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A model of digital health communication media use during the Covid-19 pandemic

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Abstract

Purpose – This research aims to develop and test a model of digital health communication media (DHCM) use for healthy food information – DHCM usage – during the Covid-19 pandemic. More specifically, this research investigated the simultaneous effects of perceived threat of Covid-19, e-health literacy, attitude toward DHCM usage, knowledge toward DHCM usage, facilitating conditions and information quality on the DHCM usage.
Design/methodology/approach – The empirical data were collected through a survey. The respondents of the survey are 192 DHCM users who lived in Tangerang Regency. Structural equation modelling (SEM) analysis was performed.
Findings – The DHCM usage during the Covid-19 pandemic is significantly affected by the attitude towards the DHCM usage and the facilitating conditions. However, the DHCM usage during the Covid-19 pandemic is not significantly affected by the perceived threat of Covid-19, e-health literacy, information quality and knowledge of the DHCM usage.
Research limitations/implications – This research was conducted only in Tangerang Regency and employed a purposive sampling technique. Future research should be conducted in other contexts to examine the stability of the research findings.
Practical implications – In order to improve DHCM usage for healthy food information, it is important for building a positive attitude towards DHCM usage and ensuring the availability of the facilitating conditions.
Originality/value – This paper is the first that develops and tests a model of DHCM usage for healthy food information during the Covid-19 pandemic.

Keywords Digital media, Health communication, Healthy food, Covid-19 pandemic

Paper type Research paper

Introduction

Research background

Nowadays, there are two global health issues, namely non-communicable diseases (NCD) and the Covid-19 pandemic. NCDs contributed 70% of mortality and was recognized as the major causes of death and sickness worldwide (Bennet *et al.*, 2020). On the other hand, as of 17 January 2021, globally there have been over 95,429,176 Covid-19 infected people with mortality count fell above 2 million (Worldometers, 2021).

To prevent NCDs, people need to consume healthy foods consistently (Trapp *et al.*, 2015; Amrein *et al.*, 2017; Kalsum *et al.*, 2018; Akil and Top, 2019; Febriani and Sudiarti, 2019). Many empirical studies have showed that the consumption of healthy food can prevent the risk of contracting NCDs or reduce their effects (e.g. Trapp *et al.*, 2015; Amrein *et al.*, 2017; Kalsum

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et al., 2018; Akil and Top 2019; Febriani and Sudiarti 2019). During the Covid-19 pandemic, the consumption of healthy food can improve the immune system (Aman and Masood, 2020; Butler and Barrientos, 2020; Naja and Hamadeh, 2020). Someone who has adequate immune system would have higher chance of fighting off Covid-19 than the ones who do not (Aman and Masood, 2020; Butler and Barrientos, 2020; Naja and Hamadeh, 2020). In other words, to reduce the negative impacts of Covid-19, people also need to consume healthy foods consistently (Aman and Masood, 2020; Butler and Barrientos, 2020; Naja and Hamadeh, 2020). Hence, it is important to encourage the consumption of healthy food, a type of health behaviour, during the Covid-19 pandemic.

Public health education is needed to encourage the consumption of healthy food during the Covid-19 pandemic. During normal situation, public health education can be performed through conventional healthy food extension education that involved face-to-face meetings (Simanjuntak *et al.*, 2013; Devi *et al.*, 2016; Sihabudin *et al.*, 2018; Hidayati *et al.*, 2019). However, during the Covid-19 pandemic, these activities are deliberately being limited. Therefore, public health education on healthy food consumption during the Covid-19 pandemic must be conducted through different approach.

During the Covid-19 pandemic, healthy food extension education can be conducted by utilizing information technology (IT) and the internet. The extension education using IT and the internet was called a cyber extension education (Sumardjo *et al.*, 2010; Ahuja, 2011). Related to the cyber extension education in Indonesia, there are several digital health communication media (DHCM) that provided cyber extension education (e.g. Alodokter, Halodoc, Klikdokter). Thus, the cyber extension education on healthy food consumption during the Covid-19 pandemic can be conducted through the DHCM.

The effectiveness of cyber extension education depends on the usage of the DHCM that facilitates public health education (Mou *et al.*, 2016; Sumaedi *et al.*, 2020). In other words, to ensure the effectiveness of the cyber extension education on healthy food consumption behaviour during the Covid-19 pandemic, it is important to increase its usage for obtaining healthy food information during the Covid-19 pandemic. Therefore, a study on the factors influencing DHCM usage for obtaining healthy food information during the Covid-19 pandemic was essential.

Healthy food information has important role in influencing someone's healthy food consumption behaviour. Healthy food information forms someone's knowledge on healthy food (Lee *et al.*, 2018). The study by Lee *et al.* (2018) showed that someone's knowledge on healthy food positively affect someone's healthy food consumption behaviour. Furthermore, the research by Samoggia and Riedel (2020) also showed that healthy food information can encourage healthy food consumption behaviour.

Research gaps

DHCM usage for obtaining healthy food information is a part of the internet usage for procuring health information. Researchers have investigated the use of the internet for obtaining health information (Escoffery *et al.*, 2005; Czaja *et al.*, 2013; Kontos *et al.*, 2014; Hall *et al.*, 2015; Tennant *et al.*, 2015; Ahadzadeh *et al.*, 2015; Kampmeijer *et al.*, 2016; Haluza *et al.*, 2016; Walker *et al.*, 2017; Dashti *et al.*, 2017; Yang *et al.*, 2017; Alhuwail and Abdulsalam, 2019). However, this study still identified a couple of research gaps.

First, there is a lack of research that specifically investigated DHCM usage for obtaining healthy food information during the Covid-19 pandemic. The usage can be categorized as a health behaviour (Rosenstock, 1974). Given this, based on the Health Belief Model (HBM), DHCM usage for obtaining healthy food information during the Covid-19 pandemic may be influenced by the perceived threat of Covid-19. However, there is no study that developed a

model of DHCM usage for procuring healthy food information that involved the perceived threat of Covid-19.

Second, based on a review of previous studies on DHCM and the internet usage for obtaining health information, there may be several factors that influences DHCM usage during the Covid-19 pandemic. The factors included electronic health literacy (e-health literacy) (Netter and Brainin, 2012; Schulz *et al.*, 2017; Dashti *et al.*, 2017; Knitza *et al.*, 2020), attitude towards DHCM usage (Ahadzadeh *et al.*, 2015, 2018; Ahadzadeh and Sharif, 2017; Wang *et al.*, 2019), knowledge of DHCM usage (Czaja *et al.*, 2013), facilitating conditions (Hossain *et al.*, 2019; Ware *et al.*, 2019), information quality (Tao *et al.*, 2017; Sun *et al.*, 2019; Wang *et al.*, 2020) and source credibility (Bates *et al.*, 2006; Hocevar *et al.*, 2017; Chang *et al.*, 2021). Unfortunately, there is no research that has developed a model of DHCM usage for getting healthy food information that involved the above-mentioned factors. From this point forward, the term "DHCM usage" refers to "the use of DHCM for obtaining information regarding healthy foods".

Research objectives

To fulfil the gaps in the literature, this research aims to develop and test a model of DHCM usage during the Covid-19 pandemic that involved perceived threat of Covid-19, e-health literacy, attitude towards DHCM usage, knowledge of the DHCM usage, facilitating conditions, information quality, and source credibility. More specifically, this research aims to examine:

(1) The effect of perceived threat of Covid-19 on the DHCM usage during the Covid-19 pandemic

(2) The effect of e-health literacy on the DHCM usage during the Covid-19 pandemic

(3) The effect of attitude towards the DHCM usage on the DHCM usage during the Covid-19 pandemic

(4) The effect of knowledge of the DHCM usage on the DHCM usage during the Covid-19 pandemic

(5) The effect of facilitating conditions on the DHCM usage during the Covid-19 pandemic

(6) The effect of information quality on the DHCM usage during the Covid-19 pandemic

(7) The effect of source credibility on the DHCM usage during the Covid-19 pandemic

Literature review and hypotheses

Digital health communication media usage

The DHCM is a digital communication media that provides health information services and can be accessed through various Internet-based platforms (Mou *et al.*, 2016), such as traditional website/web 1.0 (Castren *et al.*, 2008; Czaja *et al.*, 2013; Kontos *et al.*, 2014; Walker *et al.*, 2017), social media/web 2.0 (Walker *et al.*, 2017; Thielsch *et al.*, 2019; Deng and Liu, 2017) or smartphone applications (Paramastri *et al.*, 2020; Walker *et al.*, 2017). The DHCM is a type of electronic Health (e-Health)/mobile health (mHealth) (Kontos *et al.*, 2014; Paramastri *et al.*, 2020). Briefly, mHealth can be viewed as a health-related application for mobile phone while e-Health is a health-related application for desktop/computer (Kampmeijer *et al.*, 2016).

The DHCM is also referred as a health website (Czaja *et al.*, 2013; Kontos *et al.*, 2014). Several examples of DHCM in Indonesia were Alodokter, Klikdokter and Halodoc. They provide health information for public through health articles and medical consultation

services (doctor consultation services). They can be accessed through traditional website, social media and smartphone application.

The DHCM usage is a part of the internet usage for obtaining health information. The Internet usage is a popular topic on the internet and health behaviour literature. Many researchers have investigated it, and generally, they measured it using the search frequency of health information through the internet (Escoffery *et al.*, 2005; Ahadzadeh *et al.*, 2015; Haluza *et al.*, 2016; Alhuwail and Abdulsalam, 2019). A similar definition was also adopted in the studies of the DHCM (Chang *et al.*, 2015; Walker *et al.*, 2017). In general, the DHCM usage is viewed as the frequency of searching health information through DHCM (Chang *et al.*, 2015; Walker *et al.*, 2017). Therefore, this study defined DHCM usage as the frequency of searching healthy food information through DHCM during the Covid-19 pandemic.

The DHCM usage may be affected by various factors. In the existing literature, there are four models that are frequently used to explain Internet/digital media usage and/or health behaviour, namely HBM, theory of planned behaviour (TPB), Technology Acceptance Model (TAM) and unified theory of acceptance and use of technology (UTAUT). However, we addressed two main issues that caused the models may not be sufficient for explaining DHCM usage for healthy food information during the Covid-19 pandemic. First, the DHCM usage can be viewed as a health behaviour that is facilitated by digital media. Thus, the behaviour may be influenced not only by the variable related to the aspect of Internet/media use but also the variable related to health aspect. The four models did not comprehensively include both the variable related to the aspect of Internet/media use and the variable related to health aspect. Second, the DHCM usage for healthy food information showed that someone has a capability for using both digital media and health information. The capability for using both digital media and health information reflected someone's e-health literacy. In other words, e-health literacy may have an important role in predicting DHCM usage. Unfortunately, the four models previously mentioned did not involve e-health literacy. Based on this condition, this research selected to develop a new model for explaining DHCM usage by involving the variable related to the aspect of Internet/media use, the variable related to health aspect, and e-health literacy. Based on the literature review and other previous relevant studies, this study identified seven factors, which are the perceived threat of Covid-19, e-health literacy, attitude toward DHCM usage, knowledge of the DHCM usage, facilitating conditions, information quality, and source credibility, that may influence DHCM usage. Figure 1 shows the conceptual model of this research. The explanation of the factors and the rationale of the effect of the factors on DHCM usage can be seen in the next sections.

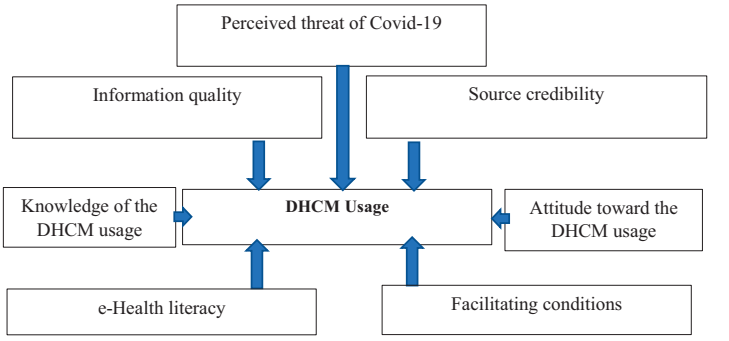


Figure 1.
The conceptual model of DHCM usage

Perceived threat of Covid-19

The perceived threat of disease has an essential function in forming health behaviour (Rosenstock, 1974). The concept is also referred to as the perceived risk of disease (Lavielle and Wacher, 2014; Paige *et al.*, 2018) or the perceived health risk (Ahadzadeh *et al.*, 2015). In the context of Internet usage for obtaining health information, numerous researchers have also investigated the perceived threat of disease and generally, they adopted the HBM's definition of the perceived threat of disease (Ahadzadeh *et al.*, 2015; Mou *et al.*, 2016; Sumaedi and Sumardjo, 2020a). The perceived threat of disease is basically people's evaluation of their probabilities of contracting a disease and their potential severity of symptoms (Ahadzadeh *et al.*, 2015, 2018; Mou *et al.*, 2016; Sumaedi and Sumardjo, 2020a). Therefore, this study defined the perceived threat of Covid-19 as people's evaluation of their probability of contracting Covid-19 and their potential severity of symptoms.

The HBM proposed that health behaviour is positively influenced by the perceived threat of disease (Rosenstock, 1974; Mou *et al.*, 2016). This proposition has been confirmed by many empirical studies (Janz and Becker, 1984; Lavielle and Wacher, 2014; Paige *et al.*, 2018). In the context of Internet usage, numerous researchers have also come to similar findings (Ahadzadeh *et al.*, 2015, 2018). Since the DHCM usage is a type of Internet usage, this study expected that the perceived threat of Covid-19 positively affects the DHCM usage. The first hypothesis was formulated as follows.

H1. Perceived threat of Covid-19 positively and significantly influences the DHCM usage

e-health literacy

e-Health literacy is a frequently discussed concept on the internet and health behaviour literature. It is someone's capability to search, assess and utilize online health information (Norman and Skinner, 2006; Tennant *et al.*, 2015; Mitsutake *et al.*, 2016; Dashti *et al.*, 2017; Yang *et al.*, 2017; Alhuwail and Abdulsalam, 2019). This research adopted a similar view.

e-Health literacy is a predictor of the different levels of Internet usage for obtaining health information among people who have similar access to Internet physical facility (Alhuwail and Abdulsalam, 2019). Empirically, many researchers have investigated the effect of e-health literacy on the internet use for medical information seeking (Netter and Brainin, 2012; Schulz *et al.*, 2017; Knitza *et al.*, 2020). They generally found the positive impacts of e-health literacy on the internet use for health information (Netter and Brainin, 2012; Schulz *et al.*, 2017; Knitza *et al.*, 2020). In the context of the DHCM, researchers also came to similar findings (Chang *et al.*, 2015). This study expected a comparable effect. The second hypothesis was formulated as follows.

H2. e-health literacy positively and significantly influences the DHCM usage during the Covid-19 pandemic

Attitude towards the DHCM usage

Attitude is a central concept in Internet and health behaviour literature. Many researchers equated attitude as someone' acceptance of the internet use, including Internet use for health information (Ahadzadeh *et al.*, 2015, 2018; Ahadzadeh and Sharif, 2017; Wang *et al.*, 2019). Attitude can be seen as someone's overall favourable or unfavourable evaluation of the internet and its uses (Ahadzadeh *et al.*, 2015, 2018; Ahadzadeh and Sharif, 2017; Wang *et al.*, 2019). Therefore, this research defined attitude towards the DHCM usage as someone's overall favourable or unfavourable evaluation of the DHCM usage.

Attitude towards certain behaviour positively influences the behaviour (Kraus, 1995). In the context of Internet use for health information, numerous empirical studies have found the positive impact of attitude on Internet use for health information (Ahadzadeh *et al.*, 2015,

2018; Ahadzadeh and Sharif, 2017; Wang *et al.*, 2019). Since the DHCM usage falls into the category of Internet use for health information, this study expected that attitude towards the DHCM usage positively influences the DHCM usage. The third hypothesis was formulated as follows.

H3. Attitude towards the DHCM usage positively and significantly influences the DHCM usage during the Covid-19 pandemic

Knowledge of the DHCM usage

Health education and health behaviour literature regarded knowledge as an important concept. Generally, one of the objectives of a healthy food extension education program is to improve participants' knowledge (Grimes *et al.*, 2018). Knowledge is cognitive aspect of a human (Czaja *et al.*, 2013). It represents the insights a person has about something (Sumaedi and Sumardjo, 2020a, b). Therefore, this research defined knowledge of DHCM usage as the insights a person has about DHCM and how to use it for obtaining healthy food information.

The TPB has revealed that people will tend to perform certain behaviour if they perceived that they have sufficient abilities to perform the behaviour (Ajzen, 1991). Their abilities are reflected by several factors (Zolait, 2011). In the context of technology use, one of the factors that reflect people's ability to use technology is their knowledge of that particular technology and how to use it (Yuan *et al.*, 2015). In other words, knowledge of technology use can positively influence the actual technology use (Yuan *et al.*, 2015). In the context of e-health, the research of Dünnebeil *et al.* (2012) showed that knowledge regarding e-Health has a positive role in forming the actual use of e-Health. This finding was supported by Cajita *et al.* (2018) through a qualitative study on mHealth use. Khatun *et al.* (2015) identified mHealth knowledge as a criterion of mHealth adoption's readiness. The study of Czaja *et al.* (2013) on DHCM use for health information found that people with higher knowledge on DHCM use "were more successful using the website and performing the tasks". Hence, this study expected that knowledge of the DHCM usage positively affects the DHCM usage. The fourth hypothesis was formulated as follows.

H4. Knowledge of the DHCM usage positively and significantly influences the DHCM usage during the Covid-19 pandemic

Facilitating conditions

Facilitating conditions refers to the extent the conditions around someone facilitated him or her to perform certain behaviour (Taylor and Todd, 1995; Venkatesh *et al.*, 2003; Zolait, 2011; Yuan *et al.*, 2015). Facilitating conditions represents the degree of easiness in performing a behaviour (Taylor and Todd 1995; Venkatesh *et al.*, 2003; Zolait, 2011; Yuan *et al.*, 2015). In the context of technology use, facilitating conditions may be viewed as the conditions related to the resources provided by other parties (Taylor and Todd 1995; Venkatesh *et al.*, 2003; Zolait, 2011; Yuan *et al.*, 2015). Facilitating conditions is the extent of resource support provided by the other parties, such as the government, people around someone and someone's office to use certain technology (Taylor and Todd 1995; Venkatesh *et al.*, 2003; Zolait, 2011; Yuan *et al.*, 2015). This research adopted a similar definition.

Based on the UTAUT, facilitating conditions positively influences technology use (Venkatesh *et al.*, 2003). Empirically, numerous studies have confirmed the positive impact of facilitating conditions on various contexts of technology use (Tao *et al.*, 2020; Bervell and Arkorful, 2020), including Internet use for health information (Hossain *et al.*, 2019; Ware *et al.*, 2019). Thus, this study expected that facilitating conditions positively influences the DHCM usage. The fifth hypothesis was formulated as follows.

H5. Facilitating conditions positively and significantly influences the DHCM usage during the Covid-19 pandemic

Information quality

The concept of information quality is popular on the internet and health behaviour literature (Deng *et al.*, 2015; Zhang *et al.*, 2015; Tao *et al.*, 2017). In the context of Internet use for health, many researchers have discussed information quality. Generally, they agreed that information quality is someone's overall evaluation of the characteristics of health information provided by Internet-based sources (Tao *et al.*, 2017; Sun *et al.*, 2019; Wang *et al.*, 2020). Information quality can be measured using several indicators, such as timeliness, completeness, accuracy, relevance and clarity (Tao *et al.*, 2017; Sun *et al.*, 2019; Wang *et al.*, 2020).

DeLone and McLean Information System Success (ISS) Model proposed that information quality positively affects the use of information systems (DeLone and McLean, 1992; Tao *et al.*, 2017). Numerous empirical studies have supported the ISS Model's proposition on the relationship between information quality and information system use (Saeed and Abdinnour, 2008; Ameen *et al.*, 2019; Al-Obthani and Ameen, 2019). In the context of Internet use for health information, a meta-analysis study by Wang *et al.* (2020) also showed a similar finding. Hence, this study expected that information quality positively affects the DHCM usage during the Covid-19 pandemic. The sixth hypothesis was formulated as follows.

H6. Information quality positively and significantly influences the DHCM usage during the Covid-19 pandemic

Source credibility

All information communicated by the DHCM has sources. The sources can be the authors of the health information, the institution that issued the data and information quoted, and other references used for compiling health information (Hocevar *et al.*, 2017). Source credibility is a concept related to the information source used by the DHCM (Bates *et al.*, 2006; Hocevar *et al.*, 2017; Chang *et al.*, 2021). In the context of the DHCM, numerous researchers have studied source credibility. They saw source credibility as someone's perception of the believability of the information source used by the DHCM (Bates *et al.*, 2006; Hocevar *et al.*, 2017; Chang *et al.*, 2021). This research adopted a similar view.

The positive impact of source credibility on digital communication media has been confirmed by several studies (Lucassen and Schragen, 2013; Lin *et al.*, 2016; Rahardjo *et al.*, 2016). Research by Sillence *et al.* (2007a) found that source credibility is one of the determiners of DHCM use. The finding was also supported by Sillence *et al.* (2007b). Furthermore, Hong (2006) showed that source credibility positively influences DHCM use. Thus, this study expected that source credibility positively affects the DHCM usage during the Covid-19 pandemic. The seventh hypothesis was formulated as follows.

H7. Source credibility positively and significantly influences the DHCM usage during the Covid-19

The research methodology

Research approach

This research employed quantitative research methodology. Furthermore, this study conducted a field survey using a questionnaire to collect data. The survey was performed in Tangerang Regency (Kabupaten Tangerang), Indonesia. Tangerang Regency was a municipal area that known as the supporting area of Jakarta City, the Capital of Indonesia.

Tangerang Regency shared its borders with other regencies: Tangerang City (Kota Tangerang), South Tangerang City (Kota Tangerang Selatan), Lebak Regency (Kabupaten Lebak), Serang Regency (Kabupaten Serang), and Bogor Regency (Kabupaten Bogor).

Tangerang Regency was chosen because of two main reasons. First, Tangerang Regency faced three serious health problems – the Covid-19 pandemic, high prevalence of NCDs, and substandard healthy food consumption behaviour – that could be managed through the cyber healthy food extension education (Indonesian Ministry of Health, 2019). Second, the majority of Tangerang Regency residents (58.67%) have accessed Internet (The Indonesian Center Bureau of Statistic, 2019).

Variables and measures

This research involved eight variables, namely the perceived threat of Covid-19, e-health literacy, attitude towards the DHCM usage, knowledge of the DHCM usage, facilitating conditions, information quality, source credibility and the DHCM usage. The content validity was ensured by using indicators taken from previous studies or relevant literature (Sekaran and Bougie, 2010). Table 1 shows the indicators. This research measured the indicators using a four-point Likert scale to avoid respondents' mid-point response bias (Garland, 1991; Lee *et al.*, 2002).

Sample and data collection

The population of this research is 15 years old and above DHCM users who lived in Tangerang Regency. This study selected this population to ensure that the respondents have sufficient capability to evaluate the DHCM and give an independent opinion. In Indonesia, 15 years old is the threshold of productive age. More clearly, Indonesian Central Agency on Statistics (Biro Pusat Statistik Republik Indonesia) defined working age population as "persons of 15 years old and over" (The Indonesian Center Bureau of Statistic, 2021).

This study employed a purposive sampling technique. There were three main reasons behind this decision: (1) the population characteristics were unknown, (2) the technique was acceptable for a study that tested a model, and (3) there was an operational constraint because of the Covid-19 pandemic (Sekaran and Bougie, 2010; Calder *et al.*, 1981 cited in Park and Sullivan, 2009). The sample criteria were as follows: (1) lived in Tangerang Regency, (2) 15 years old or older, and (3) have used the DHCM in the last three months. Respondent's involvement was voluntary. They were recruited in their houses and filled the questionnaires on-the-spot.

The questionnaire consisted questions related to the demographic profile and the main variables of this research. To increase respondents' understanding of the DHCM, the questionnaire provided the examples of DHCM. In order to ensure that the respondents are 15 years old and above DHCM users, there are also screening questions in the questionnaire regarding the respondents' age and the respondents' experience in using DHCM.

The number of respondents is 192. Most respondents are female (57%), married (67.2%), aged 25–29 years old (17%) and had a high school education or equivalent (82.8%). Table 2 shows the demographic profile.

Data analysis

This study conducted two stages of data analysis. First, this research performed a data transformation using the Indicator Transformation Index technique previously performed by Aminah *et al.* (2015). Second, this research conducted Structural Equation Modelling (SEM) analysis to test the conceptual model and the proposed hypotheses. SEM was chosen because: (1) it had better performance for testing a parsimonious model than multiple

No	Variable	Indicator	Adapted from
1	Digital health communication media (DHCM) usage	The frequency of DHCM usage through websites to seek healthy food information in the last three months The frequency of DHCM usage through smartphone application to seek healthy food information in the last three months The frequency of DHCM usage through social media platform to seek healthy food information in the last three months	Rahardjo *et al.* (2016), Son *et al.* (2019), Sumaedi and Sumardjo (2020a, b)
2	Attitude toward the DHCM usage	Favourable (or unfavourable) valuation of DHCM usage through website to seek healthy food information Favourable (or unfavourable) valuation of DHCM usage through smartphone application to seek healthy food information Favourable (or unfavourable) valuation of DHCM usage through social media to seek healthy food information The importance of DHCM usage through smartphone application to seek healthy food information The importance of DHCM usage through website to seek healthy food information The importance of DHCM usage through social media to seek healthy food information	Rahardjo *et al.* (2016), Sumaedi and Sumardjo (2020b)
3	Knowledge of the DHCM usage	The knowledge of DHCM usage through website platform for healthy food information The knowledge of DHCM usage through smartphone application platform for healthy food information The knowledge of DHCM usage through social media platform for healthy food information	Rahardjo *et al.* (2016), Sumaedi and Sumardjo (2020b)
4	Perceived threat of Covid-19	The risk of contracting Covid-19 The probability of contracting Covid-19 compared to others in the same age bracket The anxiety of contracting Covid-19 The perception of Covid-19 as a severe health problem (Dropped) The perception of Covid-19 as a serious health threat (Dropped) The anxiety of experiencing the impact of contracting Covid-19	Deshpande *et al.* (2009), Koivumäki *et al.* (2017), Paige *et al.* (2018), Sumaedi and Sumardjo (2020), Sumaedi *et al.* (2020)

(*continued*)

Table 1.
The DHCM usage research variable and indicator

No	Variable	Indicator	Adapted from
5	e-Health literacy	The ability to identify useful health resources on the internet The ability to search health information on the internet The ability to use health information to solve health problem The ability to evaluate health information on the internet	Norman and Skinner (2006), Alhuwail and Abdulsalam (2019)
6	Facilitating conditions	Internet access and facilities in the office Internet access and facilities at home or surrounding neighbourhoods Social supports for accessing DHCM	Rahardjo *et al.* (2016), Sumaedi and Sumardjo (2020b)
7	Information quality	Information clarity Information accuracy Information relevance Information timeliness Information completeness	Boon-itt (2019), Sumaedi *et al.* (2020)
8	Source credibility (Dropped)	Believability of the source The attractiveness of the source The expertise of the source	Boon-itt (2019), Sumaedi *et al.* (2020)

Table 1.

regression analysis (Cheng, 2001) and (2) many previous studies on health behaviour and Internet/DHCM use utilized it.

Based on Anderson and Gerbing (1988), this research employed two-step approach in conducting SEM analysis. First, this research evaluated the validity and reliability of the measurement model. The validity of the measurement model was assessed using Confirmatory Factor Analysis (CFA)-SEM. The CFA-SEM was performed for all variables together at one time in order to obtain the better psychometric properties of the variables (Cheng, 2001). The variables of the study were valid if the factor loading value of each indicator $\geq$0.5, the Average Variance Extracted (AVE) $\geq$ 0.5, and the composite reliability (CR) $\geq$ 0.6 (Lai and Chen, 2011). The reliability of the measurement model was assessed using Cronbach's alpha analysis. The Cronbach's alpha coefficient was used as the reliability criterion. The reliability was fulfilled if the coefficients were 0.6 or above (Hair *et al.*, 2010; Sekaran and Bougie, 2010). If an indicator/a variable did not fulfil the requirements, the indicator/the variable was dropped. This research re-performed CFA-SEM and Cronbach alpha analysis if there is an indicator/a variable deletion. Second, after this research obtained a valid and reliable measurement model, this research evaluated the goodness of fit of the structural model and the proposed hypotheses. A hypothesis would be accepted if two criteria were fulfilled: (1) a structural equation coefficient with the same direction as the hypothesis and (2) a *t*-value of 1.97 or higher (Hair *et al.*, 2010; Sekaran and Bougie, 2010). The data analysis was carried out using SPSS and Lisrel.

Results and discussion

The statistic descriptive of the study variables

As previously mentioned in the methodology section, the data were transformed. The scale of transformed data was 0–100. Table 3 shows the statistic descriptive of the variables after the data were transformed.

No	Demographic profile		%
1	Age	15–19 years old	10
		20–24 years old	15
		25–29 years old	17
		30–34 years old	15
		35–39 years old	15
		40–44 years old	9
		45–49 years old	7
		≥50 years old	12
2	Sex	Male	43
		Female	57
3	Education	Didn't finish elementary school	0.5
		Elementary school	1.0
		Junior high school	11.5
		Senior high school	82.8
		Diploma	1.0
		Bachelor degree	3.1
4	Marital status	Single	28.1
		Divorce	4.7
		Married	67.2
5	Occupation	Unemployed	3.6
		Household wife	24.0
		Student	9.4
		Entrepreneur	19.8
		Private company employees	23.4
		Civil servant/police/military personnel	5.2
		Freelance/honorary labour	14.1
		Other	0.5
6	Monthly income	0 – Rp.1.000.000,-	21.4
		Rp. 1.000.001,- - Rp. 5.000.000,-	70.3
		Rp. 5.000.001,- - Rp. 10.000.000,-	8.3

Table 2. The sample demographic profile of the DHCM usage research

No	Variable	Mean	Standard deviation
1	Digital health communication media (DHCM) usage	52.78	26.18
2	Attitude toward the DHCM usage	66.06	13.56
3	Knowledge of the DHCM usage	65.57	15.24
4	Perceived threat of Covid-19	45.01	27.24
5	e-Health literacy	67.88	12.56
6	Facilitating conditions	56.94	30.62
7	Information quality	93.57	17.24
8	Source credibility	95.48	12.30

Note(s): 0–25: very low, 25.01–50: low, 50.01–75: moderate, 75.01–100: high

Table 3. The statistic descriptive of the DHCM usage research variable

From Table 3, it can be seen that the level of DHCM usage is moderate and close to low (52.78). This condition indicated that the respondents do not frequently use the DHCM. This condition may be caused that the Indonesian tended to use DHCM when they/their relatives are sick or have health problem. Furthermore, the research of APJII (2020) also showed that health services is not the top five reasons why Indonesian use Internet. The majority of Indonesian use Internet for social media, communication, entertainment, public service access and online shopping.

The measurement model analysis

The initial CFA-SEM analysis revealed that there are two indicators of perceived threat of Covid-19 that have the loading factor value ≤ 0.5. Furthermore, the AVE of credibility source is less than 0.5. Therefore, the two indicators of perceived threat of Covid-19 and credibility sources were removed from the model. Table 4 shows the results of the final measurement model analysis. The results of the final measurement model analysis showed that all variables included in structural model analysis had fulfilled the validity and reliability requirements.

The structural model analysis

Table 5 and Figure 2 show the results of the structural model analysis. From Table 5, it can be seen that the structural model fulfilled the criteria of goodness of fit. Therefore, the structural model has a good of fit. In other words, the proposed independent variables simultaneously affected the DHCM usage during the Covid-19 pandemic.

Based on the *t*-value and the structural equation coefficients of the independent variables, the third and fifth hypotheses were supported by data while the others were not. The DHCM usage during the Covid-19 pandemic was significantly affected by the attitude towards the DHCM usage and the facilitating conditions. On the other hand, the DHCM usage during the Covid-19 pandemic was not significantly affected by the perceived threat of Covid-19, e-health literacy, knowledge of the DHCM usage and information quality.

Table 4.
The validity and reliability testing results of the measurement model of DHCM usage research variables

No	Variable	Indicator	CR	AVE	Factor loading	Cronbach's alpha coefficient
1	Digital health communication media (DHCM) usage	DHCMU1	0.88	0.71	0.73831	0.874
		DHCMU2			0.91326	
		DHCMU3			0.86798	
2	Attitude towards the DHCM usage	Att1	0.88	0.56	0.60239	0.880
		Att2			0.87244	
		Att3			0.84925	
		Att4			0.62217	
		Att5			0.74714	
		Att6			0.75389	
3	Knowledge of the DHCM usage	Knw1	0.77	0.53	0.61815	0.757
		Knw2			0.80657	
		Knw3			0.75461	
4	Perceived threat of Covid-19	PT1	0.88	0.67	0.92789	0.881
		PT2			0.96257	
		PT3			0.77382	
		PT6			0.53282	
5	e-Health literacy	e-HL1	0.81	0.53	0.59004	0.811
		e-HL2			0.53131	
		e-HL3			0.89276	
		e-HL4			0.82483	
6	Facilitating conditions	Fac1	0.85	0.67	0.92816	0.820
		Fac2			0.56013	
		Fac3			0.91346	
7	Information quality	IQ1	0.90	0.64	0.66784	0.884
		IQ2			0.82747	
		IQ3			0.84051	
		IQ4			0.76216	
		IQ5			0.87386	

The first finding of this research revealed that the perceived threat of Covid-19 does not influence the DHCM usage during the Covid-19 pandemic. This finding does not corroborate the HBM's proposition (Rosenstock, 1974). It is also different from the results of Ahadzadeh *et al.* (2015) and Ahadzadeh *et al.* (2018).

The second hypothesis of this research was not proven. The e-health literacy does not affect the DHCM usage during the Covid-19 pandemic. This finding is dissimilar from the finding of Chang *et al.* (2015) and does not support the results of Netter and Brainin (2012), Schulz *et al.* (2017), and Knitza *et al.* (2020).

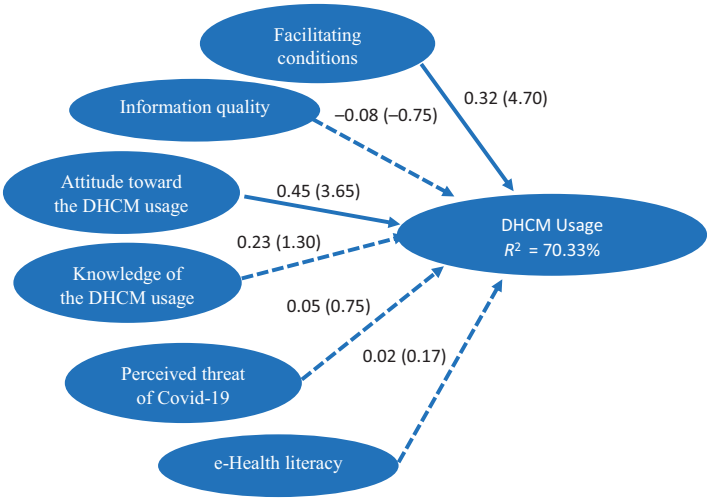
The third finding of this research showed that the attitude towards the DHCM usage positively affects the DHCM usage during the Covid-19 pandemic. This finding means that a more positive attitude towards the DHCM usage will likely lead to a higher frequency of DHCM use during the Covid-19 pandemic. This finding supports the findings of previous studies (Ahadzadeh *et al.*, 2015, 2018; Ahadzadeh and Sharif, 2017; Wang *et al.*, 2019).

The fourth hypothesis was not supported by the data. Knowledge of the DHCM usage does not influence the DHCM usage during the Covid-19 pandemic. This finding does not support the finding of Dünnebeil *et al.* (2012), Cajita *et al.* (2018), Khatun *et al.* (2015) and Czaja *et al.* (2013).

The fifth hypothesis was proven. The facilitating conditions positively affects the DHCM usage during the Covid-19 pandemic. It showed that if a person feels that he or she has the necessary facilities to use the DHCM for obtaining information regarding healthy foods, he or

Criteria	Cut off value	Results	References
χ^2/df	<5	3.577	Wheaton *et al.* (1977), Cheng *et al.* (2006), Hooper *et al.* (2008)
SRMR	≤0.09	0.087	Hair *et al.* (2010)
NNFI	≥0.90	0.909	Hair *et al.* (2010)
CFI	≥0.90	0.921	Hair *et al.* (2010)
IFI	≥0.90	0.921	Hair *et al.* (2010)

Table 5.
The goodness of fit of the structural model



Note(s): --------- = non statistically significant

Figure 2.
The results of the structural model analysis

she will be more likely to use the DHCM more often during the Covid-19 pandemic. This finding is similar to the findings of previous studies (Hossain *et al.*, 2019; Ware *et al.*, 2019).

The sixth finding of this research revealed that information quality does not influence the DHCM usage during the Covid-19 pandemic. This finding is different compared to the one concluded by Wang *et al.* (2020). This finding is also dissimilar from the findings of Saeed and Abdinnour (2008), Ameen *et al.* (2020), and Al-Obthani and Ameen (2019).

Theoretical implications

During the Covid-19 pandemic, DHCM has an important role on public health education. DHCM can provide valid and reliable healthy food information. In other hand, healthy food consumption can reduce the harmful effects of Covid-19 and NCDs. Therefore, it is vital to improve the DHCM usage. In other words, it is essential to develop a model of DHCM usage for healthy food information that can be used to understand the DHCM usage for healthy food information during the Covid-19 pandemic. Unfortunately, there is a lack of research that developed and tested a model of DHCM usage for healthy food information during the Covid-19 pandemic.

This paper's first contribution is to develop and test a model of DHCM usage during the Covid-19 pandemic that involved the perceived threat of Covid-19, e-health literacy, the attitude towards the DHCM usage, knowledge of the DHCM usage, facilitating conditions and information quality. This research found that the DHCM usage during the Covid-19 pandemic is significantly affected by the attitude towards the DHCM usage and facilitating conditions. The perceived threat of Covid-19, e-health literacy, information quality and knowledge of the DHCM usage do not generate a significant impact on the DHCM usage during the Covid-19 pandemic.

The perceived threat of Covid-19 does not affect the DHCM usage during the Covid-19 pandemic. Two reasons may be the culprit behind this finding. First, it is well known that healthy food consumption can provide health benefits for everyone, not just people with high susceptibility to Covid-19. Others may also use the DHCM for obtaining healthy food information consistently and continuously for the sake of their general health. Second, during the Covid-19, online information is the main source of medical information (Sumaedia *et al.*, 2020). The DHCM is a credible health information source that can be easily identified and accessed during the Covid-19 pandemic. This condition may cause an overall high exposure of information related to healthy foods consumption regardless of the users' levels of perceived threat.

e-Health literacy and knowledge of the DHCM usage do not influence the DHCM usage during the Covid-19 pandemic. This finding may relate to the easiness of identifying and accessing the DHCM. Identifying and accessing e-Health do not require both high e-health literacy and knowledge of DHCM usage. Someone with minimal skill can also manage to get information from the DHCM. Thus, people of all levels of literacy and knowledge of DHCM usage may end up having a similar level of DHCM usage. Consequently, it obscured the impact of e-Health literacy and knowledge of DHCM usage on the DHCM usage during the Covid-19 pandemic.

Information quality does not significantly influence the DHCM usage during the Covid-19 pandemic. This finding may be related to the position of information quality in DHCM users' evaluation. The statistic descriptive analysis showed that the level of information quality can be categorized as high. This condition indicated that information quality may be positioned as order qualifier aspect. The existence of this aspect will not increase the level of DHCM usage (Noshad and Awasthi, 2018). Therefore, information quality does not significantly affect DHCM usage.

Managerial implications

Based on this research's findings, there are several managerial implications that can be exploited to improve the DHCM usage for healthy food information during the Covid-19 pandemic. First, this research found that the facilitating conditions affects the DHCM usage for healthy food information during the Covid-19 pandemic. Thus, in order to improve the DHCM usage for healthy food information during the Covid-19 pandemic, the DHCM management and/or the government should ensure that there are the necessary facilitating conditions to use the DHCM. For example, the government should ensure that a good Internet access is available for the citizens.

This research found that the DHCM usage for healthy food information during the Covid-19 pandemic is affected by the attitude towards the DHCM usage. Therefore, in order to improve the DHCM usage for healthy food information during the Covid-19 pandemic, it is important for the DHCM management and/or the government to build a positive attitude towards the DHCM usage. In order to build a positive attitude towards the DHCM usage, it is essential to systematically and consistently promote the DHCM and its programs.

This research found that information quality does not influence the DHCM usage during the Covid-19 pandemic. Based on this finding, in promoting DHCM, the DHCM management and/or the government should not only emphasize the information quality but also other aspects that may improve the DHCM usage. In the existing literature, someone's motivation to use a certain online technology is divided into functional-utilitarian motivation and hedonic-emotional motivation (Solomon, 2012). Information quality is part of the functional-utilitarian motivation. The DHCM management and/or the government should consider using hedonic-emotional motivation to improve the DHCM usage since it may have a more significant effect. This research also found that the perceived threat of Covid-19 does not influence the DHCM usage during the Covid-19 pandemic. Based on this finding, the DHCM management and/or the government should not only emphasize the threat of Covid-19 in promoting DHCM.

Conclusion

This research developed and tested a DHCM usage for healthy food information model during the Covid-19 pandemic that involved perceived threat of Covid-19, e-health literacy, attitude toward DHCM use for healthy food information, knowledge toward DHCM use for healthy food information, facilitating conditions, and information quality. This research found that the DHCM usage during the Covid-19 pandemic is significantly affected by the attitude towards the DHCM usage and facilitating conditions. However, the DHCM usage during the Covid-19 pandemic is not significantly affected by the perceived threat of Covid-19, e-health literacy, information quality and knowledge of the DHCM usage.

Even though this research has yielded interesting findings, the Authors admitted that there are a couple of limitations. First, this research only took samples from Tangerang Regency, Indonesia. Second, the sampling method used was purposive sampling. Therefore, the findings cannot be generalized to different contexts. Based on those limitations, the next research should retest the model with a bigger and more varied sample. Third, this research only involved variables related to the utilitarian aspect of the DHCM usage. The next study should include variables related to the hedonic aspects of DHCM usage.

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A biblioguidance approach to understanding and developing adolescents' social-emotional competence in the health education classroom: a formative research study

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Abstract

Purpose – Though the benefits of social-emotional competence (SEC) are well-recognized, measuring it and designing appropriately matched interventions remains elusive and methodologically challenging. This paper shares formative research designed to uncover the SEC of one secondary school health teacher's students and to help her make evidence-based curricular and instructional decisions.

Design/methodology/approach – Inspired by bibliguidance (or bibliotherapeutic) approaches to well-being, the researchers and teacher developed a fiction literature curriculum intended to foster SEC and health literacy skills. A mixed-method approach was used to gather and analyze data from 133 students and a teacher. A survey and journal entries embedded into the curriculum, and an interview were the sources.

Findings – Results indicate the curriculum paired well with national standards for health education and a respected SEC framework; it also served well as a vehicle to reveal students' SEC. Students appeared to be competent in some areas and less in others, and there were differences between self-assessed and expressed competence.

Practical implications – Biblioguidance approaches to developing SEC in health education and other school subjects are worth continued investigation. The current results will be used to revise the curriculum and to develop supplemental materials.

Originality/value – In sharing the processes and findings, the authors hope teachers seeking to foster their students' SEC will replicate this work. Further, they hope health educators will gain recognition as the ideal professionals to deliver social-emotional learning instruction in schools.

Keywords School health promotion, Social-emotional health, Curriculum development, Action research, School mental health, Teachers, Adolescents

Paper type Research paper

Introduction

Social-emotional competence (SEC) is comprised of interpersonal and intrapersonal competencies that manifest as patterns of thoughts, feelings and behaviors originating from one's biological predisposition and environment (Assessment Work Group, 2019;

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Taylor *et al.*, 2018). The acquisition of SEC during childhood and adolescence is correlated positively with academic performance, well-being, career and life outcomes. This relationship holds true for students from different economic backgrounds, races, ethnicities and genders (Abrahams *et al.*, 2019; John and De Fruyt, 2015; Jones and Kahn, 2017).

Though the benefits of SEC are well-recognized, measuring it and designing appropriately matched interventions remains elusive and methodologically challenging. Shifting paradigms, definitions and frameworks, and the complexity of SEC due to its multiple contributors, are cited as reasons for the difficulty in SEC research (Abrahams *et al.*, 2019; Marzano, 2015). In this article, we present formative research that evaluates a young adult, fiction literature curriculum designed to foster and to measure SEC, while also developing health literacy skills, in a secondary school health education teacher's classroom. We also explain how the results have informed her future curricular decisions. By sharing our processes, findings and implications, we hope teachers seeking to foster the SEC among their students will benefit. Further, we hope school professionals will recognize health education teachers as ideal SEC educators.

Background

The health education classroom: a natural setting for social-emotional learning (SEL) instruction

The health education classroom is a natural setting to develop students' SEC. Health education forges personal values and beliefs that support healthy behaviors, shapes group norms that value a healthy lifestyle and develops skills necessary to adopt, practice and maintain health-enhancing behaviors (Centers for Disease Control and Prevention, 2013). These aspects align perfectly with the efforts to develop SEC, otherwise known as social-emotional learning (SEL). According to Elias and Moceri, SEL is the "process of acquiring knowledge, skills, attitudes, and beliefs to identify and manage emotions; to care about others; to make good decisions; to behave ethically and responsibly; to develop positive relationships; and to avoid negative behaviors," (2012, p. 424).

The alignment between health education and SEL is visible when comparing the USA's National Health Education Standards (NHES) (Joint Committee on National Health Education Standards, 2007) to the Collaborative for Academic, Social, and Emotional Learning (CASEL) framework competency areas. The NHES provide a framework of critical health literacy skills and learning expectations "to establish, promote, and support health-enhancing behaviors for students in all grade levels" (Joint Committee on National Health Education Standards, 2007). The CASEL framework consists of five interrelated competence areas and emphasizes a systematic approach to enhancing SEL (2017). Table 1 reveals how these frameworks overlap.

In addition to the NHES alignment with the CASEL framework, health teachers are the ideal education professional to lead SEL experiences. Per Marzano, "Social and emotional learning practitioners teach students to acquire and effectively apply the knowledge, skills, and attitudes to understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions" (2015, p. 337). In the USA, health teachers receive training in each of these areas (Society of Public Health Educators, 2019). Compared to other subject matter teachers, this unique training prepares health teachers to play a substantial role in developing students' SEC.

Bibliotherapy/biblioguidance: a natural fit to fostering SEC

Methodologically, bibliotherapy is a literature-based approach to social-emotional learning. "The basic premise of bibliotherapy is that information, guidance, and solace can be found through reading" (McNicol and Brewster, 2018, p. xiii). In bibliotherapy's early days, much focus was on self-help resources to address specific conditions among adults and primarily took place in clinical settings. In recent decades, its use has expanded to include fiction and poetry to improve mental health and well-being and in new settings, including schools.

National health education standard	CASEL framework area*
Standard 1: Students will comprehend concepts related to health promotion and disease prevention to enhance health	
Standard 2: Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors	*Self-awareness*: The ability to accurately recognize one's own emotions, thoughts, and values and how they influence behavior. The ability to accurately assess one's strengths and limitations, with a well-grounded sense of confidence, optimism, and a "growth mindset"
Standard 3: Students will demonstrate the ability to access valid information, products, and services to enhance health	Self-management: The ability to successfully regulate one's emotions, thoughts, and behaviors in different situations — effectively managing stress, controlling impulses, and motivating oneself. The ability to set and work toward personal and academic goals
Standard 4 Students will demonstrate the ability to use interpersonal communication skills to enhance health and avoid or reduce health risks	*Relationship skills*: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. The ability to communicate clearly, listen well, cooperate with others, resist inappropriate social pressure, negotiate conflict constructively, and seek and offer help when needed *Social awareness*: The ability to take the perspective of and empathize with others, including those from diverse backgrounds and cultures. The ability to understand social and ethical norms for behavior and to recognize family, school, and community resources and supports
Standard 5: Students will demonstrate the ability to use decision-making skills to enhance health	*Responsible decision-making*: The ability to make constructive choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms. The realistic evaluation of the consequences of various actions, and a consideration of the wellbeing of oneself and others
Standard 6: Students will demonstrate the ability to use goal-setting skills to enhance health	*Self-management*
Standard 7: Students will demonstrate the ability to practice health-enhancing behaviors and avoid or reduce health risks	*Self-management*
Standard 8 Students will demonstrate the ability to advocate for personal, family, and community health	Relationship skills *Social awareness*

Note(s): *We provide descriptions of each CASEL area only once. CASEL areas in italic font are those we regard as tightly aligned; non-italic font signifies moderate alignment

Table 1.
Alignment between national health education standards and CASEL framework areas

In schools, bibliotherapy is sometimes referred to as biblioguidance (Gladding and Gladding, 1991). Within this context, biblioguidance is a structured curriculum during which students read selected books to identify with the characters and to observe how they transcend challenges. The way characters handle different situations can afford insight and helps students learn healthy ways to cope with difficult experiences (McPherson-Leitz, 2018; Rozalski *et al.*, 2010; Thibault, 2004). For example, after Hurricane Katrina hit Louisiana in the USA, teachers used a fiction literature curriculum to help students cope with anxiety, displacement, and loss and to increase self-esteem, decrease levels of hopelessness and improve academic engagement (Stewart and Ames, 2014).

In group settings, such as the classroom, reading shared literature also helps students to connect with each other, to analyze their thoughts and behaviors. These outcomes, in addition

to those mentioned above, are central to SEL and support many of the NHES. Further, research shows the best way to observe and understand students' SEC is in context and books can provide that context (Abrahams *et al.*, 2019; Denham *et al.*, 2016). This factor, along with the other benefits, made the use of fiction literature an ideal fit for our project.

The role of formative research in designing relevant SEL curriculum

To design relevant SEL curriculum, teachers need to be able to place learners along an SEC continuum. Formative research is an ideal way to gain this insight. Formative research is "research conducted during the development of a program to help decide on and describe target audience, understand the factors which influence their behavior, and determine the best ways to reach them" (Centers for Disease Control and Prevention, 2016). In education, formative research is more commonly referred to as formative assessment and is defined as "a process used to guide, mentor, direct, and encourage student growth" (Tomlinson and Moon, 2013, p. 18).

There are two types of formative assessment, pre-assessment and on-going assessment. *Pre*-assessment can reveal students' interests, learning preferences, and existing knowledge and skills. Educators can use this data to determine learners' starting points in relation to a learning target and to guide curriculum and instructional decisions. *Ongoing* assessment allows educators to monitor knowledge and skills, providing a feedback loop for curricular and instructional modifications (Tomlinson and Moon, 2013). We regard both assessment types as essential to designing and fine-tuning an effective SEL curriculum.

Formative research approach, goals and questions

For our project, we decided *in situ* formative research was best. *in situ*, or action research, means educational research jointly conducted by an educator and a researcher in a live instructional setting (Cobb *et al.*, 2003). In a live setting, we could build a self-assessment into the curriculum's introduction (i.e. pre-assessment) and gather data about students' SEC in practice by way of strategically designed learning activities (i.e. ongoing assessment) throughout instruction. A pilot SEL curriculum could host these assessments and serve as a launching pad for a more complete, refined curriculum. Figure 1 depicts our logic model.

Our research goal was to establish an SEC learner audience profile that would inform one health teacher's SEL curricular decisions. Our research employed a mixed-method approach and included both pre- and ongoing formative assessment to answer these questions:

(1) Does the pilot curriculum support both the NHES and CASEL framework?

(2) To what extent is the pilot curriculum a vehicle for SEL?

(3) What is the range of students' SEC?

(4) Is students' self-assessed SEC similar to or discordant with their expressed SEC?

(5) Based on the teacher's experience, what aspects of the curriculum were successful and what revisions are needed?

Methods

The curriculum

The pilot curriculum was six weeks long and overlaid an existing 10th grade mental and emotional health unit. The curriculum involved students reading young adult fiction literature from a curated selection and participating in activities intended to support SEC and health skills development. This curated collection included literature whose themes focused on identity, diversity and/or social justice, and whose characters' behaviors afforded

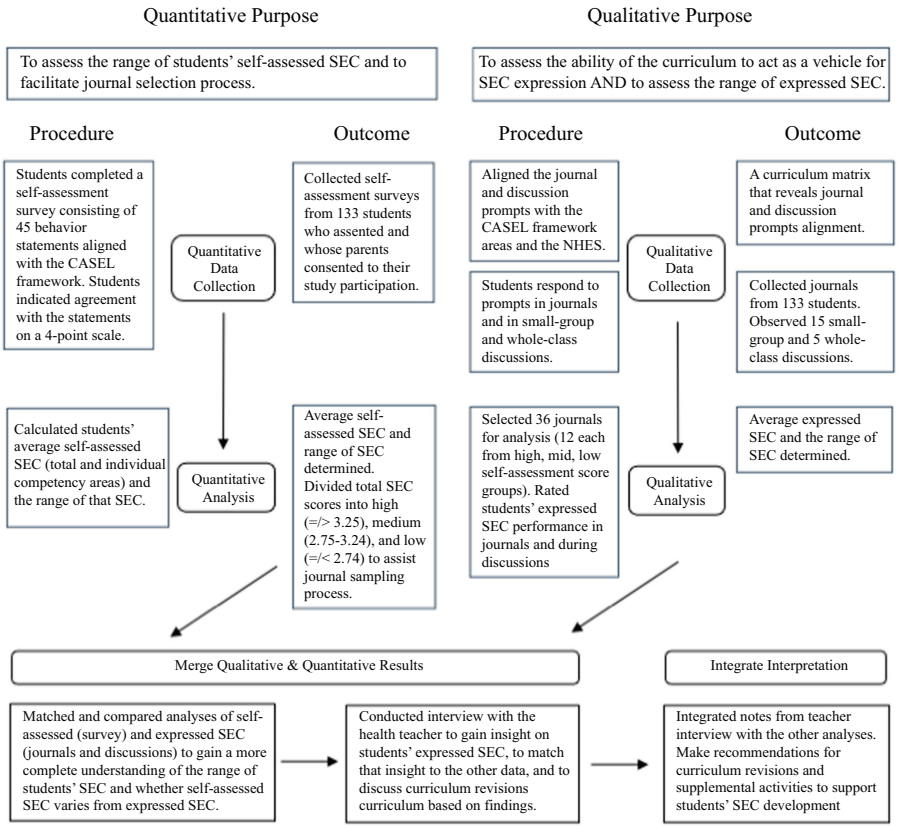

Figure 1.
Formative research design logic model

discussions about NHES skills and CASEL framework competencies. We selected this literature from lists of books recommended by international organizations (e.g. the International Literacy Association) and local public libraries. With the assistance of the school librarian, we narrowed the choices on the basis of reading level, content appropriateness and availability to acquire copies at low or no-cost. Additionally, we informed the school counseling team about the curriculum in case any topics triggered students in a way that they might need support.

Over the six weeks, at staggered points of book completion, students journaled and participated in small-group discussions based on prompts aligned with the NHES and CASEL frameworks (see Appendix). Because being able to extract and analyze key ideas and details are literacy skills essential to *experiencing* literature, we phrased and sequenced the prompts to align with Wilhelm's 10 dimensions of reader response, which are organized into three groups: evocative, connective and reflective. Per Wilhelm, these dimensions are transactions that occur when "expert" readers engage with text (Wilhelm, 2016). Without this engagement, it is difficult to elaborate, evaluate and use text in meaningful ways.

Setting and participants

This study took place in five 10th grade health education classes taught by a secondary school health teacher in a small city outside of Chicago, Illinois, in the USA. Data collection

occurred in the Fall 2019 semester. We chose to work with this teacher based on an existing research partnership, her willingness to engage, and the needs of her students. The Illinois Report Card website (2020) identified her school as underperforming. This means one or more student groups perform at or below all students in the lowest 5% of the state's schools. The school's graduation rate is 13% lower than the state average and chronic absenteeism is three times higher. Of the 4606 students, 59% are low income, 17% are English language learners and 12% have special education plans (2019). Demographically, 80.2% identify as Latino/Hispanic, 12.2% identify as Black, and the remaining identify as White, Asian, Pacific Islander, American Indian, other, or more than one race.

Informed consent

Data collection activities were part of regular classroom instruction and were evaluated by the teacher for grading or participation points. Only data from students who gave written assent and whose parents provided consent were analyzed for research. Students did not know which classmates were participants, and they were neither penalized nor rewarded for participating.

Instrumentation, sampling and analysis

Accurate assessment requires clearly defined constructs (Abrahams *et al.*, 2019). Our study used the clearly defined constructs of the CASEL framework as the basis for measurement, analysis and recommendations. We selected complementary instruments based on their ability to relay self-assessed or expressed SEC and to reveal similarities and differences between and within the student population. By between, we mean how students differed from each other; by within, we mean how students' *self-assessed* SEC differed from their *expressed* SEC. For us, this required using both qualitative and quantitative data collection methods so the strengths of one method would offset the limitations of the other. In this section, we describe each instrument, our sampling approach and the method of analysis.

Pilot curriculum matrix. We aligned the pilot curriculum with the NHES and CASEL frameworks and Wilhelm's (2016) ten dimensions of reader response (see Appendix). We used a three-phased approach to assure the matrix's validity and reliability. First, we independently reviewed and aligned the prompts which were written by the lead researcher and the teacher. Then, we discussed differences in interpretation, established agreement and re-aligned the prompts. Later, when evaluating student responses journals, we became aware of additional interpretations. After discussion, we re-aligned the prompts again.

Self-assessment. As a pre-assessment to gain insight on students' existing SEC, we administered an online survey one week before the curriculum. This assessment included demographic questions and a self-assessment called the Social Skills Improvement System Social Emotional Learning Edition (SSIS-SEL) Student Form (Gresham and Elliott, 2008). The SSIS-SEL includes 46 behavior statements aligned with the CASEL framework. For each statement, students note agreement on a four-point scale. Both composite (i.e. total) and competency-level scores can be calculated. This instrument has been validated and tested for reliability (Gresham *et al.*, 2018; Wilson-Ahlstrom *et al.*, 2011). Further, scale-based, self-assessments like the SSIS-SEL are regarded as important SEC data sources (Abrahams *et al.*, 2019).

To gather data, we employed non-probability, voluntary sampling. *Non-probability* sampling means we did not randomly select participants and/or their data. All students ($n = 149$) in the health teacher's five classes completed the survey; however, we only studied data of students who provided assent to and whose parents provided consent. Based on this requirement, we removed 12 students' surveys and an additional four that were partially complete. To protect the identity of the remaining 133 students, we removed their names from

the self-assessments and applied codes. We applied the same code on their journal entries (described next) to match and compare data.

To prepare the self-assessment for analysis, and as intended by the creators of the SSIS-SEL (Gresham and Elliott, 2008), we created variables representing the five CASEL framework areas. To do this, we used Statistical Package for the Social Sciences (SPSS) software to combine the item responses for each area. We also created a composite SEC variable. To study the range of students' SEC, we performed descriptive statistics. We later used a Wilcoxon signed rank test to compare the self-assessment and journal entry results.

Journal entries

Journal entries served as a learning activity and an ongoing formative assessment tool. The journal was a Google Doc pre-loaded with the prompts and electronically shared with the teacher. Students' responses to the prompts permitted us to evaluate whether the curriculum served as a vehicle for SEL, to describe the range of students' SEC, and to compare students' self-assessed versus expressed SEC. To evaluate the responses, we used the SSIS-SEL monitoring scales (Gresham and Elliott, 2008). Consisting of holistic rubrics aligned with the CASEL framework, these scales help to identify, describe and differentiate students' SEC and to monitor progress. Because they were developed by the same researchers who developed the SSIS-SEL student form, there was consistency in construct definition. One key difference is the scales consist of five levels and the form responses are based on four levels. To facilitate comparison, we modified the scales such that the bottom level was zero, and we regarded it as an absence of SEC performance. Then, we labeled the levels as follows: 4 = high, 3 = middle, and 2 and 1 = low.

To select journals for analysis, we employed a nested sampling approach that blended maximum variation and random sampling. In mixed-methods research, nested means the qualitative sample is selected from the larger quantitative sample (Fetters, 2020). In our study, we divided the 133 journals into three groups based on the journal author's overall SSIS-SEL score: high (=/>3.25), medium (2.75–3.24), and low (=/<2.74). These break-points were approximately 0.5 standard deviations above and below the mean. A visual inspection of the raw data and distribution curve shows these as natural breaks. Group-sizes were 30, 63 and 38, respectively. From each group, we randomly selected 12 journals for a total of 36. This maximum variation sampling approach ensured document diversity, assisted with initial pattern identification, and supported qualitative and quantitative data combining.

To assure coding reliability, we used a multi-phased, triangulation of analysis (Patton, 2015). In the first phase, we sought to establish $a \geq 70$ kappa level to assure inter-rater reliability. We did this using the testing center built into Dedoose, a data analysis software. Next, we set coding rules: (1) code if an entry reflects one or more CASEL areas and (2) rate the entry using the modified SSIS-SEL monitoring scales. Then, we independently coded and rated the journals, checked our inter-rater reliability, discussed differences and continued to test until the requisite kappa level was achieved. Once the requisite kappa level was achieved, we equally divided the selected 36 journals and began coding. Upon completion, we used Dedoose to conduct descriptive statistics and to extract excerpts representing each competency and at each level.

Book discussions

Like the journals, book discussions served as a learning activity and an ongoing formative assessment tool. And also like the journals, they permitted us to evaluate whether the curriculum served as a vehicle for SEL, to describe the range of students' SEC and to compare self-assessed versus expressed SEC. Data collection consisted of 15 small-group and 5 whole-class discussion observations. During observations, we noted when a competency was expressed, summarized that expression and rated it using the modified SSIS-SEL monitoring

scales. We did not count every incidence of SEC expression as we aimed to obtain a holistic understanding of the collective learner audiences' SEC.

Sampling was based on a simple rotation. On three small-group discussion days, we observed a different group in each of the teacher's five classes. Groups consisted of 3–4 students reading the same book and most classes had 6–8 groups. This means we did not observe all groups. On the whole-class discussion day, we observed everyone.

To analyze the observations, we reviewed each other's notes, discussed differences, reached agreement and made revisions. Next, the lead researcher created a summary inclusive of representative excerpts for each competency and at each level. Then, the other researchers reviewed her work, made suggestions and created a final version. Having performed this task after journal coding, we did not conduct another inter-rater reliability test.

Teacher interview

The teacher interview took place after our initial data analysis. The researchers asked her questions about students' SEC, the curriculum's alignment with the NHES and CASEL frameworks, and the curricular revisions she thought to be necessary based on her experiences and the findings. After the interview, the lead researcher summarized and interpreted the notes and shared them with the teacher and other researchers for revisions and final approval. Not only did the interview provide the researchers with another perspective, but it also served as a guided reflection for the teacher. Reflective practice like this lies at the heart of formative research's evaluation stage and feedback loop.

Mixed-method analysis

At the beginning of this section, we indicated that a benefit of mixed-method data collection is the strengths of one method can offset the other's limitations. Also, a mixed-method *analysis* is more comprehensive and possibly more accurate. This is because researchers match, compare and combine results, which can afford new insights and even create ambiguity. This ambiguity prevents researchers from making definitive statements based on one type of data (Fetters, 2020). Figure 2 reveals our mixed-method analysis approach.

Results

Demographics

There were 133 student participants, aged 15 or 16 years old. In total, 46% were female, 50% were male and 4% preferred to not identify. Ethnically, 82% identified as Hispanic/Latino, 16% identified as not Hispanic and 2% preferred to not identify.

RQ1. Does the pilot curriculum support both the NHES and CASEL framework?

The Appendix shows the curriculum supported the NHES and CASEL frameworks. This was not surprising as we wrote the journal and discussion prompts with this intention. We will update the matrix in subsequent iterations of the curriculum.

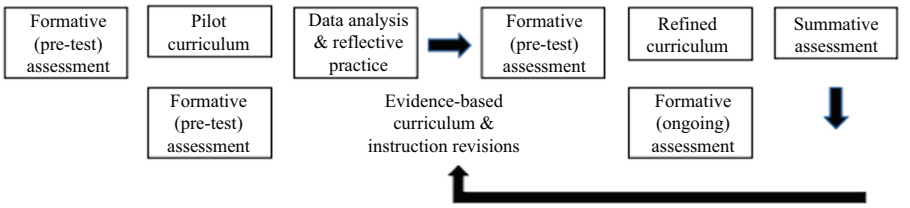

Figure 2. Mixed-methods data collection and analyses approach

RQ2. To what extent is the pilot curriculum a vehicle for SEL?

To determine the extent to which the curriculum was a vehicle for SEL, we consulted the matrix and the two ongoing formative assessments.

Matrix. The matrix shows that the curriculum served as a vehicle for SEL, but served some competencies more than others. There were more opportunities for students to practice social awareness (n = 16), self-awareness (n = 9) and decision-making (n = 6) than relationship skills (n = 3) and self-management (n = 1). In a large part, this is the "fault" of fiction literature. Relating to characters and reflecting on situations necessitates perspective-taking and acknowledging thoughts and emotions, which are skills inherent to self-awareness and social awareness. To be more balanced, supplemental learning activities should require practicing other competencies.

Journals. In their journals, students expressed some competencies more than others. Again, we anticipated this based on the matrix. We applied the social awareness code 57% of the time, which was more than the total codes applied percentage for the remaining competencies. We applied the self-awareness, decision-making, self-management and relationship skills codes 22%, 9%, 9% and 4% of the time, respectively.

Book discussions. In their discussions, students more frequently expressed their social awareness competency (in eight of the 20 observed discussions) compared to the others, particularly self-management. This was not surprising given the journal findings; but, unlike the journals, the discussions provided a different mechanism for SEC expression by way of student interactions. For example, one student stated to another, "I like that you said, 'How it is to us' – that was very deep." This statement revealed his respect for others, which is inherent to social awareness, and his communication skills, which is inherent to relationship skills. The discussions also provided students with new insights. When discussing the prompt "What have you learned about interpersonal communication?" one student said, "You can talk to people you feel comfortable around, like when Quinn talks to Jill. He does not feel comfortable talking to others." Another student said, "I learned it is important to speak up because it can positively affect you, the community, and the world." In both instances, the group members nodded their heads in agreement and then shared *their* insights.

RQ3. What is the range of students' SEC?

To determine the range of SEC, we consulted the pre- and ongoing formative assessments.

Self-assessment. Self-assessed SEC varied broadly. Scores ranged from 1 to 4 on the 4-point scale. Further, the overall distribution was not normal (i.e. non-parametric). For this reason, we present mean and median scores (see Table 2). Both the means and medians indicate students rated their self-awareness and social awareness as highest. The means show they rated self-management as lowest; but the medians show they rated relationship skills as lowest. The mean and median total SEC was similar, 2.93 and 2.95, respectively.

Journal entries. SEC expression varied broadly. Like the self-assessment, the distribution was non-parametric. The means show self-awareness expression as highest (M = 2.46); the medians show self-awareness, relationship skills, and responsible decision-making tied for highest (Md = 2.50 each) (see Table 2). Both show self-management expression as lowest (M = 1.93, Md = 2.0). The mean and median total SEC were similar, 2.40 and 2.47, respectively. For examples of competency expression from high, middle and low levels, see Table 3.

Book discussions. Our discussion notes indicate the majority of SEC expression fell into the middle range (a rating of "3"). The highest ratings were applied to self-awareness and social awareness, and the lowest to self-management and relationship skills. Below appear examples from each level to help readers understand what these levels look like.

High-level social awareness. This excerpt came from a small-group discussion about *American Boys* by Brendan Kiely and Jason Reynolds. Rashad is an African-American

Competency	*N*	Min.	Max.	*M*	SD	Md
Self-assessed SEC						
Self-awareness	129	1.67	4.00	2.95	0.48	2.89
Social awareness	130	1.71	4.00	3.01	0.54	3.00
Relationship skills	127	1.93	4.00	2.92	0.48	2.87
Self-management	132	1.33	4.00	2.83	0.51	2.89
Decision-making	128	1.67	4.00	3.00	0.51	3.00
Total SEL	118	1.94	3.80	2.93	0.4	2.95
Expressed SEC						
Self-awareness	34	0.40	3.83	2.46	0.93	2.50
Social-awareness	36	0.57	3.77	2.39	0.78	2.44
Relationship skills	28	0	4.00	2.41	0.86	2.50
Self-management	10	1.00	3.00	1.93	0.75	2.00
Decision-making	28	0	4.00	2.41	0.86	2.5
Total SEL	36	0.56	3.57	2.40	0.76	2.47

Table 2. Self-assessed and expressed SEC descriptives

Competency/Level	Excerpt
High	
Self-awareness; self-management	In all sincerity, we are nothing alike at all. First, I'm not easily influenced by my friends that have bad habits because I know what benefits me, what does not, and how it will affect those around me. I do not run or ignore my problems. I face them because facing them gets you farther and not stuck in the same place still problem solving it. Also, when I say I'm going to get my stuff together, I try even if it's challenging. I continue. I do not easily give up
Relationship skills, social awareness	If I were friends with Riley, I would definitely be there for them and help them. I have also been bullied so I would not let Riley go through that alone, I would stick up for them. I know it is hard for Riley to open up, but even if they do not tell me anything, I would let them know that I'm there and that I want to help with whatever I can
Self-management	I've learned that you need to think about things thoughtfully first and stay calm because I have noticed that Riley panics a lot when things happen to them
Middle	
Self-awareness; social awareness	I found out that I'm not the only one dealing with the same problems. I feel like I can express myself like how Melinda expressed herself
Social-awareness	I believe the character is dealing with not fitting in. They are having to change themselves when they are [at home].and at school. They cannot be herself
Self-management; self-awareness	Reading my novel has helped me understand myself better by speaking up, and talking to someone about what I'm going through
Low	
Social awareness	I do not think my character is getting treated fairly because she has no friends
Relationship skills	If I was friends with the character all I could do for them is to be supportive
Decision-making	I have learned that good decision-makers are people who know what they want

Table 3. Representative excerpts from journal entries

secondary school student falsely charged with shoplifting and pinned down by a police officer. Quinn is a White secondary school student who observed the event. The prompt was, *What do you think the main characters may be dealing with? What struggles might they experience?*

Student 1: Confusion probably. Shock. [The situation] happened so fast. They needed to process it. It was not supposed to go down like that.

Student 2: Rashad was trying to tell his dad he did not do it; but his dad was just disappointed.

Student 3: I think Rashad's angry at his dad. And Quinn, maybe he is angry with himself.

Student 3: My question is what if Rashad and Quinn were in each other's situations? I feel Quinn would not have been in that situation. I feel like he's really scared. [Also,] seeing stuff is different than it happening to you no matter what the situation. I feel Rashad's going to be very paranoid. That kind of stuff can give you PTSD.

Student 2: What do you mean Quinn would not even be in that situation?

Student 3: They're from different sides of the fence.

We regard this dialogue as high-level because students demonstrated exceptional ability to listen to each other's ideas and they consistently expressed empathy for others whose cultures or backgrounds were different from their own.

Middle-level relationship skills. This example comes from a small-group discussion about *Symptoms of Being Human* by Jeff Garvin. The prompt was, "So far what have you learned about interpersonal communication?" One student said, "Solo should not have shunned Riley in the cafeteria; he should have advocated for him." We regard this statement as middle-level because the student understood when to offer help, but she did not offer a way to negotiate the conflict or manage the situation.

Low-level self-awareness. This example comes from a small-group discussion about the book *The Hate U Give* by Angie Thomas. The prompt was, "Has the book influenced what you believe in"?

Student 1: I do not think so. We live in similar situations or backgrounds, so it has not changed.

Students 2, 3, and 4: No response

Another low-level example comes from the whole-class discussion for the prompt, "How has reading the book you selected helped you understand yourself better?" One student said, "For me no. I already know what can happen to me if I'm not careful." We rated the latter and former responses as low-level because the students demonstrated limited recognition of their emotions and/or limited ability to describe their feelings and influences on their actions.

RQ4. Is students' self-assessed SEC similar to or discordant with their expressed SEC?

During our analysis, not only did we examine each set of results in its own right, but we also combined and reviewed them to look for concordance, discordance, complementarity and expansion opportunities. This practice is a characteristic of mixed-method research.

We compared the SSIS-SEL scores of the 36 students whose journals we analyzed to the ratings we applied to their journals. Due to the non-parametric nature of the data, we used the Wilcoxon signed rank test instead of a *t*-test. This test revealed a significant difference between self-assessed and expressed total SEC; $z = -3.566$, $p < 0.001$, with a medium effect size (0.42) (Cohen, 1988). The median *expressed* total SEC (Md = 2.46) was much lower than the *self-assessed* (Md = 3.17). This significant difference also held true for each competency ($p</ = 0.01$). This discordance could mean students inflated their competency on the self-assessment or we were more critical of their expressed competency in the journals. Another explanation could be the instruments. The SSIS-SEL student form is a survey and SSIS-SEL monitoring scales are rubrics. Though developed by the same research team, they might reveal different results. Or, the difference could relate to the modifications we made to the

scales. It is beyond the scope of this article to explore these possibilities; however, we do recommend future research.

We did not compare the book discussion notes to either assessment because it was not possible to identify the 36 students due to the deidentification steps taken. However, in calculating an average total expressed SEC, the mean ($M = 3.0$) was more similar to the self-assessments ($M = 2.93$) than the journals ($M = 2.40$). This could mean students' self-assessed and orally-expressed SEC are more closely aligned than their written-expressed SEC, a variation that could be attributed to differences in written versus oral skills.

RQ5. Based on the teacher's experience, what aspects of the curriculum were successful and what revisions are needed?

The interview with the teacher revealed recommendations that we grouped into four themes. First, recognize that some students might not be motivated to read a book. By way of an informal survey, the teacher learned that many of her students did not enjoy reading. Giving students choices on which books to read, starting off the project with book talks (a brief oral preview of the book), having students discuss their books with classmates and providing a reading schedule were strategies she employed to motivate students and keep them on track. Second, direct students with lower-level reading skills toward books matched to their ability. We did not do this, but will next time. By consulting with school counselors or English language arts teachers, we can identify these students. Graphic novels might be another option. Third, *do* use fiction literature (or even mainstream movies) to provide context. The teacher found that both she *and* the students continued to reference book characters and situations during and outside of the curriculum unit. Students' life experiences vary; some will have experienced events that others have not. Literature (or movies) can provide a point of reference. Fourth, provide direct instruction on SEC. The teacher speculated some students might not have been familiar with some of the terminology or concepts in the assessments. Next time, she will begin the project with a CASEL framework overview and engage students in a discussion during which they must come up with examples for each framework area.

Discussion

Formative research supports teachers in creating a learner audience profile to guide curricular and instructional decisions (Taylor *et al.*, 2018). In this section, we reflect on our results, acknowledge limitations and offer suggestions for developing SEL curriculum.

Does the curriculum support the NHES and CASEL?

It was clear that the curriculum served as a vehicle for SEL and was aligned with the NHES. The results indicate that there were more frequent opportunities to practice social awareness and fewer opportunities to practice relationship skills and self-management. Future iterations should be more balanced. This can be achieved by way of supplemental learning activities catering to the competencies less frequently represented or by revising the prompts. Supplemental learning activities like role-plays and case studies could provide opportunities to practice decision-making and relationship skills. Behavior logs and personal reflections could develop self-awareness. Self-studies focusing on goal-setting, conflict resolution or stress management could develop students' self-management skills.

Despite the competency imbalance, we were pleased to see how the journals and discussions provided different venues for SEC expression. By nature, the journals gave students the time to reflect and to share thoughts privately; the discussions let students exchange ideas and practice SEC. In future iterations, we recommend teachers add online discussions. This would give students time to reflect before responding, expose them to others' perspectives and provide opportunities to practice their SEC, particularly relationship skills.

What was students' SEC and did their self-assessed SEC vary from their expressed?
Since we used the SSIS-SEL student form to evaluate *self-assessed* SEC, and the SSIS-SEL monitoring scales to evaluate *expressed* SEC, we thought it would be best to reflect on the range of students' SEC and to compare results using the terminology of those instruments.

Regarding similarities, students self-assessed and expressed moderate or high levels of social awareness and lower levels of self-management. Per the SSIS-SEL monitoring scales (Gresham and Elliott, 2008), a student with high or moderate social awareness competency can listen to how others feel and support their emotions. They also can demonstrate empathy for others, including those from different cultures or backgrounds. Students performing at these levels need minimal coaching to improve their skills. In contrast, students self-assessed *and* expressed moderately-low or low levels of self-management. Per the scales, someone with moderately-low or low-level self-management might have difficulty with motivation, setting and keeping goals, or staying calm when teased or disagreeing with others. Students at these levels need additional instruction to improve their competency.

In contrast to the similarities found between self-assessed and expressed social awareness and self-management, discordances were found for relationship skills, self-awareness and responsible decision-making. The SSIS-SEL student form results revealed decision-making as one of the highest and relationship skills as one of the lowest, whereas the journal analysis results indicated self-awareness as highest and self-management as lowest. This discordance might stem the following reasons: (1) the instruments were designed to measure the same constructs, but in different ways; (2) there was an actual difference between self-assessed and expressed SEC. Both reasons, and the exploration of others, would be worthy of future research.

Limitations

With any SEC assessment, there will always be some degree of uncertainty (Krachman *et al.*, 2016). Limitations to our research were site-specific or inherent to our instruments.

(1) Our participants attended a school identified as underperforming. Its possible poor literacy and writing skills impacted the data. It was evident in discussions that some students were behind in reading their books, and it was apparent from journal entries that some students had poor writing skills. Further, some participants were English language learners and may have had difficulty with reading, writing and orally expressing ideas. While we chose books with varying Lexile scores and wrote prompts with low-level readers in mind, some students still struggled.

(2) Our study focused on the experiences of one teacher and data collected from only her students. This prevents us from generalizing the results to other populations. However, our research was designed to support *this* teacher and *her* students' SEC.

(3) The SSIS-SEL monitoring scales were designed for researchers seeking to observe SEC-related behaviors. We used the scales to "observe" students' "behavior" as written in their journals entries, and these entries might not reflect their actual behaviors.

(4) The SSIS-SEL student form is a self-assessment. This leaves room for memory effects (i.e. respondents may not accurately recall actions) and social-desirability biases (i.e. respondents may provide answers they think are "correct," rather than their actual beliefs or actions).

(5) There were 13 students who did not assent or whose parents did not consent to this study and their data were excluded. It is possible that their data could have changed some results.

Despite these limitations, our assessments performed valuable functions. Our pre-assessment survey helped us to identify "where" students were along an SEC continuum and our ongoing assessments (the journal entries and book discussions) helped us to monitor students' SEC knowledge and skills. Collectively, these assessments provided a feedback loop for curricular, instructional *and* assessment modifications.

Implications and suggestions for future research

Based on our findings and existing literature, we offer suggestions to teachers seeking to conduct action research directed toward developing their own SEL curriculum and to academic researchers collaborating with educators to develop SEL interventions and measurements.

(1) Develop and utilize formative assessments. An SEL curriculum should not be "one-size-fits-all." Students' life experiences and needs will vary. Both pre and ongoing formative assessment is essential to ensuring an SEL curriculum meets learner's needs in relevant ways. As expressed in the Background section, for teachers to design relevant SEL curriculum, they need to know "where" learners are along an SEC continuum. Ideal formative assessments should include descriptive learning progressions that provide feedback to teachers and learners as to where learners are in relation to the SEL goals. The SSIS-SEL monitoring scales (Gresham and Elliott, 2008) could be a starting point for developing these progressions.

(2) Develop and utilize a summative assessment. Without a summative assessment, teachers cannot know the impact of curriculum (Taylor *et al.*, 2018). One option could be to administer a modified version of the SSIS-SEL student form and administer it as a pre-/post-assessment. However, the form focuses on behaviors unlikely to significantly change over a six-week curriculum. Instead, the form could be modified to focus on beliefs about and attitudes toward the behaviors. Per Boekaerts (2009), beliefs are a predictor of future behavior. Another option could be a final reflection assignment about one's SEC growth and the curriculum components that contributed to that growth. While this would be subjective, it could provide valuable insight into students' experiences with the curriculum and inform revisions.

(3) Establish explicit SEC goals. Goals should be set before the selection or design of formative or summative assessments. In our study, we focused on all CASEL framework areas. Others may wish to hone in on fewer. Whichever areas are selected, goals should not only focus on an endpoint, but also the continuum along which students travel to get there. For guidance, we recommend the SEL progressions proposed by Marzano (2015).

(4) Measure the impact of the curriculum in relation to the NHES or other health education standards. We did *not* measure the impact of the curriculum on students' NHES skills; however, we are exploring options for a summative assessment like the reflection assignment described in suggestion #2 but with a focus on the NHES.

(5) Use a mixed-method research approach. Not only does mixed-methodology improve the quality of findings by providing a broader perspective, but the limitations of one method can offset the strengths of another. Also, per Denham *et al.* (2016), mixed-methodology is better for diverse populations. A combination of student-generated assessments, such as self-assessments and classwork, coupled with unobtrusive assessments, such as observations, can assure that data collection methods and analyses are culturally, linguistically inclusive and developmentally appropriate.

(6) Curate a relevant book selection. We selected fiction literature from various book lists. Informal feedback from students and observations of book discussions revealed that students enjoyed some books more than others. Surveying students about the topics about which they would like to read, finding those topics in current book lists, sharing the descriptions of those books with the students and having them rank-order the books by interest-level could be a way to approach book selection.

(7) Partner with a language arts teacher. Much of the curriculum employed literacy skills. While our teacher did consult with the English language arts teacher for some feedback, a shared curriculum would allow students to more deeply explore topics and practice SEC skills. Further, shared expertise between the two subject matter teachers could lead to an even more effective curriculum, particularly in terms of literacy strategies.

Conclusion

Given the known benefits of SEC (Abrahams *et al.*, 2019; John and De Fruyt, 2015; Jones and Kahn, 2017), there is value for continued research directed toward developing appropriately-matched SEL curriculum. In this article, we demonstrated how to use formative research to uncover students' SEC and to use the findings to support curriculum and instruction decisions. We also provided evidence that a fiction literature curriculum could support SEL.

In sharing our processes and findings and discussing their implications, we hope school teachers will feel inspired and empowered to develop their own SEL curriculum. Further, we encourage researchers to continue work toward developing and sharing assessments that teachers can use to identify their students' baseline SEC and to monitor their progress toward established SEL goals. Finally, we advocate for the health education classroom as an ideal setting for SEL and health education teachers as the ideal professional for this work.

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Appendix

Pilot curriculum matrix

The matrix demonstrates how the journal and discussion prompts were rooted in Wilhelm's (2016) ten dimensions of reader response. Below appear the abbreviations used in the matrix to show the alignment between the prompts and the CASEL and NHES framework areas:

CASEL framework: Self-awareness-SA; self-management-SM; social awareness-SOA; relationship skills-RS; responsible decision-making-RDM

NHES framework: comprehend concepts-CC; analyze influences-AI; accessing valid and reliable information-AV; interpersonal communication-IC; decision-making-DM; goal-setting-GS; practice health-enhancing behaviors, avoid or reduce health risks HB; advocacy-A

		CASEL	NHES
	Evocative dimensions and prompts		
Week 2: ~10–20% complete	*Entering the story world.* The reader stimulates their prior knowledge	Variable	
	(1) When you first saw the book, what do you think the book was going to be about?		
	Showing interest in the story The reader understands, makes predictions, and forms expectations about the plot of the story	SA, RDM	AI, DM
	(1) What do you think the main character(s) may be dealing with? What struggles or challenges do they have? What kinds of decisions will they need to make?		
	(2) To what social groups do you think the main character(s) belongs? Consider racial, ethnic, cultural, income, religion, sports or clubs, gangs, etc. How might these groups influence the main character's behaviors?		
Week 3: ~20–30% complete	*Relating to characters.* The reader becomes a presence in the story and forms the opinions of characters	SA, SOA, RDM	AI, DM
	(1) Describe the main character's personality using examples. (If more than one main character, choose)		
	(2) What problems or challenges does the main character have? (If more than one main character, choose)		
	(3) What feelings are you experiencing as you read? Why?		
	(4) What personal experiences have you had that help you better understand these characters?		
	Seeing the story world. The reader constructs mental images of characters, settings, and situations of the story	SA, SOA	AI, A
	(1) Describe where the story takes place. Could the story also take place here?		
	(2) In what ways is the main character(s) like you? Different from you?		
	(3) What stereotypes might others place on the main character(s)?		
	(4) Do you think the main character(s) is being treated fairly? Why/why not?		

(*continued*)

		CASEL	NHES
	Connective dimensions	CASEL	NHES
Week 4: ~50–60% complete	*Elaborating on the story world.* The reader's role is as detective in which they generate meaning that goes beyond the surface of the text	RDM, RS	IC, DM, HB
	(1) If you were friends with the main character(s), how would you help him/her with his/her problem(s) or challenge(s)? What would you say? What healthful advice would you give?		
	Connecting literature to life. The reader makes specific connections between their personal experience and the characters' experience	RDM, RS	IC, DM, GS
	(1) So far, what have you learned about communication, goal-setting, and decision-making?		
	Reflective dimensions		
Week 5: ~60–80% complete	*Considering significance.* The reader questions which character(s) and event(s) contributed to the importance of the text	N/A	N/A
	(1) Tell me about the parts of the story you like the most, the least, and why		
	Recognizing literary conventions. The reader detects conventional moves made by the author and has to use their schema to establish meaning	SOA	AI
	(1) Select a character that is not the main character. If the story was told from that character's perspective, how would it make a difference in the story?		
	Recognizing reading as a transaction. The reader acknowledges that the meaning lies within the author, the text, and the reader themselves	SA, SOA, RS, RDM	AI, DM, IC, GS, HB
	(1) Do you agree with how the main character(s) sees the world? Explain (2) Who do you think is a role model? Why? Explain in terms of their decision-making, goal-setting, communication skills, or health behaviors		
Week 6: ~80%–100% complete	*Evaluating an author and the self as reader.* The reader assesses the author as an efficient writer as well as their own reading process and how it affects them as a reader	SA, SOA, RDM	AI
	(1) Has the novel helped you to understand yourself better? Explain (2) How have your attitudes, beliefs, knowledge, or behaviors changed because of this novel? (3) How could reading this novel (or novels, in general) help someone to feel less alone? Or help someone through a challenge or difficult situation?		

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Modeling the participation in physical exercises by university academic community in Sri Lanka

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Abstract

Purpose – The World Health Organization issued its global action plan on physical activities 2018–2030, emphasizing the importance of context-specific evidence on the subject. Accordingly, this study aims to provide unique and important policy insights on trends and drivers of participation in physical exercises by academic community in Sri Lankan universities.

Design/methodology/approach – For this purpose, we collected cross-sectional data ($n = 456$) in 2020 using a survey, and first, estimated a double-hurdle model to uncover covariates influencing likelihood and intensity of physical exercises overall. Second, count-data models are estimated to capture regularity of key exercises.

Findings – The results reveal that about 50% of members do not participate in any general physical exercise. Older members (marginal effect (ME) = 3.764, $p < 0.01$), non-Buddhists (ME = 54.889, $p < 0.01$) and alcohol consumers (ME = 32.178, $p < 0.05$) exhibit a higher intensity of participating in exercises overall. The intensity is lower for rural members (ME = −63.807, $p < 0.01$) and those with health insurance covers (ME = −31.447, $p < 0.05$). Individuals diagnosed for chronic illnesses show a higher likelihood of exercising but, their time devotion is limited. The number of children the academic staff members have as parents reduces the likelihood, but for those who choose to exercise have higher time devotion with increased number of children. The covariates play a similar role in determining regularity of key exercises: walking, jogging and exercising on workout machines.

Research limitations/implications – The results imply a need to promote exercising in general and particularly among younger, healthy, insured and female individuals living in rural sector.

Originality/value – The study covers an under-researched professional sub-group in an under-researched developing context, examining both the likelihood and regularity of exercising as both dimensions are equally important for individuals to maintain healthy lives.

Keywords Academic community, Physical exercises, Sri Lanka, Universities

Paper type Research paper

Introduction

Patterns and drivers of participation in physical exercises by different groups of people has recently gained an increased scholarly attention. According to the World Health Organization (WHO) (2018), inadequate physical exercises is one of key risk factors for non-communicable diseases and deaths worldwide. According to its recent survey, inadequacy of physical exercises results in approximately 3.2 million annual deaths worldwide. Moreover, regular participation in physical exercises is a major source of natural immunity, which helps greatly for people to protect from virus pandemics like COVID-19 (Ranasinghe *et al.*, 2020). On this backdrop, the WHO (2018) issued its global action plan on physical activities 2018–2030, elaborating guidelines and policy framework to promote physical exercises at all levels and emphasized the importance of country- and subgroup-specific studies facilitating evidence-based policies.

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The studies examining drivers of participating in physical exercises are considered vital as they lead to determinants-directed evidence-based policies to promote physical exercises among individuals (Lechner, 2009). Accordingly, individuals' biological, psycho-social and economic factors are found to be associated with their intensity of exercise participation. For instance, age plays a vital role in determining intensity of exercise participation, and evidence suggest that the intensity of exercising declines in older ages (Armstrong, 2012; Stenner *et al.*, 2020). Also, studies uncover that females are more sedentary due to family commitment and cultural barriers (Ranasinghe *et al.*, 2013; Bernardelli *et al.*, 2020). However, Fernández-Martínez *et al.* (2020) confirm the reverse, arguing that women are more physically active, and their tendency of exercising in fitness centers is relatively higher in developed countries. Further, adverse health status is found to be negatively associated with exercising due to risk of injury, less self-efficacy and social support (Medagama and Galgomuwa, 2018; Karunanayake *et al.*, 2020). The similar trend is uncovered with regard to individuals with health insurance policies (Birdee *et al.*, 2013).

Some studies extend scope to examine the role played by availability of infrastructure for exercising, such as jogging tracks, walking paths, gyms and so forth (Hunter *et al.*, 2015; Zhang *et al.*, 2019). Intensity of exercises is also a function of socio-psychological factors. The activity level is positively influenced by factors like community-wide campaigns, support groups and nature of neighborhood (Ball *et al.*, 2015). For instance, physically active neighbors positively influence individuals' likelihood of exercising (Lechner, 2009). Emphasizing on the role of religion, Bopp *et al.* (2009) opined that religious events like church-based programs favor and promote physical exercises among participants.

Depending on the literature review, what drives an individual to participate in physical exercises can be three types: demographic factors, lifestyle and health-related factors, and supply-side factors. These factors basically determine how likely individuals participate in physical exercises, how frequent and at which intensity they are involved in such activities. Figure 1 summarizes these theoretical relationships, providing a conceptual framework for the study.

The extant literature on the subject presents a vast diversity in terms of research designs, population studied and methods applied. Also, a majority of literature is based on national-level household surveys of developed-countries. The results might be different in less developed countries where the conditions required to enhance social capital are more limited (Bornstein *et al.*, 2012), and extensive databases are not frequently available (Medagama and Galgomuwa, 2018). In Sri Lankan context, Medagama and Galgomuwa (2018) and Karunanayake *et al.* (2020)

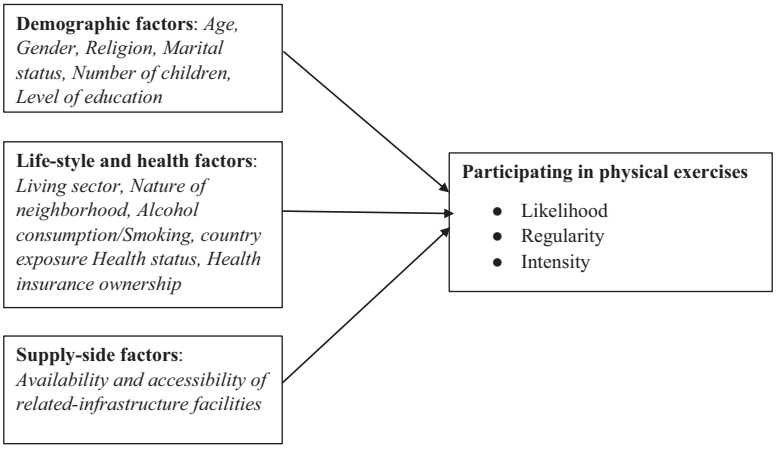

Figure 1.
Conceptual framework

revealed that physical activity patterns of Sri Lankan adults with diabetes are inactive and people with high body mass index (BMI) had a significant negative association with the level of physical activity. This review reveals a lack of evidence on trends and drivers of participation in exercises by different groups of labor community (Anwar-McHenry *et al.*, 2020; Susanto *et al.*, 2020). In particular, noncommunicable disease (NCD) prevalence induced by sedentary lifestyle is more common among highly educated white-collar job holders, and the situation is even worse in South-Asian region (Ranasinghe *et al.*, 2013).

The association between employment and health has been widely studied in a variety of contexts and, those studies concluded that work characteristics and social aspects of work are associated with employees' health (Palumbo *et al.*, 2020). Unlike the growing literature based on large-scale survey data examining the outcomes associated with physical exercises involvement and health, there is relatively less research formally examining the engagement of PA and effects of PA on university employees' lives. However, several studies have examined workforce participation patterns of academic community in relation to various health outcomes (Eng *et al.*, 2016; Kinman, 2016) and revealed that chronic conditions, illnesses, NCDs, depression and disabilities are becoming more prominent among academic members. As Butler *et al.* (2015) opined, university academics represent a segment of population who are at risk due to sedentary working patterns. Unfortunately, university employees are a relatively under-researched segment of population in terms of physical functioning irrespective of their higher level of health risk.

The main objective of this paper is, therefore, to provide empirical evidence on trends and drivers of participation in physical exercises by a specific professional group of labor force, academic community in Sri Lankan universities. The study contributes to the literature in three ways. First, it covers an under-researched professional sub-group in an under-researched developing context, Sri Lanka. Second, the study examines the role of lifestyle factors, including living area, alcohol consumption and foreign country exposure in determining trends of exercising at an individual level, which have never or rarely been studied priory. Third, in the same study, we examine both likelihood and regularity of exercising as both dimensions are equally important for individuals to maintain healthy lives (WHO, 2018).

Data and variables

The scope of this study includes the university academic members in Sri Lanka. There are approximately 3,300 academic members currently employed in the university system, representing 15 state and seven non-state universities. We included both permanent and temporary academic members who work full-time for respective universities and excluded visiting faculty members. The study used the survey method to collect data from the academics. As the second wave of COVID-19 pandemic broke out, the authors did not collect data by physically meeting respondents. As a remedy, the study utilized online survey technique to collect data. Accordingly, the authors prepared a structured questionnaire and made it available online for all the academic members in Sri Lankan universities. All participants in this study participated voluntarily and could refuse their participation at any time without consequences. The survey was conducted during October–November 2020 and terminated with 456 usable responses.

We collected data on general physical exercises, their types, date count and time spent. Our definition for general physical exercises includes more common activities that people do for "exercise purposes." Accordingly, we took into account walking (without workout machines), jogging/running (without workout machines) and cycling that people do for exercise purposes and exercising on workout machines. Also, "other general physical exercises" category is included to fully capture the construct. It should be noted that we

excluded individuals' participation in sports and active recreational activities from the definition of general physical exercises, and for them, data were collected separately. We then asked from participants the number of days per week and time in minutes per day allocated for each of above exercises. The total time per week in minutes allocated for general physical exercises is calculated by multiplying date count by time duration per day for each type and summing it up across all exercises relevant to each participant.

The survey collected data on individuals' demographic profile to be considered as a part of explanatory variables. Accordingly, age is recorded in years; gender with the meaning of biological gender of individuals is captured as a dummy variables assigning 1 for males and 0 for females; religion is also recorded as a dummy variable to capture whether an individual is a Buddhist or otherwise. Moreover, marital status is a dummy variable, capturing whether an individual is legally married or otherwise. The survey asked from the respondents the number of children the academic staff members have as parents; the number count of the ones under 18 years of age. Under living style and health-related covariates, the survey records whether an individual is living in urban or rural sector. The areas administered and serviced by local government authorities in Sri Lanka belong to urban sector, while others are rural areas. As an objective measure of health status, the survey asked whether an individual has been diagnosed for any chronic illness; one or more of diabetes, blood pressure, heart diseases, asthma, epilepsy, cancer, arthritis and other noncommunicable illnesses. Further, whether respondents have private health insurance cover is recorded as a dummy variable. Alcohol consumption is captured in three categories: non-drinker, drinking every day, drinking occasionally. The individuals with drinking every day and drinking occasionally are considered as alcohol consumers. The importance of drinking in providing the social contexts where alcohol as a legitimate social product for attaining group bonding and feeling of closeness in having fun together (Dresler and Anderson, 2018). Also, respondents were asked to indicate whether their neighbors participate in physical exercises.

The accessibility to infrastructure facilities is captured by asking whether respondents have access to walking/jogging tracks and leisure facilities within 2 km distance. Finally, the country exposure while studying for higher degrees is captured by asking the country/region (Sri Lanka and other South Asian countries, other Asian countries, the USA and Europe, and Oceania) where they have studied for postgraduate degrees by spending one or more-year period.

Analytical framework

Modeling time spent on general physical exercises

Figure 2 depicts the distribution of time spent on general physical exercises per week in full histogram with the kernel density function. Accordingly, the variable comprises a considerable portion of zeros (0s). Approximately, 50% of the sample reported zero time allocation for physical exercises. These zeros represent "genuine" zeros as they express that as a part of their way of living, they do not allocate a separate time for physical exercises.

Thus, an individual's decision to participate in physical exercises and the time to be spent on them need to be considered as two separate decisions, which can appropriately be modeled using the double-hurdle (DH) model introduced by Cragg (1971). Accordingly, the first hurdle is represented by the first equation (probit model), examining the factors influencing individual's decision to participate in physical exercises.

$$w_i = z_i\theta + \varepsilon_i$$
$$d_i = \begin{cases} 1, & \text{if } w_i > 0 \\ 0, & \text{Otherwise} \end{cases} \quad (1)$$

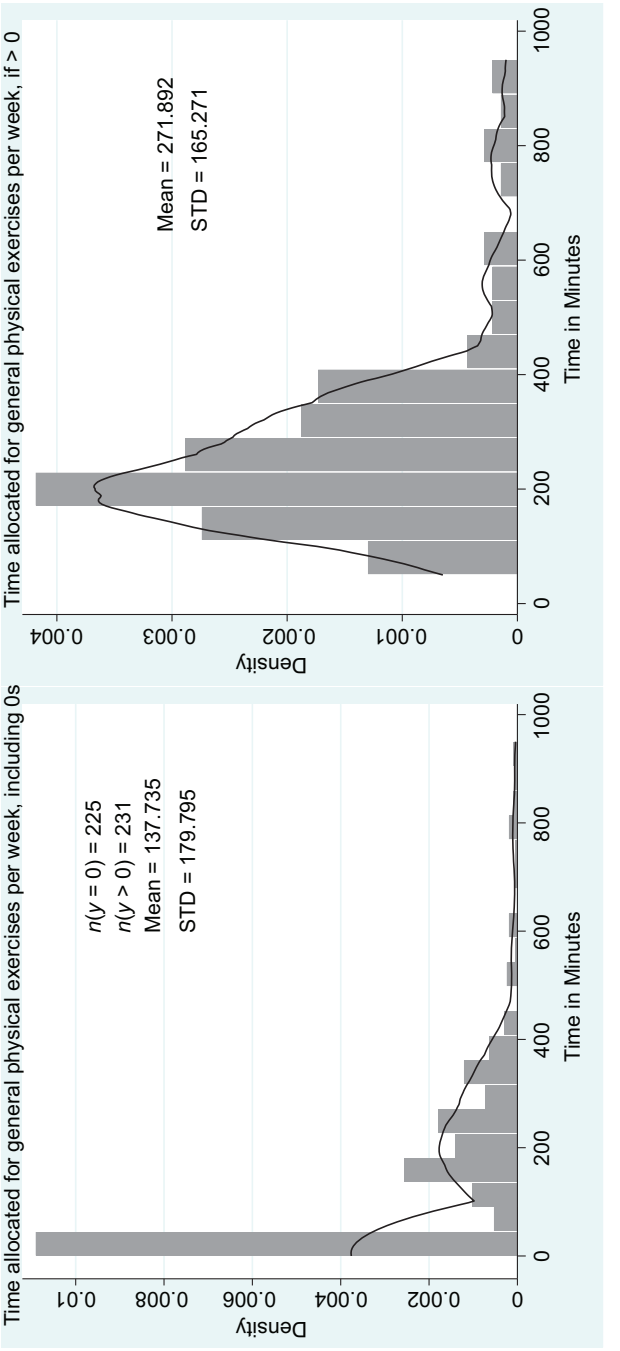

Figure 2.
The distribution of time allocated for general physical exercises per week: The full histogram including zeros and the histogram of just positive values

where w_i is the latent variable relating to individual's decision to participate in physical exercises; z_i is the vector of explanatory variables; θ is the vector coefficients; and $\varepsilon_i \sim N(0,\ 1)$.

The second equation examines the optimal time allocated for physical exercises using a linear model.

$$h_i = X_i\beta + \upsilon_i \tag{2}$$

where $h_i,\ X_i,$ and β are latent variable relating to time allocated for physical exercises per week, the vector of explanatory variables and the vector of coefficients, respectively, and $\upsilon_i \sim N(0,\ \sigma^2)$. If both hurdles are passed, then the model is estimated as:

$$y_i = \begin{cases} X_i\beta + \upsilon_i, & \text{if} \quad \min(X_i\beta + \upsilon_i, z_i\theta + \varepsilon_i) > 0 \\ 0, \text{ Otherwise} \end{cases} \tag{3}$$

where y_i is the observed dependent variable: time spent on physical exercises per week. For each hurdle, the Wald test is used to determine whether the assumption of independence of error terms between participation and time spent equations is appropriate. In both equations, we use the same set of explanatory variables presented in Table 1, except for the fact that "country exposure" is used only in the participation equation.

Modeling weekly counts of main physical exercises

The number of days per week an individual allocates for physical exercises is measured as non-negative integers or count data, denoted by $y \in \boldsymbol{N}_0\{0, 1, 2, 3, \ldots\}$. The number of days per week allocated for main general physical exercises, including walking, jogging/running and exercises on workout machines, are presented in the form histograms in Figure 3.

As can be observed, aforementioned general physical exercises have the distributions only within non-negative integer values, which are generally concentrated on zero, and it has made the distributions skewed. The traditional linear or generalized linear regression models ignore the discreteness and skewness of data, and thus, such frameworks can be inefficient with less statistical power (King, 1988). Moreover, with count-data, we are particularly interested in event probabilities. Therefore, we formally estimate different count data models for the main physical exercises: walking, jogging and exercising on workout machines.

As a benchmark count data model, we first estimate the Poisson regression model, which dominates count data modeling exercises due to its suitability to the statistical properties of count data (Cameron and Trivedi, 2010). The Poisson model specifies that each observed count y_i is drawn from a Poisson distribution with conditional mean of μ_i, given a vector of explanatory variables (X_i) for individual i. Accordingly, the probability density function of y_i can be written as:

$$f(y_i|X_i) = \frac{e^{-\mu}\mu^{y_i}}{Y_i!}, \quad y_i = 0, 1, 2, 3, \ldots \tag{4}$$

Further, μ_i is expressed as a function of socio-demographic factors of individuals via a log-link function as follows:

$$\begin{aligned} &\ln(\mu_i) = X^T\beta \\ &\text{or} \\ &\mu_i = \exp(X^T\beta) \end{aligned} \tag{5}$$

Continuous variables	Mean	STD	Min	Max	VIF
Age	42.64	9.64	26	68	1.61
Number of children	1.23	1.07	0	5	1.49

Categorical variables	*N*	%	VIF
Gender			
Male	222	48.68	1.46
Female	234	51.32	Ref
Religion			
Buddhist	383	83.99	Ref
Non-Buddhist	73	16.01	1.09
Marital status			
Married	398	87.28	1.41
Non-married	58	12.72	Ref
Living sector			
Urban living	378	82.89	Ref
Rural living	78	17.11	1.10
Health status			
Having diagnosed chronic illnesses	74	16.23	1.11
Otherwise	382	83.77	Ref
Health insurance ownership			
Yes	294	64.47	1.10
No	162	35.53	Ref
Alcohol consumption			
Yes	148	32.46	1.27
No	308	67.54	Ref
Neighbors doing physical exercises			
Yes	196	42.98	1.15
No	260	57.02	Ref
Availability of walking/jogging tracks within 2 km			
Yes	253	55.48	1.47
No	203	44.52	Ref
Availability of other leisure facilities within 2 km			
Yes	282	61.84	1.53
No	174	38.16	Ref
Country exposure			
Sri Lanka and other South Asian	221	48.46	Ref
Other Asian	111	24.35	1.27
USA/Europe	72	15.79	1.63
Oceania	52	11.40	1.24

Note(s): VIF: variance inflation factor; Ref.: reference category

Table 1. Summary statistics for the continuous and categorical explanatory variables

The regression parameter β can be obtained by applying the maximum likelihood method. However, this modeling approach has a strict assumption of equidispersion, meaning that the model assumes equality of mean and variance of y_i.

$$E(y_i) = \mathrm{Var}(y_i) = \mu_i \tag{6}$$

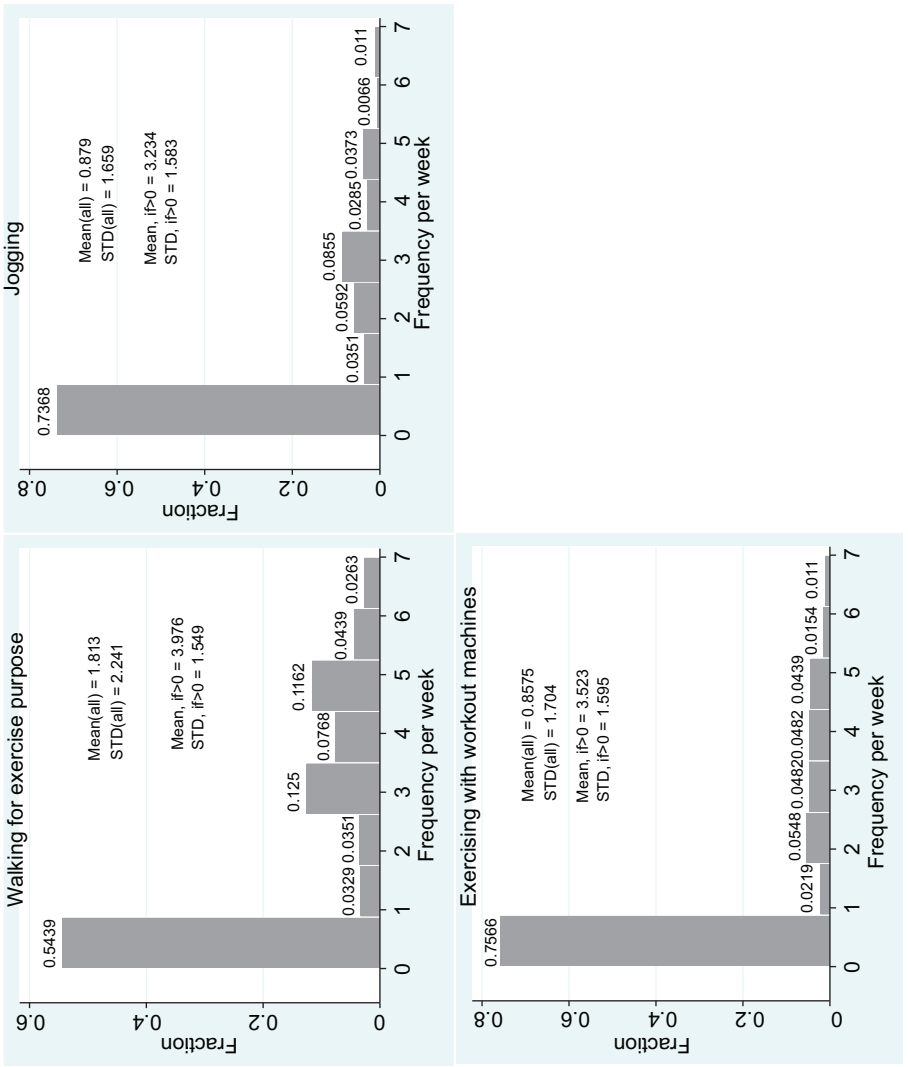

Figure 3.
The distribution of weekly frequency of participation in main general exercises: The full histograms including zeros

The assumption of equidispersion is generally violated in applied work, and researchers commonly experience overdispersion in survey data (Cameron and Trivedi, 2010). As depicted in Figure 2, the sample variance of "walking" (5.02) is approximately 2.8 times of the mean (1.81), whereas the sample variances of "jogging" (2.75) and "exercising with workout machines" (2.903) are more than three times of their mean values (0.879 and 0.858, respectively). This is an indication of the possibility of overdispersion with regard to all three dependent variables being considered for the analysis in this section, and this leads to have biased standard errors and inflated test statistics in Poisson regression analysis. The overdispersion can be accounted for the presence of unobserved heterogeneity, which needs to be addressed with an alternative count data model. Accordingly, next, we estimate the negative binomial model, which allows overdispersion. In this model, we introduce a dispersion parameter to accommodate for unobserved heterogeneity in count data. We therefore, assume that the conditional mean u_i of y_i depends not only on X_i, but also on a heterogeneity element of ε_i, which is independent of X_i. Accordingly,

$$\widehat{u_i} = \exp\left(X^T\beta + \varepsilon_i\right) = \exp\left(X^T\beta\right)\exp(\varepsilon_i) \tag{7}$$

where $\exp(\varepsilon_i) \sim \text{gamma}(\alpha^{-1}, \alpha^{-1})$. Thus, the probability density function of y_i can be written as follows:

$$f(y_i|X_i, \alpha) = \frac{\Gamma(y_i + \alpha^{-1})}{\Gamma(y_i + 1)\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1} + \mu_i}\right)^{\alpha^{-1}}\left(\frac{\mu_i}{\alpha^{-1} + \mu_i}\right)^{y_i} \tag{8}$$

Figure 2 further shows that there is a considerable portion of the respondents who do not allocate time for major physical exercises. For instance, 54.39% of the respondents do not walk for exercise purpose, whereas more than 70% of the respondents do not jog or do not exercise with workout machines, indicating excess zeros in all the cases being considered. As the data are on physical exercises that an individual does within an average week, those zeros may not represent counts, but represent individual's standard way of life (being a non-walker, a non-jogger or a non-user of workout machines for exercise purpose). In handling excess zeros, the most appropriate modeling techniques to be applied is the hurdle model, which relaxes the assumption that zeros and positive counts come from the same process.

Accordingly, we finally estimate the hurdle model, reflecting a two-stage decision-making process that is functionally independent. The first stage uses the full sample and determines whether an individual walks, jogs or does exercises on machines by separately applying standard logistic regression model. The second stage uses only the positive counts (truncated at zero) and determines the number of days per week an individual allocates for each exercise, given that he/she does that particular exercise at least for one day per week. For modeling purpose, we use truncated the Poisson model as the truncated distributions of walking, jogging and exercising on machines do not show a possibility of being over-dispersed. For instance, according to Figure 2, the sample variance does not exceed the sample mean of its truncated distribution for either case. The maximum log-likelihood value along with information measures of Akaike's information criteria (AIC) and Bayesian information criteria (BIC) are used to compare alternative count data models.

Results

Figure 4 depicts the percentage of males and females participating in main general physical exercises. A statistically significant higher percentage of males than females participate in walking, jogging/running, exercises on workout machines and other general physical exercises. More than 40% of males and females participate in walking for exercise purposes.

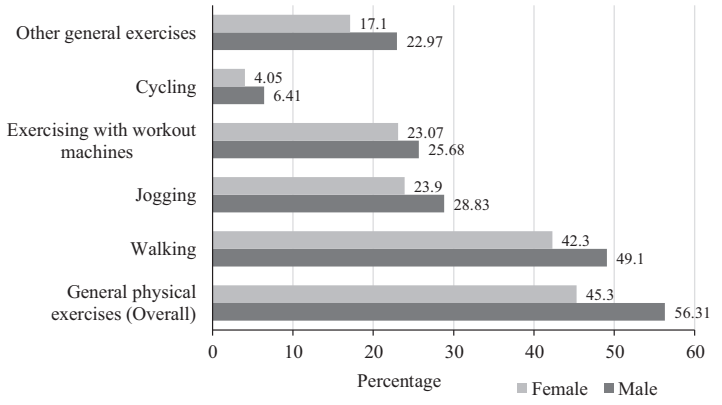

Figure 4.
Participation in general physical exercises by gender

The percentage of males and females participating on jogging, exercises on workout machines and other exercises remains less than 30%.

Table 1 provides the summary statistics for continuous and categorical independent variables. Accordingly, age of respondents ranges from 26 to 68 years, with a mean of 43 years. Majority of respondents are females, Buddhists, married, living in urban sector, not having diagnosed chronic conditions and non-drinkers with a health insurance policy. The number of children ranges from zero to five, with a mean value of 1.23. All variance inflation factor (VIF) values are less than 10, indicating that subsequent regression analyses are not impacted by the issue of multicollinearity.

Table 2 contains the results of the estimated first- and second-stage regression equations. The Wald test of independent errors is statistically significant ($p > \chi^2 = 0.0002$), and this implies rejection of the null hypothesis of zero correlation between error terms of participation and time spent equations (see Okunade *et al.*, 2010).

As shown in Table 2, it is evident that age is positively and significantly associated with the likelihood of participate in general physical exercises ($\beta = 0.035$, $p < 0.01$). The marginal effect (ME) of age suggests that each additional year of age is significantly associated with about increased 4 min per week of general physical exercises (ME = 3.764, $p < 0.01$). Accordingly, one could expect that the likelihood and time spent on physical exercises are relatively higher for older individuals. The gender coefficient in the probit model shows that males are more likely to participate in general physical exercises compared to their female counterparts ($\beta = 0.313$, $p < 0.05$). However, gender seems not to play a significant role in determining individuals' time spent on general physical exercises. The results also demonstrate that religion plays a pivotal role in individuals' time allocation for physical exercises. Accordingly, non-Buddhist individuals spend about 55 min higher for such exercises than Buddhist individuals (ME = 54.889, $p < 0.01$). Moreover, the number of children shows a significantly negative association with the likelihood of exercise participation ($\beta = -0.248$, $p < 0.01$), but not with time spent.

Under living standard and styles-related covariates, the living sector seems to play a significant role in determining both likelihood and time spent for general physical exercises. As ME of the "living in rural sector" suggests, rural individuals spend about 64 min fewer per week for general physical exercises (ME = 63.807, $p < 0.01$) compared to their urban counterparts. Panel A of Figure 5 demonstrates that the predicted time allocation for general physical exercises by rural individuals is increasing, with age being below the respective predictions of urban individuals.

Covariate	Participation equation (probit)	Time spent equation	Average MEs (dy/dx)
Age (in years)	0.0354***	1.173	3.764***
	(0.008)	(1.507)	(0.967)
Gender (Male = 1)	0.313**	−13.03	24.978
	(0.146)	(36.82)	(18.362)
Non-Buddhist	0.273	81.83**	54.889***
	(0.176)	(41.75)	(21.068)
Married individual	0.269	−169.1***	−34.407
	(0.219)	(58.87)	(25.932)
Number of children	−0.248***	34.04**	−11.383
	(0.073)	(15.21)	(8.229)
Living in rural sector	−0.376**	−79.66**	−63.807***
	(0.162)	(36.38)	(18.814)
Diagnosed chronic illnesses	0.528***	−55.04*	30.449
	(0.186)	(33.05)	(20.641)
Health insurance policy	−0.075*	−68.74**	−31.447**
	(0.036)	(26.75)	(14.531)
Alcohol consumer	0.152	50.18**	32.178**
	(0.146)	(24.28)	(15.583)
Neighbor doing exercises	0.264**	−2.879	23.991
	(0.134)	(27.15)	(15.332)
Walking tracks within 2 km	0.288*	2.751	28.196
	(0.150)	(32.06)	(17.338)
Leisure facilities within 2 km	0.053	−68.33**	−19.252
	(0.156)	(32.41)	(17.807)
Country exposure			
Asian	−0.540***		−51.121***
	(0.181)		(17.099)
USA or Europe	−0.342		−32.400
	(0.212)		(19.986)
Oceania	−0.005		−0.454
	(0.216)		(20.414)
Observations	456		
Log likelihood	−1747.8075		
Wald χ^2 (12)	37.18		
$p > \chi^2$	0.0002		

Note(s): Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 2.
Results from the DH model for participation in general physical exercises and time spent on them

Also, diagnosed chronic illnesses significantly increase the likelihood of participate in general physical exercises ($\beta = 0.528, p < 0.01$), but such conditions are negatively associated with the time spent on exercises. Nonetheless, the results in Table 2 suggest that having a health insurance cover significantly reduces the intensity of general physical exercises. For instance, individuals with a health cover are less likely to participate in general physical exercises ($\beta = -0.075, p < 0.1$), and also, they spend approximately 32 min less per week for exercises (ME = 31.45, $p < 0.05$) than those without such a policy do. Moreover, Panel B of Figure 5 shows that the predicted time allocated for general physical exercises by health policy holders is below the respective predictions of those without such a policy across the spectrum of age. Interestingly, alcohol consumption and intensity of exercising move toward the same direction. Individuals consuming alcohol spend a higher time duration for general physical exercises than non-drinkers by about 33 min per week (ME = 32.178, $p < 0.05$).

As external and supply-side factors, neighbor doing physical exercises and availability of walking/jogging tracks within 2 km increase the likelihood of participate in general physical

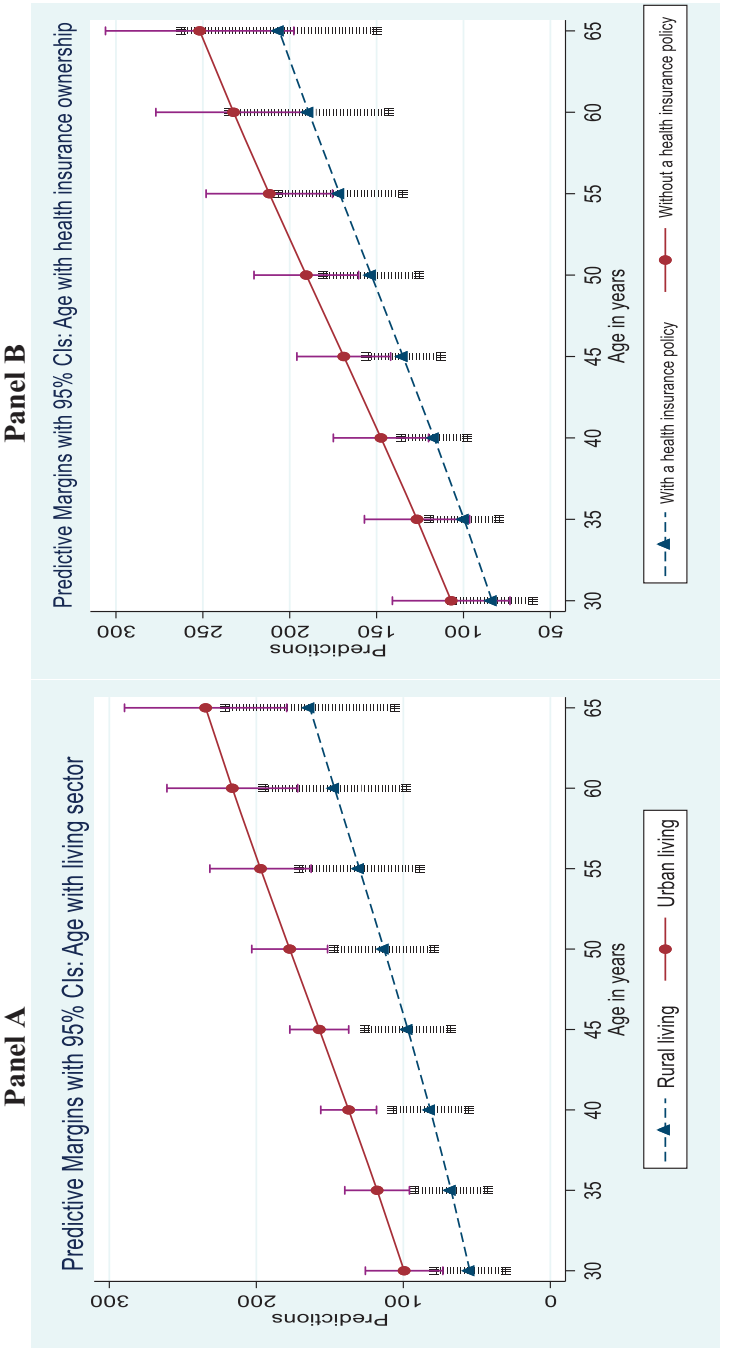

Figure 5.
Predicted time allocated for general physical exercises per week by age for rural and urban living and for those with health insurance cover and without such a cover

exercises. Finally, with regard to "country-exposure," those who have spent time in other Asian countries for higher studies are less oriented toward general physical exercises compared to the individuals who completed higher studies in Sri Lanka or other South Asian countries.

Table 3 presents results from different count data models. Accordingly, it is evident that the hurdle model performs the best in modeling date count per week on main general physical exercises as it has the least AIC and BIC values. Therefore, we can conclude that the hurdle model addresses the issue of excess zeros and overdispersion effectively. Accordingly, the following interpretations are based on the results of the hurdle model, and the results with regard to the direction of associations are robust across Poisson and negative binomial models.

The results show that older individuals are more likely to walk for exercise purpose and to exercise on workout machines. Moreover, conditional on a positive count, additional year of age significantly increases weekly date count for walking, jogging and exercising on workout machines by 0.8, 1.6 and 2.4%, respectively. Compared to females, males are more likely to walk. Also, their weekly date count for walking is significantly higher by 15.7%. Moreover, males are more likely to exercise on workout machines as well. The results also show that non-Buddhist individuals exhibit a significantly positive association with the likelihood of walking and exercising on workout machines. Also, it is evident that conditional on a positive count, non-Buddhists' date count is higher by 15.4% for walking and by 23.9% for jogging, on average. The number of children significantly decreases individuals' likelihood of walking and exercising on workout machines. Nonetheless, the results show that an additional child significantly increases individuals' date count for jogging by 22.3%, on average.

According to Table 3, rural living significantly decreases both the likelihood and weekly date count of walking and jogging. In particular, conditional on a positive count, date count of rural individuals for walking and jogging is significantly lower by 19.5 and 77.3%, respectively, compared to their urban counterparts. It is also evident that diagnosed chronic conditions significantly increase the likelihood of walking while decreasing its date count by 6.3%. However, having a health insurance policy discourages individuals to walk and to exercise on workout machines. The insurance policy holders' weekly date count for walking is lower than others by 16.9%, on average given the fact that they have a positive count. Also, regarding exercises on workout machines, having a health cover significantly reduces its likelihood while significantly decreasing date count by 15.6%, on average.

As a living style factor, alcohol consumption significantly increases individuals' weekly date count for walking, given a positive date count. Also, alcohol consumption shows a significantly positive association with both the likelihood and weekly date count of jogging. By contrast, alcohol consumption significantly reduces the likelihood of exercising on workout machines. Neighborhood impact on the trend of participating in physical exercises can be observed with regard to jogging. Neighbors doing physical exercises significantly increases the likelihood of jogging with significantly decreased weekly date count of the same conditional on a positive count.

As can be observed from Table 3, supply-side factors seem to play a vital role in determining the likelihood and weekly date count of physical exercises. For instance, availability of jogging tracks with a close proximity significantly increases the likelihood of walking. Further, it is evident that weekly date count of the individuals with such a facility for walking is significantly higher by 16.4%, overage relative to others. However, availability of other leisure facilities exhibits negative associations with weekly date count of walking and exercising on workout machines. Finally, exposure in other Asian countries and the USA/Europe is negatively associated with the likelihood of walking and jogging. However, exposure to Oceanian countries is positively and significantly associated with likelihood and weekly date count of exercising on workout machines.

Covariates	*Walking*				*Running/Jogging*				*Workout machines*			
	Poisson	Negative binomial	Hurdle model		Poisson	Negative binomial	Hurdle model		Poisson	Negative binomial	Hurdle model	
			Logit	Truncated Poisson			Logit	Truncated Poisson			Logit	Truncated Poisson
Coefficients												
Age	0.031***	0.038***	0.054***	0.008**	0.003	0.004	0.011	0.016**	0.054***	0.059***	0.053***	0.024***
	(0.006)	(0.007)	(0.014)	(0.004)	(0.011)	(0.012)	(0.015)	(0.006)	(0.011)	(0.014)	(0.015)	(0.007)
Gender	0.307**	0.432***	0.422*	0.157**	0.237	0.323	0.404	-0.038	0.596***	0.848***	0.763**	0.189
	(0.123)	(0.163)	(0.234)	(0.079)	(0.187)	(0.255)	(0.262)	(0.139)	(0.213)	(0.281)	(0.300)	(0.147)
Non-Buddhist	0.438***	0.489***	0.707**	0.154**	0.149	0.153	0.021	0.239**	0.432**	0.755**	0.775**	0.115
	(0.127)	(0.150)	(0.282)	(0.071)	(0.231)	(0.233)	(0.332)	(0.107)	(0.213)	(0.338)	(0.335)	(0.131)
Married	0.087	0.255	0.336	-0.084	-0.300	0.086	0.507	-0.949***	1.028**	1.086**	1.509***	-0.207
	(0.181)	(0.241)	(0.355)	(0.106)	(0.237)	(0.351)	(0.365)	(0.151)	(0.402)	(0.551)	(0.495)	(0.234)
Number of children	-0.168***	-0.141*	-0.276**	-0.013	0.053	0.083	-0.067	0.223***	-0.279***	-0.327***	-0.518***	-0.003
	(0.058)	(0.074)	(0.121)	(0.032)	(0.083)	(0.121)	(0.121)	(0.087)	(0.100)	(0.112)	(0.139)	(0.055)
Rural living	-0.641***	-0.961***	-0.874***	-0.195**	-1.247***	-1.398***	-1.148***	-0.773**	-0.064	-0.738***	-0.388	0.063
	(0.177)	(0.200)	(0.294)	(0.097)	(0.432)	(0.372)	(0.424)	(0.311)	(0.203)	(0.249)	(0.283)	(0.148)
Diagnosed chronic illnesses	0.212	0.445**	0.766**	-0.063*	0.069	0.146	0.299	0.256	0.239	0.228	-0.107	0.297
	(0.149)	(0.199)	(0.319)	(0.046)	(0.225)	(0.288)	(0.324)	(0.232)	(0.207)	(0.321)	(0.322)	(0.182)
Health insurance	-0.212*	-0.267*	-0.168	-0.169***	-0.063	-0.062	-0.091	-0.178	-0.375**	-0.488**	-0.452**	-0.156*
	(0.122)	(0.145)	(0.227)	(0.065)	(0.182)	(0.205)	(0.237)	(0.132)	(0.182)	(0.241)	(0.213)	(0.098)
Alcohol consumption	0.213*	0.206	0.115	0.143**	0.475**	0.633***	0.673**	0.305**	-0.316	-0.618**	-0.514*	-0.073
	(0.116)	(0.138)	(0.248)	(0.061)	(0.192)	(0.210)	(0.265)	(0.152)	(0.207)	(0.251)	(0.289)	(0.122)
Neighbors doing exercises	0.194	0.121	0.174	0.082	0.188	0.102	0.665***	-0.428***	0.094	0.191	0.395*	-0.253*
	(0.119)	(0.140)	(0.231)	(0.065)	(0.186)	(0.210)	(0.248)	(0.133)	(0.191)	(0.227)	(0.255)	(0.132)
Walking/Jogging tracks availability	0.694***	1.001***	1.183***	0.164**	-0.046	0.159	-0.006	0.121	-0.039	0.198	-0.226	0.299*
	(0.138)	(0.168)	(0.253)	(0.078)	(0.199)	(0.222)	(0.265)	(0.147)	(0.190)	(0.259)	(0.261)	(0.158)
Other leisure facilities availability	-0.266*	-0.578***	-0.304	-0.241***	0.215	0.034	0.252	-0.239	0.086	0.027	0.438	-0.367**
	(0.147)	(0.167)	(0.267)	(0.078)	(0.211)	(0.248)	(0.276)	(0.198)	(0.225)	(0.276)	(0.287)	(0.161)
Country exposure												
Asian	-0.834***	-0.896***	-1.035***	-0.354***	-0.487**	-0.628**	-0.610**	-0.396	-0.793**	-0.105***	-0.987***	-0.125
	(0.206)	(0.240)	(0.328)	(0.121)	(0.242)	(0.293)	(0.305)	(0.318)	(0.328)	(0.336)	(0.377)	(0.140)
USA/Europe	-0.354**	-0.473**	-0.712***	-0.067	-0.344	-0.221	-0.770**	0.243	-0.827**	-0.981**	-1.307***	0.141
	(0.164)	(0.201)	(0.345)	(0.082)	(0.296)	(0.361)	(0.384)	(0.190)	(0.333)	(0.403)	(0.453)	(0.189)
Oceania	-0.532***	-0.713***	-0.955***	-0.046	-1.833***	-1.599**	-1.983***	0.537	0.735***	0.665**	0.702**	0.287*
	(0.191)	(0.257)	(0.351)	(0.129)	(0.712)	(0.700)	(0.592)	(0.588)	(0.221)	(0.347)	(0.342)	(0.160)
N	456	456	456	208	456	456	456	124	456	456	456	111
Log likelihood	-912.13	-773.47		-652.30	-667.98	-512.83		-439.64	-629.68	-481.89		-404.16
AIC	1856.26	1580.94		1334.60	1367.97	1059.65		909.28	1291.35	997.79		838.32
BIC	1922.22	1651.03		1396.40	1433.94	1129.74		971.08	1357.31	1067.87		900.13

Note(s): Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$; AIC = Akaike information criterion; BIC = Bayesian information criterion

Table 3.
Results from count data models for weekly date counts on main general physical exercises

Discussion and policy implications

This paper models how individuals' tendency toward participate in general physical exercises is determined using a sample of academic members of Sri Lankan universities. The results reveal that an array of socio-demographic factors significantly affects the likelihood and time devoted to general physical exercises overall and the weekly date count of main exercises: walking, jogging and exercising on workout machines. Accordingly, academic members exhibit a higher tendency toward participating in general physical exercises overall and main exercises at an individual level with increased age. This contradicts many previous studies conducted using nationwide survey data (see Lechner, 2009), and they conclude that younger individuals' tendency toward physical exercises is relatively higher. Nonetheless, our results imply that younger academic members' opportunity cost of time devoted for general physical exercises is too high, and it can be attributed to more work demands they face at their younger ages. In particular, engage in higher studies, participation of training and development programs, and relatively higher volume of teaching and administrative works are main parts of their work demands. Therefore, there is a need to educate younger academics in Sri Lanka during their induction program on the importance of being physically active in reducing chances of becoming chronically ill in their latter stages of life. Given the importance of work patterns, physical and psychosocial characteristics of academic community and their physical exercises involvement, understanding the importance of time spent on physical exercises would be useful from public policy viewpoint. As Ball *et al.* (2015) emphasized, awareness of importance of physical exercises is not just adequate, and thus, there should be mechanisms for academic community to participate in physical exercises at workplace.

As expected, male academic members are more likely to participate in general physical exercises overall, and in particular, walking and exercising on workout machines. Household commitments of females other than commitments toward workplaces (dual role) may have resulted this trend of having less likelihood of participating in general physical exercises for females. Moreover, as already proven for the UK, females and males have different preferences over types of physical exercises (Farrell and Shields, 2002). In our study also, females might be more interested in participating in sports or recreational activities like dancing other than general physical exercises, and one of our future studies is devoted to confirm this. Considering the socio-economic status and cultural dimensions to be taken into account when promoting physical exercises among women, facilities need to be developed for them to engage in physical exercises with minimum disturbance on their other roles. Therefore, we suggest establishing day-care centers, fitness centers, jogging tracks, walking tracts at workplaces and promoting family gym membership with discounts.

Though the number of children reduces individuals' likelihood of participating in physical exercises, for those who participate, time devoted to such activities increases with increased number of children. In particular, time spent on jogging increases with number of children. These results imply that parents and children together participate in general physical exercises overall. In particular, parents might do jogging with their children. As confirmed by Rhodes and Lim (2017), in improving family health and well-being, physical activities that involve both parents and children play a vital role. According to their study, most often, parents prefer to participate in outdoor physical exercises with children after work. Accordingly, when designing jogging lanes/paths, safety of children and child-friendly environment also need to be taken into account.

Under living style and health-related factors, first, the study uncovers that rural living has more barriers to participate in general physical exercises for university academic members in Sri Lanka. This trend is true for general physical exercises overall and in particular, for walking and jogging. This finding is in line with Wilcox *et al.* (2007), a study based on developing countries. There is also a poor tendency among Sri Lankan rural people to

participate in physical exercises as it is not a part of their culture (Arambepola *et al.*, 2008). This implies that arrangements for physical exercises within workplaces would encourage the rural sector academic members to participate in physical exercises. Moreover, the results may be attributed to poor accessibility to related infrastructure like walking tracks for rural people. This implies that significant changes in related infrastructure facilities and arrangements for attractive awareness programmes for rural community would generate positive results.

The results indicate a significantly positive association between diagnosed chronic health issues and likelihood of participating in physical exercises overall. However, their time devotion for such physical activities is relatively lower. This implies that the academic members tend to do general physical exercises after having being diagnosed for chronic illnesses like diabetes. However, their poor health limits the intensity of chosen physical activities. It is important for individuals to be advised by experts with respect to physical activities; however, individuals' own decision with this regard is more important to increase their well-being (Ball *et al.*, 2015). Also, the academic community needs to be made aware about the importance of being physically active prior to being chronically ill.

Having a health insurance policy significantly reduces time devoted to general physical exercises overall. In particular, the likelihood and weekly date count are relatively lower for the ones with a health insurance cover. This trend is expected, and it is due to moral hazard, a well-known concept relating to consumer behavior in health insurance market. The issue of moral hazard emphasizes that the individuals with a health cover have no incentives for preventive care, and this is empirically confirmed by an array of studies (e.g. see De Preux, 2011 and Maia *et al.*, 2019). There is some evidence supporting the fact that physical exercises interventions delivered via the internet or mobile devices show a significant impact on individuals' likelihood and intensity of participating in physical exercises (Ball *et al.*, 2015). This implies increased monitoring of insured individuals' behavior using modern technological apparatus and discounted premium for those who maintain active lifestyles via regular physical exercises. The individual preference variable "alcohol consumption" is positively associated with participation in general physical exercises overall. Also, our count data models reveal an interesting story about the kind of individuals participating in general physical exercises. Alcohol consumers' weekly date count for walking and jogging are significantly higher, whereas they are less likely to exercise on workout machines. These results imply the incorporation of individuals' preferences that evolve overtime depending on consumption patterns and social interactions. Accordingly, drinking, walking and jogging take place outside homes with peers. By contrast, exercising on workout machines takes place within homes or gyms as solo activities for which drinkers may have less preferences.

Further, our results imply a neighborhood effect with regard to participation in physical exercises to a certain extent. However, in all cases, though individuals become more likely to participate in general physical exercises with the presence of physically active neighbors, their time devotion is found to be significantly low. Thus, the results imply that self-motivation and self-determination at the individual level are more important than being motivated by outsiders to maintain regular participation in physical exercises. Our results also favor ongoing government's projects on construction of new walking/jogging tracks and increasing the length and related facilities of the existing ones as availability of such facilities with closer proximity significantly increases both likelihood and weekly date count of walking.

The paper reveals a significant association between country exposure received by individuals while studying for their postgraduate degrees and intensity of participation in general physical exercises at present. Spending a considerable time in Asian countries other than South Asian countries, including Sri Lanka and the USA and European countries, exhibits a significantly negative association with all the cases of general physical exercises.

However, being exposed to Oceanian countries significantly increases both likelihood and weekly date count of exercising on workout machines. The opportunity cost of time devoted for exercises might be higher in the USA, European countries and other Asian countries. The universities in Oceanian countries, including Australia and New Zealand, may promote machine exercises among students by providing gym facilities. While individuals are back in Sri Lanka after their studies, they may be following the same rate of leisure–work combination by taking into account the opportunity cost of time. Future studies need to examine this trend with more qualitative information to generate a clearer conclusion. However, in all cases, as Oceanian countries' universities are practicing, Sri Lankan universities should provide and improve physical environment within university premises and encourage academic staff to utilize those facilities. Also, non-Buddhist people seem to be more active compared to their Buddhist counterparts, indicating a role played by religion in determining their intensity of exercising. A future study needs to explore this trend further by taking cultural aspects emanating from different religions into account.

Conclusion

The results indicate that approximately 50% of academic members in Sri Lankan university system do not participate in any physical exercise, implying a need to have promotions via suitable policies. Also, exercising is gendered with males being more active. Predominantly, individuals do walking as a physical exercise, and a revealed unfortunate trend is that older individuals and those diagnosed for chronic illnesses are the ones who show a higher tendency toward physical exercises, implying a need to promote exercising among younger and healthy members as a preventive measure. Related infrastructure development in rural sector and a need to remedy moral hazard issue faced by health insurance market are also recommended.

This study is not free from limitations. First, the study uses a set of cross-sectional data, and therefore, there is a limited room to interpret the estimated relationships as causation. It is more reasonable to view such relationships as associations. A future study needs to use a set of panel data to establish causality, accounting for dynamics of exercising of individuals. Second, the study does not provide any international comparison in terms of academic members' likelihood, intensity and regularity of participating in physical exercises and their drivers. This suggests a multi-country analysis to uncover regional disparities of the subject. Third, the study is limited only to general physical exercises. A future study of the same project will examine the situation of participation in recreational physical exercises like dancing and yoga and sports.

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Understanding whole school physical activity transition from a practice theory perspective

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Abstract

Purpose – In this study, the authors offer a practice theory framing of school physical activity transition with conceptual and managerial contributions to whole school approaches (WSAs).

Design/methodology/approach – Based on a literature overview of the limitations of WSA, ecological and systems theorisation and a practice theory framing of physical activity, the authors introduce a model that identifies signs of practice transition and conceptualises the relationship between signs and practice reconfigurations. To exemplify insights from the model, the authors provide illustrations from three cases from the national Estonian "Schools in Motion" programme.

Findings – The signs of practitioner effort, resistance and habituation indicate how practice ecosystem transition is unfolding across a spectrum from practice differentiation to routinisation. Several signs of transition, like resistance, indicate that reconfigured practices are becoming established. Also, there are signs of habituation that seemingly undermine the value of the programme but should instead be celebrated as valuable evidence for the normalisation of new practices.

Practical implications – The article provides a model for WSA programme managers to recognise signs of transition and plan appropriate managerial activities.

Originality/value – The practice theory framing of school physical activity transition advances from extant theorizations of WSAs that have failed to account for the dynamic ways that socio-cultural change in complex school settings can unfold. A model, based on a practice ontology and concepts from theories of practice, is proposed. This recognises signs of transition and can help with the dynamic and reflexive management of transition that retains the purpose of systemic whole school change.

Keywords Whole school approach, Physical activity, Social practice theory

Paper type Conceptual paper

Introduction

Insufficient physical activity (PA) has widely spread and contributes to obesity-related health problems (Kohl *et al.*, 2012; Reis *et al.*, 2016). The role of schools in developing a healthy lifestyle through promoting PA is critical (Rickwood and Foisy, 2014; Adamowitsch *et al.*, 2017). However, interventions to increase PA via class-based and standalone "delivered" doses of activity (Blitstein *et al.*, 2016) tend to have only limited impact in creating long term habitual active styles of living (Reis *et al.*, 2016). Given the limits of discrete intervention programmes for PA, there is a growing call for a shift towards intervention approaches that seek to integrate PA into the context of everyday life (Kickbusch, 2003).

There has been particular interest in intervention approaches focused on integrating PA into "settings"; places in which people come together and interact during everyday activities (Keshavarz *et al.*, 2010; Samdal and Rowling, 2012). Particularly, there has been much support internationally for "Whole School Approaches" (WSAs) to PA intervention, which ensures the whole school promotes and supports healthy engagement with regular PA (Adamowitsch *et al.*, 2017; Teutsch *et al.*, 2015).

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The "Whole School Approach" to PA arose from the Ottawa Charter for Health Promotion, which affirmed that "Health is created and lived by people within the settings of their everyday life; where they learn, work, play and love" (WHO, 1986). The Ottawa Charter was the starting point for the health-promoting schools initiative (WHO, 1996) that understood health as an imperative to be managed and experienced through the whole school and the wider community (Lindegaard Nordin *et al.*, 2019). Health-promoting schools focus on creating supportive environments to promote health and facilitate healthy behaviour (Inchley *et al.*, 2000), including by shaping school "ethos" through collaborative, participatory and democratic means (Inchley *et al.*, 2000). WSA uses multiple, interconnected interventions to embed health with the "culture, routine life and mainstream business of a specific setting" (Dooris *et al.*, 2007, p. 332). Areas of intervention include school policies, the physical and social environment, formal and informal curriculum, community links and health services (Adamowitsch *et al.*, 2017). For example, WSA to PA prioritises regular, highly active PE classes, provides suitable physical environments and resources to support structured and unstructured PA throughout the day, supporting active travel programmes and enabling all of these through a supportive school policy that engages staff, pupils, parents and the wider community (Kohl *et al.*, 2012).

WSA settings-based approaches have been recognised as having potential for integrating PA into the everyday life of the school, and national programmes have been implemented globally (Langford *et al.*, 2014; Adamowitsch *et al.*, 2017; Holt *et al.*, 2019; Hunt and Metzler, 2017; Naylor *et al.*, 2006; Chroinin *et al.*, 2012; Inchley *et al.*, 2000). The approach has been viewed as adding richness and a joined-up approach to public health (Dooris *et al.*, 2007). However, there is considerable critique about the sustainability of WSA programmes (McMullen *et al.*, 2020) and particularly about the problems with implementing and managing complex whole school interventions (Keshavarz *et al.*, 2010; Leger and Nutbeam, 2000; Moore *et al.*, 2019; Resnicow and Page, 2008). Research reports a tendency for the integrated and complex approach to WSA to get "lost in translation" (Lindegaard Nordin *et al.*, 2019) and for implementation to commonly fall short of systemic change required (Kelly and Russo, 2018). In some cases, the programme is reduced solely to classroom activities due to local difficulties such as insufficient staff backing (Adamowitsch *et al.*, 2017), and in others, problems have been identified with mobilising enough teachers to assume the role of health champions (Haapala *et al.*, 2017), with difficulties with communication between health and education policy sectors (Moynihan *et al.*, 2016) and with school actors feeling excluded from the processes of change (Adamowitsch *et al.*, 2017).

In this paper, we explore the limitations of the extant theoretical underpinning of the WSA that fails in practice to allow programme managers to implement complex interventions seeking to make systemic change. The ecological model dominates, and school actors remain theorised as actors who receive behaviour change interventions to reduce individualised health risks, or as blocks in programme delivery intentions. We propose an alternative, practice theory conceptualisation of WSA programme implementation and school transition that can help programme managers understand the complexity of multiple actor responses to programme delivery during the process of dynamic school transition. Although a conceptual paper, we draw on insights from the Estonian national Schools in Motion (SiM) WSA PA programme to illuminate our theoretical arguments and explore managerial implications.

Towards a practice theorisation of whole school approaches physical activity programmes

The conceptual framework for WSA PA programmes is characterised by an ecological model whole system perspective (Dooris *et al.*, 2007) and includes the following elements:

(1) The ecological model shifts focus away from what makes individuals ill to a holistic vision that understands health as determined by complex interaction of environmental, organisational and personal factors in the context of place.

(2) Settings are viewed as complex dynamic systems. The unpredictability of open systems must be allowed for.

(3) A whole system organisation development and change focus means using multiple, interconnected interventions to embed health with the "culture, routine life and mainstream business of a specific setting" (Dooris *et al.*, 2007, p. 332).

However, there is a strong critique in the literature that implementation fails to happen in accordance with the full theoretical base of the settings approach (Adamowitsch *et al.*, 2017; Dooris *et al.*, 2007; Samdal and Rowling, 2012; Wenzel, 1997). First, systems thinking tends to become lost to a project focus (Director, 2004). Lindegaard Nordin *et al.* (2019, p. 333) argue that as school-based health promotion policy travels from global to national to local levels, the framing of schools as a health promotion setting can become lost in translation and lead to a focus on the "inactivity of children and young people" as a health risk that "needs to be tackled or prevented through behaviour modification". They identified very few policies regarding schools in a more organic way, which saw the school environment as the focus. This means the ecological model for settings can become tactical (Dooris *et al.*, 2007; Wenzel, 1997) and it is used to design interventions rather than achieve whole scale cultural shift. An important critical perspective recognises that settings vary considerably, have permeable boundaries and will transition in different ways, requiring flexible and adaptive programme management (Samdal and Rowling, 2012).

Second, where the "school as system" concept becomes reduced to the school as a "site" (Rowling and Jeffreys, 2006), schools are conceptualised as "containing" captive audience of people ready to "receive" behaviour change (Samdal and Rowling, 2012). They are rendered as neutral, passive and amenable to professional efforts directed at them to be more conductive to health. The focus of research can become adherence rather than experiences and complex and messy processes of transition (Pawson *et al.*, 2005; Poland *et al.*, 2000; Ottoson and Green, 1987). Studies that fail to account for the complexity of context, e.g. pre-existing social relations, management–labour relations, power relations, social rules, norms, values and interrelationships (Dooris *et al.*, 2007), fail to understand how these can influence how programmes are framed, perceived, accepted, adapted and supported, and critically how the actions of school actors feed into the trajectory of the transition.

Relatedly, in the absence of a rigorous conceptualisation of the dynamic context of school transition, unsuccessful change efforts can label individuals as "resistant" or "hard to reach" (Poland *et al.*, 2000). People are rendered as "blocks" or problems in implementation if they resist. For example, studies have found that some teachers have been "resistant" to the idea that PA is the responsibility of the whole school and not just PE teachers (Cale and Aflrey, 2013), and they have "failed" to embrace the nature of "whole school" activities, finding them labour-intensive (Adamowitsch *et al.*, 2017). Research has found that teachers "fail" to commit, given the other pressures they are under (Young *et al.*, 2013; Lindegaard Nordin *et al.*, 2019), and find it difficult working together to plan and coordinate activities (Flaschberger *et al.*, 2012), requiring particular "effort" that teachers struggle or are unwilling to give (Holt *et al.*, 2019). Approaches that problematises actors view the actions of actors as separate to the social, political, material and temporal environment in which they live and work. Rather, Poland *et al.* (2000) emphasise the importance of a dialectical perspective, which highlights the reciprocity between people in a setting (agency) and the characteristics and nature of that setting (structure).

In light of this critique, there have been multiple calls for research and theorisation of WSA implementation experiences, processes and practice (Adamowitsch *et al.*, 2017; Dooris *et al.*, 2007). Accordingly, this paper explores the contribution of a practice theory framing of WSA PA transitions.

The practice theory emphasises "processes like habituation, routine, practical consciousness, tacit knowledge, tradition, and so forth" (Warde, 2005, p. 140). Practices are shared and social (Schatzki, 2002) and hang together through institutional arrangements, shared cultural meanings, knowledge and infrastructures that shape everyday life. Practice theorists tend to share the assumption "that practices consist in organised sets of actions, that practices link to form wider complexes and constellations – a nexus – and that this nexus forms the basic domain of study of the social sciences" (Hui *et al.*, 2017, p. 1). Various typologies of the practice theory exist, but the version with the most salience for health-related research in recent years has been Shove *et al.*'s three elements model (Shove *et al.*, 2012) (see Blue *et al.*, 2016; Keane *et al.*, 2017; Meier *et al.*, 2018; Supski *et al.*, 2017). The three elements model purports that practices "hang together" (Reckwitz, 2017) when sufficient materials, meanings and competences are both available and coherently intertwined. Materials refers to the physical resources that often directly implicate the conduct of daily life; meanings to the shared ways the world is understood amongst practitioners (Shove *et al.*, 2012) often embedded as an unreflexive sense of the "right" way to do things; competences are the understandings, knowledge or skills required for a practitioner to successfully perform the practice. The key theoretical possibilities from the practice theory for whole school PA transition are now discussed.

Whereas existing ecologically framed WSA programmes fail to account for the complex arrangements that contextualise programme delivery, a practice approach focuses on the interconnections of practices and acknowledges that addressing entire bundles of practices is necessary to unravel and reconfigure unhealthy "ways of living" (Blue *et al.*, 2016). A practice framing highlights the interconnection between practices across the school setting and beyond as an enmeshed "practice ecology" that orchestrates multiple physical or sedentary activity enactments. The practice ecology incorporates practices from which PA emerges, as the purpose of practice (such as physical education (PE)) or as a demand of practice (such as moving between classes) (Spotswood *et al.*, 2019), but also other practices with which these interconnect in the configuration of school life, *e.g.* school eating, learning, meeting and teaching. Enmeshed practices can include those that are closely coupled and mutually sustaining, such as sitting and classroom learning, or more loosely connected, such as walking and playtime, where a number of other practices may also compete for attention and time. Practices conflict or harmonise, creating important contexts for PA (Schatzki, 2002), particularly because some "anchoring" practices dominate others in a particular field (Swidler, 2001), configuring "possibilities" of practice enactment (Nettleton and Green, 2014).

Furthermore, the practice theory recognises that the "healthfulness" (Best *et al.*, 2003) of a school setting will depend both on synergy and interconnectedness between multiple aspects of physical and social environment (Dooris *et al.*, 2007), but also on the way these socio-cultural configurations and school actors interact. That is, practitioners (such as teachers or pupils) are "carriers" of multiple practices (Reckwitz, 2017), and their performance is vital for the way practices are recursively generated and reconstituted. Practices are "not brought into being by social actors but continually recreated by them via the very means whereby they express themselves *as* actors" (Giddens, 1984, p. 2). It is also through this repeated performance and reconstitution, including deviation, loyalty, adaptation and defection, that practices evolve (Maller, 2015). Although the ecological theory recognises that individuals are influenced by their social context, it does not account for the dynamic, recursive nature of school actors and the socio-cultural context. Rather than viewing school actors as "blocks" or as "recipients" of tactical intervention, the practice theory emphasises the inherent interrelatedness of practice performances by practitioners and the evolution of practice entities and the practice nexus. Practices contain the seeds of constant change (Warde, 2005).

Recognising signs of practice transition

A practice theory framing of WSA PA programmes allows WSA programme managers to recognise signs of transition emerging from the way the enmeshed ecosystem of practices across the school have been disrupted, reconfigured or recrafted (Spurling *et al.*, 2013) during the programme. Programme managers will see the reactions and responses of practitioners as they navigate and adapt in the light of newly formulated practices. These varied and emotional practitioner "doings" (actions) or "sayings" (interactions about or during the course of practice enactments) (Schatzki, 2002) are "signs" of transition that come from isolated moments in the performance of a practice that are the "tip of the iceberg", with the submerged iceberg comprising of complex and dynamic practice ecosystem interactions and relations (Spurling *et al.*, 2013; Maller, 2015).

Based on this conceptualisation, we propose a model that accounts for a spectrum of WSA programme transition spanning between *differentiation* and *routinisation*, along which different signs can indicate the current state of transition. At the *differentiation* end of the WSA transition spectrum, there are signs that indicate how performances of practices in everyday school life are adapting to the co-existence of established school practices and reconfigured or recrafted physically active practices (Spurling *et al.*, 2013). *Effort* is required by practitioners as the new practice configurations brought about by the intervention bring states of ontological insecurity (Giddens, 1984), where the effortlessness afforded by routinised practices is fractured (Wilk, 2009) and practical understanding no longer allows practitioners to feel safe within the "predictable flow of... shared routines" (Phipps and Ozanne, 2017, p. 362). Rather, practitioners "struggle" to maintain routines through tactical adjustments in the face of material reconfigurations (Phipps and Ozanne, 2017).

New configurations of interrelated practices may also afford the possibility for *resistance* as practitioners interact about and with practice variations. Discussions about change is part of the orchestration of new practice configurations, required to coordinate and align practices (Schatzki, 1996) when practice configurations are unsettled and practice fidelity can no longer be assumed (Arsel and Bean, 2013). As practices evolve, triggered by the programme of intervention, practitioners diverge in their loyalty to different versions (Shove and Pantzar, 2007) and interact with each other to adapt and establish new collective conventions. Resistance can, therefore, be a sign of the growing circumscribing power of new practices and a healthy sign of transition.

In some cases, however, resistance to the new practices can be expected in the process of transition. However, it is important to notice when signs of resistance lead to new collective mobilisation practices that could jeopardise systemic change. Collective mobilisation transcends pockets of resistance and involves the evolution of new resistance practices that take on the ritual characteristics of a subculture (Goulding *et al.*, 2013) such as the use of artefacts (songs, slogans), extraordinary actions and appeals.

Routinisation is made possible through unreflexive practical understandings that become settled when practices take hold. Routinisation enables the somewhat automated practice reconstitution that happens through practitioners' repeated performances, organised by the elements of practices that provide a blueprint for multiple, varied but collective enactments (Molander and Hartman, 2018). In schools undergoing PA transition, routinisation draws closer when increasing numbers of practitioners become loyal to the reconfigured practices and when conflict between these and established, interrelated practices reduces and disappears (Shove *et al.*, 2012). As new practices become *habituated*, practitioners have become drawn into the new practice configurations, and the ontological insecurity (Giddens, 1984) initially experienced has been replaced by a settled sense of practical understanding and automation.

Figure 1 illustrates the "signs of transition" model. In the coming sections, this model will be discussed with illustrative examples on how to recognise the signs of transition from the Estonian SiM programme. Management implications are also discussed.

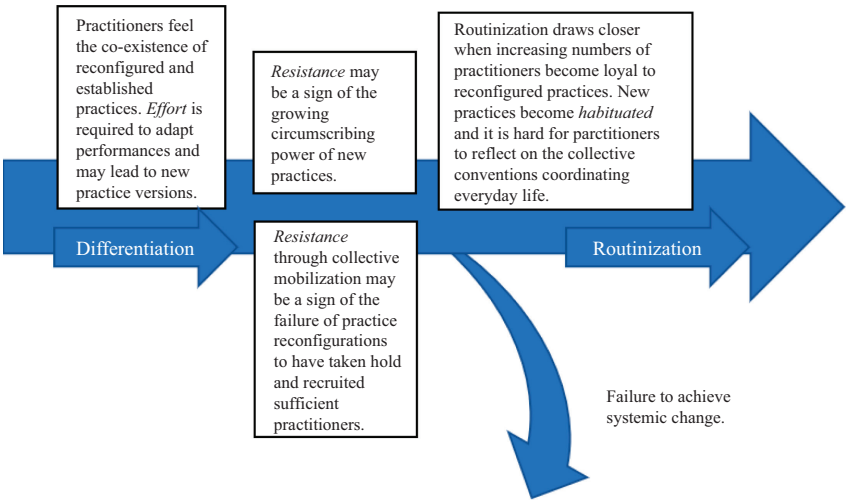

Figure 1.
Signs of transition from differentiation to routinisation

Recognising signs of transition in "Schools in Motion"

The "Schools in Motion" programme has the goal of embedding PA in the social processes of everyday school life (Mooses *et al.*, 2021) and reducing prolonged and overall sitting time. The predominantly sedentary teaching and learning practices in Estonian schools are resistant to change. The programme supports school boards and teachers to reconfigure teaching/learning, break time and commuting routines and, thus, to incorporate more physical movement throughout the school day. Since the beginning of the programme in 2016, which started with ten pilot schools on the funding of Estonian Ministry of Education and Science, the programme currently involves 148 schools with 63,000 pupils, which is more than 40% of all general education pupils. SiM is financed by the European Economic Area grant programme "Local Development and Poverty Reduction".

The SiM programme builds constant monitoring and methodologically flexible action research into the programme (see the detailed programme design in Mooses *et al.*, 2021). Researchers had attempted to monitor implementation using regular surveys among pupils and school staff as well as objective measurement of pupils' PA. However, the findings failed to answer questions about ongoing systemic shifts in schools and did not necessarily indicate changes beyond occasional project-driven events and new initiatives. Both the online surveys and informal interviews revealed natural fluctuation: teachers' enthusiasm went up and down, as well as pupils' feelings about being encouraged to move more during the school day. Although survey responses demonstrated clearly the increase in general knowledge about the SiM and understanding about the importance of PA, there were also signs of conflict and resistance to the WSA implementation efforts.

Three schools have been purposively selected to illustrate the practice theory conceptualisation because they represent a significantly varied set of school transition experiences. Schools participated in a web survey in four consecutive years (2016–2019) and represent different contexts in terms of location and size. Each offers examples of different signs of transition. For background information, Table A1 provides an overview of the characteristics of each school and their experience of transition.

In what follows, the signs of transition brought out in the theoretical model (Figure 1) will be explained and discussed.

Signs of practice differentiation: effort and resistance

Both effort and resistance have been evident during the SiM programme. For example, the effort in changing teaching practices to incorporate activity breaks lead in some cases to the reconfiguration of a number of interrelated practices in creative ways. The authors learned in their field visits to School B that activity breaks in lessons were perceived as problematic by some teachers because they conflicted with teachers' understandings of meanings associated with teaching, i.e. keeping control and discipline in the classroom, which was ensured by pupils sitting quietly to learn. A teacher in School B resisted the activity breaks policy but made an effort to reconfigure her teaching practices to allow pupils to change their sitting positions flexibly, to sprawl on their chairs and to fidget as they wish. This approach deviated from both the SiM programme and established conventions of lesson-based discipline in the school. However, the teacher's defection allowed them to align with teaching expectations that emphasised discipline and also allowed a recrafted practice to emerge.

Other signs of resistance included the way school actors aligned to different versions of enmeshed, evolving practices group together and used the language of "us" and "them" to distance themselves from alternative practice versions and practitioners. For example, in School A, indications of differentiation between reconfigured and established, enmeshed practices formed in the second year of the programme. Teachers who practised the WSA programme goal of active lessons and encouraged pupils to move more also participated in programme seminars, went on hiking trips and walking meetings, rather than traditional sedentary meetings. Teachers who had not been recruited to the recrafted teaching practices also did not participate in the hiking and walking meetings. This illustrates how related practitioner networks help the recruitment of practitioners across interconnected practices (Shove *et al.*, 2012). An active teacher in the SiM programme explained the reaction of her colleagues as a resistance to the effort required to adjust to new practice conventions:

> Our not enthusiastic colleagues say: "I do not have time for this *tilu-lilu*! [Estonian derogative term for insignificant things]. . . I have felt so much negative attitudes with this walking meeting, [people saying] "Why do we have to do it?! Why cannot we sit behind the table?! Whose idea was that?" Of course, it hurts. Many people are jealous that we are doing this [PA programme] and we are doing it well.

Her use of the word "jealous" indicates the divergence of practices and practitioners during this differentiation stage, but her pride in doing the PA programme well also indicates loyalty to new practice configurations that bring accepted collective conventions.

Signs of the failure to achieve systemic change

Mobilisation practices indicating unhealthy resistance and potential transition failure appeared in School B where older pupils (age 13–15) started an organised protest against newly introduced mandatory break times. School management enthusiastically followed the SiM programme suggestion that outdoor breaks will increase the PA of pupils. However, going outdoors conflicted with older pupils' existing bundle of break time practices, which included sitting in corridors and playing with mobile phones. Initially, pupils complained and tried to stay indoors by hiding in the cupboards during the break time. As this resistance was not fruitful, they organised a collective protest via co-created posters that were fastened to the doors of teachers' cupboards. They also co-created a protest rap song. The words of this song reflect the source of the practice conflict as a sense of disempowerment and inequality between pupils and teachers. Outdoor break was not mandatory for teaching staff. Pupils claimed their right to contributing to the transition process:

> You say "warm clothes",
>
> But I say "staying indoors".

No, you cannot!

We have been taught from early age

That everybody is equal

Where is this equality now?

If you would not force on us. . .

We have only duties

But where are our rights?

You say "warm clothes",

But I say "staying indoors".

No, you cannot!

Let us say a word:

We feel that nobody listens to us.

By doing it together we can change

Change the school better for everyone.

As the protest grew, the school leaders negotiated with the pupils by offering some compromises: older pupils could shorten the outside break time by having their meal slightly later (the 50-min break time is both for a lunch and going outside). Also, the head master finally agreed to the use of mobile phones while outdoors. As a result, the older pupils complied to the new rules by eating their lunch slowly to colonise more of their break time and make eating more dominant in that temporal location (Southerton, 2013). They then sat or stood outside during the rest of break to use their phones, which was an important anchoring practice (Swidler, 2001), thereby avoiding the additional PA that was the purpose of the initial policy.

This experience of failure illustrates how a rigorous understanding of the way the elements of an existing practice link together, like meanings (e.g. autonomy to choose break practices), materials (e.g. mobile phones) and competences (e.g. the lack of skills and knowledge how to spend active time outdoors) (Shove *et al.*, 2012), is required to underpin successful practice reconfiguration. In this illustrative example, the meanings of autonomy at break time were a central organising structure in break time practices, and this was not acknowledged by school management as practices were reconfigured without pupils' input, noted as a common failing of other WSA in the previous studies (Adamowitsch *et al.*, 2017). School leadership was forced to backtrack, relenting on the use of mobile phones, which has colonised time that would otherwise be spent actively. The result was transition stalemate.

Signs of the transition towards routinisation

In School C, the transition towards reconfigured physically active practices was supported systematically. School C's joining of the SiM programme coincided with major changes in the school itself, such as having a new head teacher and a reorganisation of the school management. During those structural and symbolic changes, which meant great effort and active reflexivity about school culture, the school management was able to reimagine the role of PA in lessons and break times using a variety of practical tools and methods provided by the programme. This opportunity underpinned a swift transition to a more physically active practice ecosystem in School C, including routine physically active outdoor break times that

included dance and various sport breaks. Additionally, new equipment was introduced for outdoor play, further locking in the new PA conventions of break time. The PA conventions of break time quickly "spilled over" (Frezza *et al.*, 2019) into other interrelated school practices such as classroom teaching. For example, according to the pupils, enacting physically active exercises at the beginning of a class was wholly normative, requiring no reward or enforcement: "No one forces you. You just do it".

Important signs that new versions of SiM practices had become habituated were the way practitioners talked about school PA practices. On the one hand, when transition is approaching routinisation, practitioners were not always able to reflect explicitly on the new collective conventions driving the school's everyday life. During the interviews, pupils would use expressions such as "it just is. . .." or "it has been always so" with little explanation. At this point, the new practice ecosystem feels normative. The school is felt to have "always been PA-friendly", as one teacher explained. Practical understanding governs the enactment of everyday life, with little need for reflection or effort in relation to change.

On the other hand, a sign of habituation might also be overt criticism of occurrences that appear to "go against" the collective conventions of the established physically active practice re-configuration. Pupils at SiM schools answered the open-ended questions in the survey using phrases like "I/we want more of. . .." or "We do not have enough. . .". These comments indicate raising awareness of new school conventions in relation to PA and a shift in perceived normality. These might be interpreted as signs of poor performance of the PA programme, but they can also be signs of routinisation, as expectations about PA are contingent on a new practice ecosystem. Programme managers must be wary of evaluation that categorises such comments as problematic, instead understanding the way they relate to the process of practice ecosystem transition via habituation.

The transition to routinisation is unlikely to be quick or linear, be matched across different institutional contexts or be predictable. In many schools, the continuation of training and programme's activities needs to continue across multiple years. However, within two years, most teachers at School C agreed (in the survey conducted by the SiM programme) that inducing pupils' PA is their task, suggesting the programme had taken root. Furthermore, teachers did not consider it to be a heavy burden, contrary to some other programme schools where reconfigured practices failed to recruit sufficient teachers for the recrafted practices to take hold. Furthermore, in School C, pupils' tacit understanding of the school's physically active collective conventions meant they could easily identify teachers who failed to lead physically active lessons. For example, the head teacher of School C told a story about a teacher who routinely did not provide PA opportunities in her lessons. When her lesson was observed, she included a PA break to impress the visitors. However, this was so clearly different from her normal teaching performance that pupils asked why the lesson was being held in such an abnormal way. After this incident, the teacher registered herself on the active lessons training course. The head teacher stressed her acceptance of "slow adopters" who take time to internalise the new conventions that transition brings.

Our illustrations from the SiM programme show that where teachers apparently "fail" to incorporate intended practice changes, their effort may lead to the emergence of new practice versions that can gain traction. We have also illustrated that resistance, which can seem problematic to programme delivery, can be a sign that reconfigured practices are becoming established, triggering practitioners who have yet to be recruited to vocalise their difference. However, it is important that resistance can also be a sign of collective mobilisation, where new practice configurations fail to take hold in the interrelated ecosystem of school practices due to conflicting practice meanings, for example. This can mean systemic transition has failed. Where transition is becoming established and newly reconfigured practices are becoming routinised, there may be indications that practitioners are indifferent to the change programme, finding it difficult to articulate the collective conventions that feel normative and settled.

Conversely, complaints may emerge that opportunities or equipment are insufficient. Rather than these being a sign of programme failure, they may mean practitioners' expectations about PA have shifted in alignment with the collective conventions of the new practice configurations, and that a physically active practice "regime" has taken hold (Arsel and Bean, 2013).

Managerial implications

Managing whole school PA transition is a complex task, particularly because changes will gain traction in different ways depending on particular pre-existing configurations of practices that make up school life in any given context and how new practices and practice configurations interrelate with these. Recognising signs of transition in practice terms may help programme managers and school leadership with identifying, tracking, interpreting and acting on multi-directional, dynamic and complex signs of change. For example, signs of differentiation can be recognised from the emergence of practitioner "in" and "out" groups. These can be addressed by encouraging collaborative interaction that enables practitioner recruitment of others to the new versions of practices (Maller and Strengers, 2013). Discussion may take the form of seminars, workshops and debates, or via opportunities for sharing practice performances such as joint lessons between teachers or subject-related meetings for staff. It is also important for managers to recognise the effort required by practitioners to adapt their performances. The SiM experience shows the benefit of communicating the achievements of slower adopters, demonstrating that school transition is a process not a competition.

Scepticism is common amongst teaching staff during a transition (McMullen *et al.*, 2020) but often shifts as more practitioners are "drawn in" to the new practices (Reckwitz, 2017). However, when resistance and effort in the differentiation stage have given way to collective/mobilised resistance against the emergence of new connections between new and old practices, it may be necessary to lean on the material agency of practice elements to enhance their prescriptive power (Maller, 2015). For example, creating active indoor corridor trails or opening sports halls for longer indoor break times may shape the meanings of break time at a collective level. However, it is important for school managers to engage in the practice theory-informed research about the practice configurations that make up everyday school life (Spotswood *et al.*, 2019) and to consider carefully the significance of the elements being recrafted through intervention and the way that elements and practices interconnect (Blue *et al.*, 2016). This insight may help avoid the emergence of mobilisation practices as a powerful and detrimental form of resistance. For example, there were several new practices that did not meet strong resistance in the SiM programme. A novel break time activity called "play break" involved pupils leading physically active games for other, usually younger pupils. This gained traction in the participating schools because there were existing meanings of pupil leadership and mentorship in other practices and strong conventions about play. By contrast, the mandated outdoor break time in School B was seen as a curtailment of freedom, and active break times failed to recruit practitioners.

It is also suggested that where resistance is overt, organised, ritualised and strong, slowing down the transition can help prevent further collective mobilisation. "Slowing-down" can be counterintuitive for the transition managers when it seems logical to publicly recognise and prize those who have quickly adopted. This may, however, intensify polarisation between the practitioners by attaching unhelpful meanings of status to different practice career stages. Resistance can be dispersed by facilitating collaborative effort, e.g. through internal training and co-created resources (idea banks, joint lessons). Furthermore, the introduction of "neutral" practices, or activities that are not tightly bound with existing practices, can also help to cool tensions. Examples are dancing break times or activities led by older pupils that do not involve teaching staff. In case of collective mobilisation and protests, the negotiations between the management and protesters may also help save the programme from failure.

Programme managers should recognise the seeds of change contained within practices, supporting and encouraging teachers to recraft practices through their own mastery. The dynamic evolution of practices can be supported by celebrating the creativity of teaching practitioners as they acquire knowledge and expertise and progress through their practice careers as "physical activity champions". As practices become habituated, evaluators should be encouraged to see beyond demands for more PA opportunities by pupils and beyond nonchalance towards the transition programme by staff. These are signs that the new practice configurations have become subject to practical rather than reflexive understanding. Managers can celebrate the new normality by embedding PA expectations in the materiality of the school, e.g. through investment in permanent active play resources. Furthermore, sustainability can be achieved through school policies such as recruitment. In School C, expectations about physically active learning environments are made clear in the recruitment interviews and through the compulsory training for all teachers.

Concluding discussion

Existing whole school PA programme literature emphasises the limitations of the ecological and systems theorisation of settings approaches, centred on the difficulties in translating the theoretical framework in practice. There is a tendency for school actor experiences to become lost (Green *et al.*, 2000) and for actors to be dismissed as obstacles to implementation (Young *et al.*, 2013) rather than understood as part of the process of school transition. Furthermore, programme management tends to emphasise adherence to inflexible notions of implementation rather than accounting flexibly for the dynamic unfolding of programmes in unique institutional contexts. Following a growing stream of research that explores the "exciting" potential for a practice theory conceptualisation of public health research and intervention (Kelly and Russo, 2018; Blue *et al.*, 2016; Maller, 2015; Spotswood *et al.*, 2019, 2021, 2021), we offer a practice theory-informed model of school PA transition from which both conceptual and managerial contributions emerge.

First, conceptualising signs of transition as evidence of the dynamic unfolding of practices allows the systemic nature of schools to remain the focus of intervention. The practice theory-informed framing shifts the focus away from adherence to implementation schedules, and flexibility and reflexivity are emphasised. Schools have their own codes of conduct, infused with situational characteristics (Poland *et al.*, 2009), within a framework of practices that are templates to action (Molander and Hartman, 2018). Practices interrelate and co-evolve, with "something of a life of their own" (Blue *et al.*, 2016, p. 41), as interventions recraft or substitute practices. The way physically active practices interrelate with others in the school practice ecosystem will require careful watching and reflection by managers. Signs of transition are an indication of complex interrelationships, conflicts and harmonisations happening below the surface. Transition, and signs of transition, will vary depending on the particular configuration of practices in any school (Spurling *et al.*, 2013).

Second, our practice theory framing reimagines apparent failure or problems with implementation as signs of the unpredictable flow of practices as they are reconfigured and form new arrangements (Alkemeyer and Bushman, 2017). The response of actors, e.g. through resistance, is not the focus of conceptual understanding about the transition, so actors are not viewed as "blocks" or problems. Rather, their responses are understood to be contingent on the practices that contain the seeds of constant change (Warde, 2005). Resistance may be a sign that practitioners are negotiating their relationship with new practices as they establish a hold and recruit unreflexive (and silent) loyal practitioners. It can be a positive sign. Similarly, nonchalance or indifference about a programme's effectiveness may be a sign that habituation is driving performance. Only where resistance actuates competing practices of mobilisation, it may be a sign of transition failure.

Third, a practice theory framing conceptualises performances as unique and open ended (Molander and Hartman, 2018) and so emphasises that the responses, reactions, perceptions and understandings of all actors are important for managers for understanding and managing school transition. Multiple, ongoing and adaptive research methods are required to understand how practices are evolving. This multi-dimensional and ongoing research project is necessary for managers to adapt their implementation plans to the unique and unpredictable pattern of transition in their particular setting. The practice configurations, reconfigurations and substitutions should be the focus of ongoing programme management insight. A practice theory-informed approach to transition management, therefore, advances from extant evaluation approaches that seek causal influence as a result of uniform programme implementation (Avitsland *et al.*, 2020).

Fourth, placing practices, not people, at the heart of analysis (Schatzki, 2002) is a significant contribution to prior conceptualisations of WSA PA programme implementation and transition. Health promotion texts emphasise the importance of physical and social contexts to whole school programme design, implementation and evaluation (Dooris *et al.*, 2007), and it is clear that the intention of the WSA is to avoid the pitfalls of behavioural–individualist intervention approaches in avoiding the responsibilisation of individuals (Spotswood *et al.*, 2019). However, the limitations of the extant theorisation of WSA programmes has led to conceptual slippage (Lindegaard Nordin *et al.*, 2019) and a return to treating individuals as "recipients" of intervention and as "blocks" to programme success. Rather, the conceptual benefits of the practice theory have seen it fuel a stream of health-oriented research that seeks to move beyond understanding and changing "health behaviour" (Cohn, 2014) and instead to inform "practice-oriented public health policy" (Blue *et al.*, 2016). For example, the practice theory helps conceptualise PA as emergent from the configuration of everyday life (Hopkins *et al.*, 2020; Nettleton and Green, 2014; Spotswood *et al.*, 2019, 2021). Thus, the practice theory has inherent strengths for programmes of intervention and policy that seek to shape and strengthen collective conventions around physically activity (Southerton, 2013). Particularly, it privileges neither individual action nor social context (Blue, 2019), but the recursive nature of both is held centre stage. This brings into focus the actions of practitioners as an important ongoing part of transition, yet understands the limitations of the signs their actions provide, ensuring that the focus of programme management is on practice configurations, practice and practice element conflicts and interrelationships.

Finally, the practice theory emphasises complexity and contingency and provides an opportunity to those involved in the management of social change to move away from the expectation of linear processes and rather to situate the dynamics of practices at the heart of transition management (Weenink and Spaargaren, 2016). This is particularly important, given the need for learning about how interventions work in natural settings Reis *et al.* (2016) to enable the scaling up of intervention pilots. Our practice theory-informed model provides a flexible way of identifying emergent signs and practice evolution that are inherently naturalistic. However, although this conceptual paper has provided a starting point for future research, future practice theory-informed WSA implementation research should focus on developing empirical insights into signs of practice ecosystem transition. This research agenda would further contribute to the bridging between the conceptual promise of practice theory-informed health research (Blue *et al.*, 2016) and applied frameworks for policy and intervention management.

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Appendix

School	WSA profile	Insights from the Web surveys 2016–2019: Fluctuation or smooth change of standardised indicators of transition
A	Urban, > 300 pupils, Grades 1 to 9 Large unrenovated building, small outdoor ground Several PA-supporting activities, e.g. dancing break time or active break time lead by older pupils. Group of enthusiastic teachers engaged with PA-related activities and incorporate activity breaks in lessons The head teacher is very supportive of PA-enhancing activities in school but avoids mandating them	Not a smooth transition – many indicators were fluctuating across the years, e.g.: (1) Active lessons (2) Teachers encouraging pupils to move more during the school day (3) Pupils feeling encouraged to move more during school day (4) Perceived opportunities to move during the school day
B	Rural, < 100 pupils, Grades 1 to 9 Homely, renovated building and large outdoor space Long (50 min) mandatory outdoor break time and 85-min-long lessons (in contrast to the 45 min that is normal in Estonia) Head teacher and team of activists are implementing the whole school PA transition	Indications of transition include slight positive change or no change. Some indicators were fluctuating across the years, e.g.: (1) Active lessons (2) Teachers' agreement with the statement "Every staff members' duty is to encourage pupils to move during the breaktime"
C	Located in a very small town ~300 pupils from Grades 1–12 Half-renovated, large building. Spacious outside area PA principles are integrated into the lessons, break times space planning and management, e.g. active walking meetings and active events with parents Recruitment of new teachers acknowledges PA implementation requirements School mentors others in SiM School posts regularly about PA-related activities on the school Facebook page	Indicators of transition include generally positive changes or no change. The indicators that changed the most in a positive direction: (1) Active lessons (2) Teachers encouraging pupils to move more during the school day (3) Teachers' self-reported participation in staff PA activities (4) Teachers feeling supported by school management (5) Pupils' PA-related break time activities (6) Pupils feeling encouraged by teachers to move more during school day (7) Parents' attitudes about PA promotion in school

Table A1. Background of three illustrative cases

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