly anonymous and no information will be able to identify or associate you with the data. All data collected during the research will be stored securely and identifying materials (including name of the school) will be kept separate from the coded data. The questionnaire data will only be seen by you and the investigators and will be stored electronically (on password-protected computers) for six years. The data will then be destroyed (all data files will be deleted). Research publications and presentations of findings from this study will not contain any information that could identify your school, you or any other participant.

7. Researcher contact details. If you have any queries, please contact:

The **Principal Investigator,** Associate Professor Marcus Henning

School of Medicine, The University of Auckland
Private Bag 92019, Auckland 1142
Email: m.henning@auckland.ac.nz
Ph.: (09) 923-7392

Or the **Head of the Centre for Medical and Health Sciences Education**, Professor Jennifer Weller

School of Medicine, The University of Auckland,
Private Bag 92019, Auckland 1142
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For any queries regarding ethical issues you may contact the **Chair of The University of Auckland Human Participants Ethics Committee**

The University of Auckland Research Office,
Private Bag 92019, Auckland 1142.
Email: ethics@auckland.ac.nz
Ph.: (09) 373 7599 extn. 83711.

We appreciate the time you have taken to read this invitation.

Approved by the University of Auckland Human Participants Ethics Committee
on 09/04/2020 for a period of 3 years. Reference number: 024388

Appendix XXIII: Answers to the open-ended survey question - Study 4

Student # (age, gender, prioritised ethnic group, study level, school decile)	**How would you like to be taught about health literacy (the ability to access, understand, appraise and use health information)?**
S2: 17yo, female, European, Year 13, high decile school	Through school (teachers)
S4: 17yo, female, Other Ethnicity, Year 12, high decile school	Learn more about mental health in teenagers
S5: 16yo, female, Māori, Year 12, high decile school	More lessons about mental health
S6: 16yo, female, European, Year 12, high decile school	Through learning from teacher
S7: female, Māori, Year 12, high decile school	Mental health What causes poor mental health the most How to deal with poor mental health What you can do to prevent poor mental health Diet +nutrition What are good foods Bad diet habits What we need in our diet
S8: 16yo, female, Asian, Year 12, high decile school	Printed copies of worksheets to work from Physical pamphlets
S9: 16yo, female, Other Ethnicity, Year 12, high decile school	In class during the health lessons
S10: 16yo, female, Asian, Year 12, high decile school	Not sure
S11: 16yo, female, European, Year 12, high decile school	To be taught by people involved in those industries e.g., doctors, phycologists etc. and also demonstrations of health-related topics to have a better understanding
S12: 17yo, female, Other Ethnicity, Year 12, high decile school	No idea, my mum pretty much does it whenever she feels like it
S14: 16yo, female, Other Ethnicity, Year 12, high decile school	I would like for it to be mentioned more in health classes. We do lean about basic things in year 9 and 10 such as the understanding of health literacy but in year 11, 12 and 13 we don't further continue our knowledge on it.
S15: 17yo, female, European, Year 12, high decile school	I would like health class to consist more about real life situations and experiences e.g., sex, drugs, injuries, illnesses. I think fields trips or presentations by people when we can see the negative effects and harms on our bodies would be more beneficial.
S16: 16yo, female, Māori, Year 12, high decile school	I want to be able to understand in more depth about health issues and be able to access help with easy when needed as well as know how to help myself.

S17: 16yo, female, European, Year 12, high decile school	I would like to be taught about health literacy through first-hand experience. I feel as if health students could benefit their level of knowledge and education on health in formation if they were to go on trips to places such as the hospital, clinics, etc. by visiting these health services, students will have a visual understanding of how healthcare works and also can be advice information from health professionals. Personally, I also think that mental health is more important to be informed about than physical health so health departments in schools should focus more on one-on-one mental health lessons.
S18: 16yo, female, European, Year 12, high decile school	School
S21: 16yo, female, Other Ethnicity, Year 12, high decile school	In class
S22: 17yo, female, European, Year 12, high decile school	Through an online course
S23: 17yo, female, European, Year 12, high decile school	Online
S25: 16yo, male, European, Year 12, high decile school	In health classes with no judgement zones.
S26: 16yo, male, Asian, Year 12, high decile school	Health classes that are mandatory in year 9/10, using videos as they are most effective to help me learn.
S27: 17yo, female, Asian, Year 12, high decile school	Hard copies (pamphlets, posters or printed info)
S28: 17yo, female, European, Year 13, high decile school	With all information given
S30: 18yo, male, European, Year 13, high decile school	? common misconceptions people have surrounding health Be able to confidentially talk about health literacy with extensive knowledge on related topics
S31: 18yo, male, Māori, Year 13, high decile school	General health lessons
S32: 18yo, female, European, Year 13, high decile school	More about mental illnesses About exercise and eating well Getting in the environment + learning in more physical ways
S33: 18yo, female, European, Year 13, high decile school	General health
S34: 16yo, male, Other Ethnicity, Year 12, high decile school	Making us feel comfortable and relaxed so everyone feels welcome

S35: 16yo, female, European, Year 12, high decile school	More detailed information with different scenarios
S37: 16yo, female, Other Ethnicity, Year 12, high decile school	School lessons
S38: 17yo, female, European, Year 13, high decile school	Not sure
S39: 18yo, female, European, Year 13, high decile school	Hand on activities
S40: 18yo, female, European, Year 13, high decile school	In class or through the media
S41: 17yo, female, European, Year 13, high decile school	Interactive activities
S44: 17yo, female, Māori, Year 13, high decile school	Through hight school learning e.g., health class
S46: 17yo, female, European, Year 13, high decile school	Videos and websites with information
S47: 17yo, female, European, Year 13, high decile school	A wider range of issues
S48: 17yo, female, Asian, Year 13, high decile school	Not sure
S49: 16yo, female, Asian, Year 12, high decile school	Easy to use online website, go through during school. Tutor/form time
S50: 18yo, male, Asian, Year 13, high decile school	More compulsory and honest health education in secondary school
S51: 16yo, male, Asian, Year 12, high decile school	Classes at school Online At hospital or general practitioner
S52: 17yo, female, Asian, Year 12, high decile school	Mental health
S53: 18yo, male, Asian, Year 13, high decile school	The way school teaches it is fine, except not enough information is covered
S54: 16yo, female, Asian, Year 12, high decile school	School health lessons

S55: 17yo, female, Asian, Year 12, high decile school	I wish to be comfortable learning about things without the risk of others finding out (parents) especially about mental wellness or eating disorders. Telling parents is a big thing I'm uneasy about especially when they are the problem
S56: 17yo, female, European, Year 13, high decile school	In an upfront and unbiased manner. I would like the information to be entirely fact based and useful
S57: 16yo, female, Asian, Year 12, high decile school	More in school and health lessons in junior years
S58: 17yo, female, Asian, Year 13, high decile school	At school, with specific periods allocated to health literacy lessons.
S59: 17yo, male, Asian, Year 13, high decile school	In school
S62: 17yo, female, Asian, Year 13, high decile school	A reliable website that is easy to understand and search for, so I can use it in my own time
S64: 17yo, female, Asian, Year 13, high decile school	Have a website given to us where we can find all the information
S65: 17yo, female, European, Year 12, high decile school	Resources gathered together online
S66: 17yo, male, Asian, Year 13, high decile school	Through online courses
S68: 16yo, male, Asian, Year 12, high decile school	Presentations at assembly
S70: 17yo, male, European, Year 13, high decile school	In an open and inclusive manner
S72: 17yo, male, Pacific Peoples, Year 13, high decile school	In school Through life
S75: 17yo, male, Asian, Year 13, high decile school	Health classes
S77: 17yo, male, Asian, Year 13, high decile school	Slide show presentation Documentary
S78: 17yo, male, Asian, Year 13, high decile school	Through school
S79: 17yo, male, Year 12, high decile school	Probably through health classes in schools or some advertising activities around the school
S81: 17yo, male, European, Year 13, high decile school	School, uni, or classes outside the school Documentary and YouTube videos

S82: 17yo, male, Asian, Year 13, high decile school	Through a website
S87: 16yo, female, European, Year 12, high decile school	I would like to be able to understand information on food packaging
S88: 16yo, female, European, Year 12, high decile school	Teaching?
S89: 16yo, female, Māori, Year 12, high decile school	Assertively and openminded people I find are amazing at teaching health
S90: 16yo, female, Asian, Year 12, high decile school	Practicals: gaining understanding through physical experiences of the situation. E.g., having conversations with people about health-related topics
S91: 16yo, female, European, Year 12, high decile school	I'd like to understand food packaging information
S95: 16yo, male, European, Year 12, high decile school	AIDS
S96: 16yo, female, European, Year 12, high decile school	Practical activities that are fun, so it engages us-games, quizzes, outside the class activities
S97: 16yo, European, Year 12, high decile school	Practical activities
S98: 16yo, female, Asian, Year 12, high decile school	Videos, games
S99: 17yo, female, European, Year 13, high decile school	Tell us what's reliable and what's not
S100: 17yo, female, Asian, Year 12, high decile school	More about health and recommend books about health
S101: female, European, Year 12, high decile school	I would like to be taught about health literacy through talking to someone with a health-related profession (doctor, nurse, health teacher) and learn through documentaries and videos and informative visual lessons of health
S102: 16yo, male, Asian, Year 12, high decile school	In class by doing, it myself rather than just being taught it
S103: 16yo, female, European, Year 12, high decile school	I would like to be informed about sexuality and how it can create difficult impacts
S104: 16yo, female, European, Year 12, high decile school	Do not know
S105: female, Other Ethnicity, Year 12, high decile school	Do not know

S106: 16yo, female, European, Year 12, high decile school	Through school and health classes
S107: 16yo, female, Asian, Year 12, high decile school	Through pamphlets or anything that can be easily accessible
S108: 16yo, female, European, Year 12, high decile school	Less focus on decision making and sexuality. More on effects of different things, how to keep healthy and learn more deeply about mental health e.g., chemical imbalance in your brain, etc.
S109: 17yo, male, European, Year 13, high decile school	Online articles
S111: 16yo, female, Other Ethnicity, Year 12, high decile school	Being showed examples and being treated as adults when learning. I would also like to learn about health literacy in a comfortable environment and not be judged.
S112: 17yo, decline to answer gender, Asian, Year 13, high decile school	Seggs without Jesus seeing
S114: 17yo, male, European, Year 13, high decile school	Through health classes
S115: 18yo, male, Other Ethnicity, Year 13, high decile school	Health classes
S116: 17yo, male, Pacific Peoples, Year 13, high decile school	Through school
S117: 17yo, male, European, Year 13, high decile school	With slideshows and videos of what happens to your body
S121: 17yo, male, Asian, Year 13, high decile school	Through doctors or teachers
S122: 17yo, female, European, Year 13, high decile school	Online with school
S123: 17yo, female, European, Year 13, high decile school	Health class, watching videos
S124: 17yo, female, European, Year 13, high decile school	Watching informational videos
S125: 17yo, male, Asian, Year 13, high decile school	Not sure

S127: 17yo, female, European, Year 13, high decile school	Video and websites
S128: 17yo, male, Asian, Year 13, high decile school	Not too sure, sorry
S130: 17yo, female, European, Year 12, high decile school	I feel as though if I felt more comfortable around the person teaching about health/mental health I would ask more questions.
S131: 17yo, male, European, Year 12, high decile school	Become more understanding of how and what foods I consume have a positive /negative effect on my body
S132: 16yo, female, Māori, Year 12, high decile school	Practical engaging lessons that are engaging and get point across
S133: 17yo, male, Asian, Year 12, high decile school	Special lessons or separate lessons
S135: 17yo, male, Asian, Year 12, high decile school	Have training sessions, tutorials
S137: 17yo, female, European, Year 13, high decile school	Quiz/classes/website: easy to understand info with examples/comparisons
S138: 18yo, male, Other Ethnicity, Year 13, high decile school	In person face to face
S140: 16yo, male, Asian, Year 12, high decile school	Just in tutor time in school
S142: 16yo, male, European, Year 12, high decile school	Tutor time in school
S143: 16yo, female, European, Year 12, high decile school	More general lessons in classes around health and how to look after yourself
S144: 16yo, female, Other Ethnicity, Year 12, high decile school	I'm not too sure, not my biggest interest
S147: 17yo, male, European, Year 12, high decile school	I think it should be more widely taught throughout schools
S148: 16yo, male, Asian, Year 12, high decile school	Monthly visits with a GP or doctor about common health hazards in my age group (and given prompts to ask questions about my health)
S149: 18yo, female, Asian, Year 13, high decile school	By online sources, teachers, doctors, pamphlets

S151: 17yo, female, European, Year 13, high decile school	It would be good to be taught about health literacy
S152: 18yo, female, Asian, Year 13, high decile school	Teaching health literacy in class
S153: 17yo, female, European, Year 13, high decile school	By teachers?
S154: 17yo, female, European, Year 13, high decile school	Classes?
S155: 17yo, female, Asian, Year 13, high decile school	I'm not sure
S156: 18yo, female, Asian, Year 13, high decile school	NZ is easily accessible to drugs so it would be good to raise more awareness about it
S157: 17yo, gender diverse, European, Year 13, high decile school	A simple and easy to navigate website
S158: 17yo, female, Asian, Year 13, high decile school	It is already very accessible and easy to find in the public. The information given should be more detailed
S165: 17yo, male, Asian, Year 13, high decile school	Basic health is enough in school, the rest can be found online
S169: 16yo, male, Asian, Year 12, high decile school	During PSS
S170: 16yo, male, European, Year 12, high decile school	A few classes every term related to health issues and just overall more information and learning about illness.
S172: 17yo, female, European, Year 13, high decile school	School, teachers in classroom.
S173: 17yo, female, European, Year 13, high decile school	School trough teachers educating us
S175: 17yo, female, European, Year 13, high decile school	I'd like to be taught about it semi regularly, with/by someone that has the ability to answer any questions and share knowledge
S176: 17yo, female, European, Year 13, high decile school	I would like to learn by having a website to access where all the information is available
S177: 17yo, gender diverse, European, Year 13, high decile school	I don't know

S180: 17yo, female, European, Year 13, high decile school	Taught more relevant information in class rather than stuff that isn't that relevant
S182: 18yo, female, Asian, Year 13, high decile school	Recommended govt website Mandatory health information classes for a long period of time
S183: 18yo, male, Other Ethnicity, Year 13, high decile school	Understand that everyone is different and may have different responses to certain substances, therefore people would relate to certain substance positively and negatively
S187: 18yo, female, European, Year 13, high decile school	By actual health professionals
S188: 17yo, female, European, Year 13, high decile school	I think teaching it in health classes would be beneficial. People can ask questions and have discussions etc.
S189: 17yo, female, Māori, Year 13, high decile school	Through visual videos. Teachers
S192: 17yo, female, European, Year 13, high decile school	Don't know
S193: 18yo, female, Asian, Year 12, high decile school	I would like to learn it through the movie and some activity
S195: 18yo, female, Asian, Year 13, high decile school	Maybe by watching videos
S196: 18yo, female, European, Year 13, high decile school	An app/website
S198: 18yo, male, Asian, Year 13, high decile school	More in depth junior health
S199: 17yo, female, European, Year 13, high decile school	It should be taught in more levels at school as it is only compulsory (health classes) up until year 10
S202: 18yo, male, Asian, Year 13, high decile school	In junior years a more in-depth health course
S203: 17yo, female, European, Year 13, high decile school	Online or in school
S204: 17yo, female, European, Year 13, high decile school	Information on website
S205: 17yo, female, European, Year 13, high decile school	In class/website

S206: 18yo, female, Other Ethnicity, Year 13, high decile school	I think junior classes were good (my school dedicates week of PE lessons per term in year 9 +10), but they should be more frequent, I think. They also discussed barely any of the topics discussed here (not even our rights). I would like more lessons on our rights and how to interact with doctors and stuff.
S208: 17yo, male, Asian, Year 13, high decile school	During a period where it doesn't get in the way of our classes
S210: 18yo, male, Asian, Year 13, high decile school	I would like to learn health literacy. But wouldn't want to give up one of my subjects for health literacy
S212: 17yo, male, European, Year 13, high decile school	Easy to access resources that are relevant to my demographics. At a sound (primary school) we learn about health risks, but we do not go into detail about how to avoid them in our lives. It would be good to start health promotion at a young age and continue throughout later years (in detail)
S213: 17yo, female, Asian, Year 13, high decile school	Websites Classes (not just focused on prevention, but on how to be safe) At the doctors?
S214: 17yo, male, Other Ethnicity, Year 13, high decile school	Through studies summarized into key points
S217: 17yo, male, European, Year 13, high decile school	unsure
S218: 17yo, female, European, Year 13, high decile school	Compulsory health classes beyond year 9 and 10 at high school
S220: 17yo, male, Māori, Year 13, high decile school	IDK
S224: 17yo, male, Māori, Year 13, high decile school	I don't know
S225: 17yo, male, European, Year 13, high decile school	I don't know
S226: 17yo, female, European, Year 13, high decile school	School education (otherwise I feel many would not attend any classes/info)
S227: 17yo, male, Asian, Year 13, high decile school	websites
S228: 18yo, female, Asian, Year 13, high decile school	In health classes. PE classes more often. In science class as well?
S229: 17yo, female, European, Year 13, high decile school	I think that this is something that a certain age you need to take charge for yourself. Personally, I don't want to waste a school subject on health learning and so for me, if I want to know something, I will find it out from another credible source. However, I still believe that health as a subject should continue

	to be compulsory at a younger age. However, the subject matter taught definitely needs to be developed.
S231: 17yo, female, European, Year 13, high decile school	More in depth learning and more inclusivity with sexuality and gender diverse health
S232: 17yo, male, European, Year 13, high decile school	Health is a subject compulsory for year 9 and 10 but is only taught for about 1 term. I believe if health is compulsory on to year 11 it would be extremely helpful as I took it in year 11 and learned quite a lot of useful information that others don't know concerning health issues.
S233: 17yo, male, Māori, Year 13, high decile school	Not too sure
S235: 17yo, female, European, Year 13, high decile school	I believe that health right should be educated especially to younger people more
S236: 17yo, female, European, Year 13, high decile school	Video tutorials during tutor classes
S237: 17yo, female, Māori, Year 13, high decile school	More information in classes
S238: 18yo, female, European, Year 13, high decile school	Website, classes, extra events
S239: 16yo, female, European, Year 12, high decile school	In school it should be somewhat compleser so everyone can understand what things affect your health
S240: 16yo, female, European, Year 12, high decile school	Through group activities and books
S243: 16yo, female, European, Year 12, high decile school	In school learning or taking a class about this should be compulsory
S244: 16yo, female, Māori, Year 12, high decile school	school
S246: 17yo, male, Other Ethnicity, Year 12, high decile school	school
S247: 16yo, female, European, Year 12, high decile school	By a teacher in a classroom
S248: 16yo, female, Asian, Year 12, high decile school	By attending health classes with teachers that provide health information
S249: male, European, Year 12, high decile school	In a classroom

S250: 16yo, female, European, Year 12, high decile school	In a school environment
S253: 16yo, male, European, Year 12, high decile school	Readily available pamphlets
S254: 16yo, female, European, Year 12, high decile school	Leaflets that are readily available
S260: 16yo, male, Pacific Peoples, Year 12, low decile school	I prefer talking to parent about your health
S261: 16yo, male, European, Year 12, low decile school	School
S262: 16yo, male, Māori, Year 13, high decile school	Not sure
S263: 16yo, male, European, Year 13, high decile school	During school classes. At home from my parents
S264: 17yo, male, European, Year 13, high decile school	Being taught more about it in a schooling-based environment would be beneficial
S265: 17yo, male, Pacific Peoples, Year 13, high decile school	More extensive health classes at school as part of PE
S266: 17yo, male, Māori, Year 13, high decile school	I don't know
S267: 17yo, male, European, Year 13, high decile school	Through online courses that I can complete in my own time
S268: 17yo, male, Asian, Year 13, high decile school	Would like to understand more about food nutritional information. I have seen many teenagers vaping and would like for them to find out the negative effects as most of them say "it doesn't have nicotine so there is nothing wrong with it". There has got to be a caught. Also, would like to understand more about how to understand medical leaflets and how to take care of self if ill.
S270: 17yo, male, European, Year 13, high decile school	In A level Biology we learn about diseases such as malaria, cholera, HIV/AIDS, tuberculosis and others, as well as how pathogens work in the body (macrophages) and plasma cells and memory cells
S275: 16yo, male, European, Year 12, high decile school	Online
S276: 17yo, male, European, Year 13, high decile school	Online

S277: 17yo, male, Asian, Year 13, high decile school	Classes, assemblies, more easily accessible resources (e.g., pamphlets, posters etc)
S280: 17yo, male, Māori, Year 13, high decile school	? confusion
S281: 17yo, male, Māori, Year 13, high decile school	Simple format Straight format
S282: 17yo, male, European, Year 13, high decile school	At school
S283: 17yo, male, European, Year 13, high decile school	Do not know
S285: 17yo, male, Māori, Year 13, high decile school	Easy access on the internet that's really true and not made up
S286: 17yo, male, Māori, Year 13, high decile school	Ceebs (means can't be bothered)
S287: 17yo, male, European, Year 13, high decile school	I'm immune to everything, don't even bother!
S288: 17yo, male, Māori, Year 13, high decile school	Listen to a speaker to be able to ask questions and get answers
S289: 17yo, male, Māori, Year 13, high decile school	In group discussion with someone who is experience in the health wellbeing code
S290: 18yo, male, Pacific Peoples, Year 13, high decile school	Through hands on task, such as P.E. or sport's studies where you learn not in a class but through experience
S291: 17yo, male, Māori, Year 13, high decile school	Classes at school
S292: 17yo, female, European, Year 12, high decile school	Have people come into share their personal experiences e.g., drugs or mental health
S293: 16yo, female, Pacific Peoples, Year 12, high decile school	I want to be able to learn and understand more about real life situations that can happen such as what to do if you get cuts or burns etc
S294: 16yo, female, European, Year 12, high decile school	I think it is better to be taught about more personal topics such as health literacy in a very unforceful manner. I understand that it is difficult to do this, but I would feel more honest and comfortable. In an environment with much less people instead of a classroom. Currently, I kind of just learn about health literacy whenever I encounter anything I don't know. Otherwise, I think the skills under health literacy are so important for life and the future. I think we should be taught these things through actually experiencing them, instead of just being fed

	verbal information about it. In class, I feel as though I am just being spoken to and nothing is actually comprehended. By getting up and using my hands not only will I learn better but I will enjoy it.
S295: 17yo, female, Asian, Year 12, high decile school	- Better know my rights as a patient - Know how to better identify my own health issues
S296: 16yo, female, Māori, Year 12, high decile school	- To better know what effects drugs and alcohol have - More about mental health
S297: 16yo, female, Asian, Year 12, high decile school	- Learning through a teacher - Videos - About COVID, what it does - mental health, talk more about it - sexual things (intercourse, oral) – what happens during sex and what is normal/isn't
S298: 16yo, female, Year 12, high decile school	Learn more about discrimination, and mental health awareness and how to know how everyone feels
S299: 17yo, female, European, Year 12, high decile school	Mental health awareness, how to help other people consent
S300: 16yo, female, European, Year 12, high decile school	Mental health awareness and how to help people deal with it
S301: 16yo, female, European, Year 12, high decile school	I would like to interact more in class
S302: 16yo, female, European, Year 12, high decile school	In classes be taught more thoroughly about it as well as health places making it more obvious about effects of health etc. Have people be more aware about how important health is and more information - learn more about health resources medical + physical and mental - have teachers more educated - how to keep safe - mental health like depression, anxiety, other issues and disorders
S303: 16yo, female, Māori, Year 12, high decile school	Learn more about how mental health occurs and what the chemical imbalances are that cause it. The type of medication that is given and what the medication can cause (all the bad impacts possible)
S304: 16yo, male, European, Year 12, high decile school	Why drugs are… not sure…
S305: 16yo, female, Asian, Year 12, high decile school	Learning more about mental health specifically.
S307: 16yo, female, European, Year 12, high decile school	People can come in and we can learn more from experts. We could also have a credited test for it. I also want to know more about mental health such as anxiety and OCD. I also think we should learn more of other mental disabilities e.g., DID
S311: 17yo, female, Asian, Year 12, high decile school	Health wellbeing Personal, interpersonal and societal long-term, short-term effect

S312: 16yo, female, European, Year 12, high decile school	Mental health and more about disabilities and diseases and how they're transmitted
S313: 17yo, female, Asian, Year 12, high decile school	I think that lessons could be more interactive. I would like to know more about the psychology and ways we could make depressed students feel better.
S316: 16yo, decline to answer gender, Pacific Peoples, Year 12, low decile school	Someone talks to me about it
S318: 16yo, male, Pacific Peoples, Year 12, low decile school	Short interview
S322: 16yo, male, Māori, Year 12, low decile school	I would not like to learn health literacy
S327: 16yo, male, Māori, Year 12, low decile school	Visual learn
S334: 16yo, male, Māori, Year 12, low decile school	I don't
S336: 16yo, male, Māori, Year 12, low decile school	It would be good to have more anal sexual advice and comys? were stronger
S346: 16yo, European, Year 12, low decile school	Videos
S349: 16yo, male, Māori, Year 12, low decile school	Internet
S350: 16yo, male, Asian, Year 12, low decile school	In a fun way
S355: 17yo, male, Māori, Year 13, low decile school	I don't
S356: 17yo, male, Pacific Peoples, Year 13, low decile school	I don't know
S358: 18yo, male, Asian, Year 13, low decile school	Somewhat likely to learn and understand about health
S360: 18yo, male, Māori, Year 13, low decile school	Online learning Online video
S361: 17yo, male, Other Ethnicity, Year 13, low decile school	I wouldn't mind

S362: 17yo, male, Asian, Year 13, low decile school	From the internet myself
S364: 19yo, male, Other Ethnicity, Year 13, low decile school	Via email once a week on importance of health and how to improve it
S365: 17yo, male, Māori, Year 13, low decile school	By a teacher
S367: 17yo, male, Māori, Year 13, low decile school	I don't know
S370: 17yo, gender diverse, Māori, Year 13, low decile school	Don't want to learn
S372: 17yo, male, European, Year 13, low decile school	Health as a whole should be taught so when you go to doctors/hospital, you can understand
S374: 16yo, male, European, Year 12, low decile school	Nada none zero no I wouldn't.
S376: 16yo, male, European, Year 12, low decile school	I wouldn't
S378: 17yo, male, Pacific Peoples, Year 13, low decile school	At school
S379: 17yo, male, Pacific Peoples, Year 13, low decile school	I don't know how at school
S380: 17yo, male, Pacific Peoples, Year 13, low decile school	Join a health course
S381: 17yo, male, Pacific Peoples, Year 13, low decile school	I don't know what that even means.
S385: 20yo, male, Pacific Peoples, Year 13, low decile school	I would like to learn more to improve my knowledge about health.
S386: 16yo, male, European, Year 12, low decile school	At school
S388: 16yo, male, Māori, Year 12, low decile school	School

S390: 16yo, male, European, Year 12, low decile school	In class/out of school
S395: 16yo, male, European, Year 12, low decile school	All streams of news and sharing should be used to promote health literacy. In the classroom, open conversations unaltered.
S398: 16yo, male, Asian, Year 12, low decile school	In a class
S400: 16yo, male, Māori, Year 12, low decile school	In class
S404: 16yo, male, Pacific Peoples, Year 12, low decile school	It would be nice and comforting to have some what of knowledge about health. Like how we can prevent diseases and what to do it you have it.
S410: 16yo, male, Pacific Peoples, Year 12, low decile school	Anything
S412: 16yo, male, European, Year 13, low decile school	I don't mind
S414: 17yo, male, European, Year 13, low decile school	Online
S418: 17yo, male, European, Year 13, low decile school	Person to person but I don't mind.
S419: 17yo, male, European, Year 13, low decile school	Not at all – not much interest
S420: 16yo, male, Māori, Year 13, low decile school	Make it more common to talk about so it doesn't feel like an awkward topic.
S421: 16yo, male, Māori, Year 12, low decile school	Not sure
S422: 16yo, male, European, Year 12, low decile school	I wouldn't really want to learn frankly.
S427: 17yo, male, Pacific Peoples, Year 13, low decile school	Being taught by a teacher, online wouldn't be affective
S429: 17yo, male, Māori, Year 13, low decile school	I don't
S430: 17yo, male, Māori, Year 13, low decile school	Yes, good.

S431: 17yo, male, Māori, Year 13, low decile school	Myself through the internet and parents.
S432: 17yo, male, Asian, Year 13, low decile school	I wouldn't
S437: 17yo, male, Māori, Year 13, low decile school	Simple keep everything simple and straight forward
S441: 16yo, male, Pacific Peoples, Year 12, low decile school	Idk
S442: 16yo, male, Pacific Peoples, Year 12, low decile school	None
S445: 16yo, male, Māori, Year 12, low decile school	I wouldn't
S446: 16yo, male, Māori, Year 12, low decile school	Guess speaker, videos, internet
S447: 16yo, male, Māori, Year 12, low decile school	Videos, internet, etc
S450: 16yo, male, European, Year 12, low decile school	Don't really want to learn about it.
S451: 16yo, male, Māori, Year 12, low decile school	Don't really want to learn about it.
S456: 19yo, male, Māori, Year 13, low decile school	Simple keep everything simple and straightforward
S459: 16yo, male, Pacific Peoples, Year 12, low decile school	To be taught it from a tutor because I'm really interested.
S463: 17yo, male, Year 13, low decile school	School/ university/ doctor

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