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It's Cool to be Healthy! The Effect of Perceived Coolness on the Adoption of Fitness Bands and Health Behaviour

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ABSTRACT

Contemporary technology success is frequently associated with the competitive advantage of being cool. A fitness band is one of the smart wearable devices promoting health behaviours, which is one of the cool lifestyle trends in modern societies. Although past research established the profound effects of coolness on user technology acceptance, the influencing role in fostering health behaviour remained obscure. To bridge the existing literature gap, the current study aims to examine the perception of coolness as a higher-order construct with multiple dimensions, namely originality, attractiveness, and sub-cultural appeals, by investigating the direct effect on fitness band adoption and indirect influence on users' health behaviour. An

online survey was conducted on 280 fitness band users, and the data was subsequently analysed via the Partial Least Squares-Structural Equation Modeling (PLS-SEM). The study results demonstrated that the perceived coolness of fitness bands significantly affects users' device adoption levels, which subsequently influence personal health behaviour. This study thus contributes to health communication research by testing the coolness concept and developing the diffusion-innovation framework from current human-computer interaction literature. The findings would guide future developers of fitness bands to emphasise the coolness functions for higher degrees of adoption and positive impact on society.

Keywords: Smart wearable device, ubiquitous computing, health behaviour, technology adoption, human-computer interaction, user experience.

INTRODUCTION

The increasing diffusion of innovation ushers innovative communication methods regarding contemporary health-related products and services to aid in resolving numerous health challenges. The ability of health users to adopt innovative technologies presents a distinctive research area for documenting alternative approaches to address health issues through a social system (Haggstrom et al., 2019). As the most common and current smart wearable device, the fitness band is beneficial to improving various users' health aspects (Lee & Lee, 2018). The ubiquity of the device could promote a healthier lifestyle by encouraging regularity of physical activities, which assist in reducing health issues, such as diabetes (Mohamed et al., 2018). Thus, fitness bands could serve as a prudent tool to encourage health behaviours in the affected populations (Siepmann & Kowalczuk, 2021).

Most past studies on fitness bands were conducted in the Western context, with minimal information available for less developed and developing countries (Stiglbauer et al., 2019). To provide a different perspective, the current study is based on the Malaysian context that mostly adopts inferior lifestyle choices, such as unhealthy food choices, lack of physical activities, and voluntary sleep deprivation, which contribute to an escalating number of non-communicable diseases (NCDs) (Thavarajah, 2016). Malaysia has developed

into the 'fattest' Asian nation, with approximately half of the adult population being overweight or obese currently (Bernama, 2018a). This demands constructive strategies to raise community awareness and implement realistic solutions by applying pertinent digital technologies as a stimulating instrument which includes social support and psychological factors for sustainable health behaviour.

Health behaviour determinants were primarily studied in terms of social dimensions, such as societal organisations, institutions, structures, and ideologies, and psychological determinants, including cognitions, beliefs, motivations, and biological factors (Ahn & Park, 2022; Siepmann & Kowalczuk, 2021). In the current study, the coolness concept introduced in human-computer interaction (HCI) was executed to measure the social and psychological determinants of health behaviour concerning social desirability. Particularly, this study assessed the coolness factors as a medium to enable health communication through fitness band adoption, which corresponds to previous studies narrating the coolness concept on innovative technology acceptance (Ashfaq et al., 2020; Kim et al., 2015) and user behaviour (Peng et al., 2016). Therefore, the present study referred to perceived coolness as the primary antecedent of users' health behaviours mediated by fitness band adoption.

THEORETICAL UNDERPINNING

User technology acceptance has frequently been associated with coolness factors in predicting the success of innovative technologies or features (Kim et al., 2015; Liu & Mattila, 2019). The notion of investigating innovation to predict diffusion as a success indicator is regularly based on the established theory of diffusion of innovations (DOI) by Rogers (Naglis & Bhatiasevi, 2019). Specifically, research on the effect of health technologies and courses frequently employed the DOI theory to explicate the interactions in the innovation adoption process by focusing on the effect of the pre and post-adoption on the participant or patient behaviour. This study integrated three concepts and theories, namely perceived coolness (Kim et al., 2015), the DOI (Min et al., 2019), and health behaviour (Jaafar et al., 2017) to appraise the driving factor of fitness band adoption and analyse the impact on users' health behaviour. The study concentrates on device adoption instead of acceptance among actual fitness band users to allow higher accuracy in gauging personal perceptions and rationales regarding

fitness band adoption compared to merely examining the reactions towards the technology with concise descriptions of fitness bands.

Innovation Diffusion

Adoption is widely discussed in technology research, mainly through Rogers's DOI theory, to elucidate the innovation momentum from information technology ideas and products to diffusing techniques where individuals adopt innovative ideas, behaviours, or products (Ax & Greve, 2017; Min et al., 2019). The theory delineates the instrumental actions to minimise technology acceptance hesitancy while elevating the anticipated outcomes of utilising and diffusing the technology (Blackburn, 2011). In public health programmes, the theory is applied to understand the target population and the factors influencing the adoption rates (Wiley & Cory, 2013). Hence, the DOI is pertinent to evaluate the adoption factors and determine the adoption rate of wearable technologies (Ahn & Park, 2022).

Personal enjoyment and entertainment, social influence, and interaction are several significant adoption drivers (Zolkepli & Kamarulzaman, 2015). Rogers and Bhowmik (1970) revealed that effective communication would frequently occur when the source and receiver are homophilous, where individuals in a social system share similar attributes, beliefs, and backgrounds. Contrarily, heterophilous individuals, members of a social system who do not share similar beliefs, values, social status, and attributes, are perceived to pose a significant hurdle in the DOI (Yu & Gibbs, 2018). A heterophilous individual would possess the potential to reject instead of adopting a technological application, as personal attitudes would be consequential in adopting or rejecting an innovation (Wang et al., 2018). Summarily, the incorporation of fitness bands is regarded as an innovation, coolness factors as adoption factors, improved health behaviour as a behaviour, and self-tracking practice as an alternative idea—would allow an in-depth discovery of intangible factors than the typically discussed adoption drivers. This study also extended the adoption parameters by incorporating hedonistic factors.

Health Behaviour

The third United Nations (UN) Sustainable Development Goal (SDG) aims to ensure healthy lives and promote well-being for different age groups (Transforming Our World: The 2030 Agenda for Sustainable

Development, 2015). Health behaviour manifests as a behavioural pattern that comprises appropriate actions or habits employed to maintain, restore, or improve health (König et al., 2022). Nonetheless, improving health behaviour would be challenging for certain individuals owing to the alterations in daily routines to allocate time for exercise (Kaewkannate & Kim, 2016). As such, offering hassle-free, convenient, and seamless wearable devices, such as fitness bands, could potentially amplify the self-perceived necessity to execute health behaviour. The convenient and constant self-tracking function would also encourage sustaining the newly adopted healthy lifestyle, including a higher number of walk counts (Attig et al., 2019). The introduction of wearable devices, therefore, offers a new possibility for effective technology intervention to promote physical activity (Naglis & Bhatiasevi, 2019) due to physical inactivity being the largest risk factor contributing to the prevalence of diabetes in Malaysia (Ahmad et al., 2021; WHO, 2016).

In the healthcare domain, approximately 40,000 mobile health (mHealth) applications are available (Isaković et al., 2016), indicating a high consumption volume of health-related technology applications. The trend calls for further studies on adopting wearable technology, particularly for health management. From 2013 to 2017, 463 studies on wearable devices were conducted, with 26 percent focused on the technology employed in examining the quality of data collection and technological performance (Shin et al., 2019). The previous studies, nevertheless, were primarily experimental by solely investigating users' perspectives on personal interactions with the system. As such, a dearth of applicable findings in social realities would hinder the illumination of actual user behaviours after extensive usage in a natural environment. Meanwhile, several past studies on wearable device adoption measured users' motivation, self-efficacy, utilitarian benefit, and visibility (Asimakopoulos et al., 2017; Chuah et al., 2016) but not on health behaviour. Resultantly, the research scarcity prompted the current study to explicitly address health behaviour influenced by coolness perceptions of fitness bands. This study predicted that wearable fitness devices would be embedded in the healthy lifestyle as one of the eight megatrends through 2030 (Stiglbauer et al., 2019).

Perceived Coolness

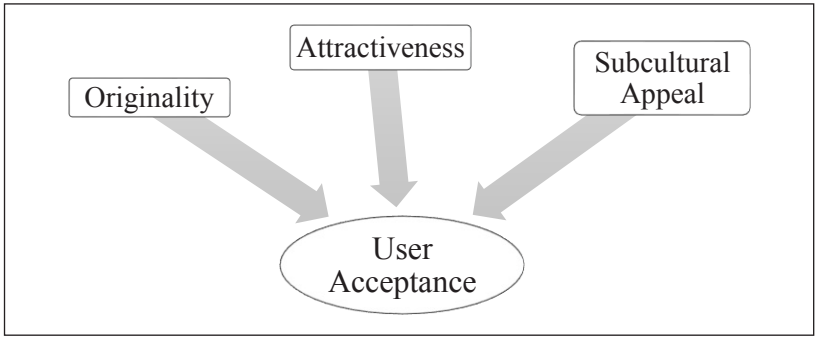
Previous studies discussed technology intervention and behavioural alteration numerously (Kim & Chiu, 2019; Pinder et al., 2018).

Nevertheless, research on the effect of coolness in driving health behaviour is still in the preliminary stage. With earlier qualitative research discovered that smoking could enhance the perception of coolness among adolescents, the trend suggested that health promotion should be strategised around smoking refusal and uptake based on personality and age (Plumridge, 2002). Sundar et al. (2014) proposed a socially constructed multidimensional consumer assessment composed of four factors, namely attractiveness, originality, subcultural appeal, and utility. Kim et al. (2015) investigated three of the factors and excluded utility from the assessment as the former were more inclined to increase technology acceptance by improving affection qualities.

Despite being empirically established, the predictive power of Kim et al.'s coolness model (2015) was refuted in recent literature by Ashfaq et al. (2020). Initially, Sundar et al. (2014) established the three coolness subcomponents as crucial determinants to appraise the holistic perceived coolness in user technology acceptance. Contrarily, Ashfaq et al. (2020) refined the model to be more parsimonious in being structurally analysed as a second-order construct.

Figure 1

The Coolness Model (Kim et al., 2015)



HYPOTHESIS DEVELOPMENT

In investigating health behaviour and utilising medical services, a psychological construct, such as coolness, could be systematically assessed to obtain practical insight into the extensively researched

nature of attitudes, diversities, and behaviours (Dar-Nimrod et al., 2012) and provide a deeper comprehension of user experience (Kim & Park, 2019). Besides technological functions and features, emotion as part of psychological determinants is one of the most influential human components in the HCI, which represents user response and feeling towards technological artefacts (Ahmad & Ali, 2018).

Although coolness concepts in health communication and health-related studies were not extensively discussed, a patient interviewed by a physiotherapist of Ekso Bionics exoskeleton in a neurological rehabilitation hospital expressed interest and remarked the technology as a 'cool technology' (Read et al., 2020). The utterance is parallel to the idea of incorporating fitness bands as a beneficial technology in health management and patient monitoring, with the coolness concept as one of the contributing factors to healthier behaviour through fitness band adoption. While the mainstream DOI research mostly focused on homophilous society and peer influence on innovation networks (Rong & Mei, 2013; Yu & Gibbs, 2018), this study encompassed users who regarded themselves as 'cooler than others,' specifically the heterophilic individuals, by referring to perceived coolness as the adoption factor. Therefore, the present study proposed the first hypothesis:

H_1: Perceived coolness positively affects fitness band adoption.

Fitness band adoption encourages the self-tracking practice, comparable to previous innovations in social media, which is beneficial to health, especially through the application of strategies for transforming behaviour (Lee & Lee, 2018). Fitness bands present expansive reach and interactivity, which enable convenient social networking by being wearable. The portability of a technological device would produce a positive effect on encouraging physical activity by supporting persistent cognitive activation of health goals through long-term activity patterns with social support as a motivator (Shin et al., 2018). Given the availability of innovative sensing and communication technologies of the Internet of Things (IoT), health management with real-time data tracking of wearable devices allows accurate decisions and innovative services (Achouri et al., 2018). In ubiquitous computing, employing accelerometers and gyroscopes for human activity recognition (HAR) in wearables is prevailing due to competitive cost, minimal installation complexities, compact size, and high availability (Mohamed et al., 2018). Exploring the coincidence

of encountering health information through innovative technology adoption is advantageous since the adoption could promote positive health behaviours, as manifested by studies on individuals with positive health behaviours who would constantly seek health information to continuously improve personal health (Jaafar et al., 2017). As such, this study proposed the second hypothesis:

H_2: Fitness band adoption positively affects health behaviour.

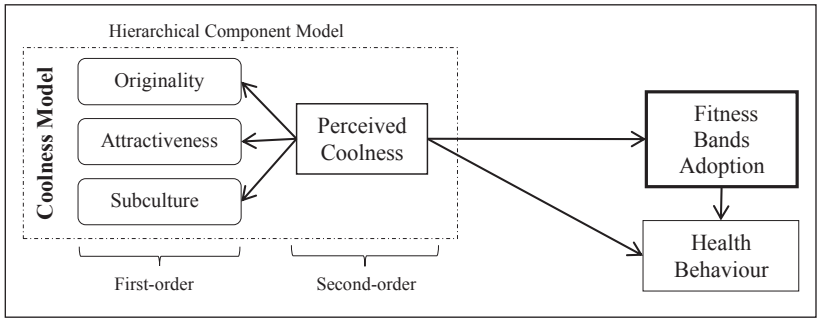
Perceived coolness as a cognitive heuristic or mental shortcut could propel a spontaneous decision where consumers seek trending products rather than utilitarian products to satisfy hedonic feelings, such as enjoyment, fun, and empathy, which is a vital criterion in evaluating technological values (Sagala & Sumiyana, 2020), especially among youngsters (Shin, 2017). Nevertheless, several reports revealed that the outcomes of e-health technologies were not necessarily favourable as the usage did not reflect the relevant results immediately (Pinder et al., 2018). The expected gains and practical consequences of health technologies are occasionally divergent. Therefore, this study aimed to contribute findings on the positive association of coolness factors in health-related technology, such as fitness bands with health behaviour. Studies on technology adoption mediating health improvement and behaviour demonstrated mixed results. A plethora of mobile health applications available in the app market are produced with minimal scientific methodology (Svendsen et al., 2020). Similarly, only limited studies on wearable tracker user acceptance and driving factors were available to address the post-adoption outcome on the adopters' health behaviour before validating the assertion of positive or significant technological effects. Furthermore, when the relationship between two variables was insignificant, statistical modelling scholars opted for mediating variables to grasp a discovered association by exploring the underlying process by which one variable influenced another variable through a mediator (Memon et al., 2018). In this study, fitness bands were considered to mediate the relationship between perceived coolness and health behaviour to determine the effect of perceived coolness on health behaviour. Delineating the behavioural alteration process could improve a fitness programme and encourage fitness band adoption, thus resulting in the following hypotheses:

H_{3a}: Perceived coolness positively affects health behaviour.

H_{3b}: Fitness bands adoption mediates the relationship between perceived coolness and health behaviour.

Figure 2

The Proposed Research Model



The research model proposed in the present study, as depicted in Figure 2, was based on the entire established theories and models discussed previously to elucidate the mediating effect of fitness band adoption in the relationship between perceived coolness and health behaviour of Malaysian fitness band users. This study adapted the coolness model measurement as a reflective second-order construct with the three subcomponents, namely attractiveness, originality, and subculture (Ashfaq et al., 2020; Kim et al., 2015) being the indicators in the hierarchical component model (HCM) for perceived coolness in a highly parsimonious model (Ashfaq et al., 2020). Meanwhile, device adoption appraisal was based on a study of Malaysian social media adoption (Zolkepli & Kamarulzaman, 2015) and the dependent variable, which was health behaviour, was based on a Malaysian study regarding the effect of health information-seeking behaviour on health behaviour (Jaafar et al., 2017). Therefore, the statistical model possessed one second-order construct, two first-order constructs, and a mediator.

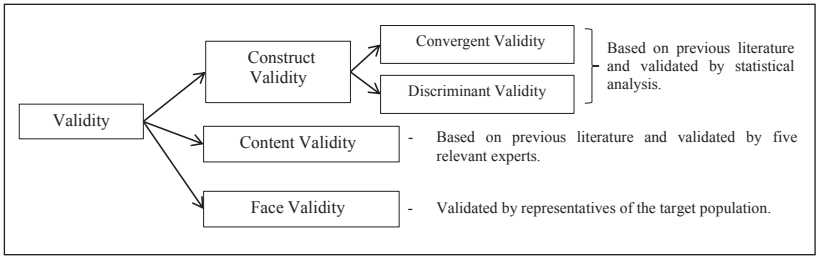
METHODOLOGY

The present cross-sectional study collected data through a survey of 280 Malaysian fitness band users. The general guideline for sampling size was based on several past studies where 200 responses were considered sufficient (Green, 1991). Meanwhile, two important validities, namely content and construct validity, were assessed to ensure that the questionnaire measurements included a sufficient and

illustrative set of items underpinning the study concept (Sekaran & Bougie, 2016). Face validity was also investigated, although the result was deemed superficial. Figure 3 illustrates the measurement validity. The questionnaire is appended in Appendix A.

Figure 3

Administered Validity Tests



Before collecting the data, a pilot study was conducted on 51 respondents (Johanson & Brooks, 2010), wherein the results demonstrated that the study protocol was feasible. The current study data collection was conducted by employing an online survey method, which was the Google Form. Sampling was executed based on the researchers' appropriate judgment by disseminating the survey link to fitness band users through social media and through snowballing by encouraging completed respondents to recruit potential respondents fulfilling the research criteria (a Malaysian and utilising a fitness band). Due to the low accessibility to determine the precise number of Malaysian fitness band adopters as the target demographic could not be accurately specified, the non-probability sampling technique was perceived as the most efficient when probability sampling was also not time and cost-effective. The sample demographics were also not restricted to a specific age, gender, or geography. Ultimately, purposive sampling was utilised since the method was the most effective for studying a particular cultural domain with knowledgeable users (Tongco, 2007). The demographic data are presented in Table 1. The measurement of each questionnaire section implemented an ordinal five-point Likert scale to increase response rate and quality while reducing respondents' frustration levels (Buttle, 1996). The ordinal scales measured the agreement and disagreement degrees. Subsequently, this study analysed the model via structural equation modelling (SEM) and partial least square (PLS) to examine the relationship

between independent and dependent variables on the SmartPLS 3 software. The model was also assessed concerning predictive validity, discriminant, and convergent validity. The rationale for utilising PLS path modelling was due to the technique being a preferred statistical tool to model strong concepts in latent variables of behavioural research (Henseler et al., 2015). The PLS also allowed the estimation of complex models with various constructs, indicator variables, and structural paths without imposing distributional assumptions on the data (Hair et al., 2019).

Table 1

Demographic Data and Analysis

		Frequency, *n*	**Percentage %**
Gender	Female	128	46
	Male	152	54
Age	18 – 25	34	12
	26 – 35	150	54
	36 – 45	80	29
	46 – 60	14	5
	61 and above	2	1
Education	Primary school	3	1
	Secondary school	15	5
	Diploma or equivalent degree	51	18
	Bachelor's degree	154	55
	Master's degree	46	16
	Doctorate's degree	11	4
Location	Urban	85	30
	Suburban	178	64
	Rural	17	6

DATA ANALYSIS AND RESULTS

Measurement Model

Figure 4

The PLS Algorithm Outputs

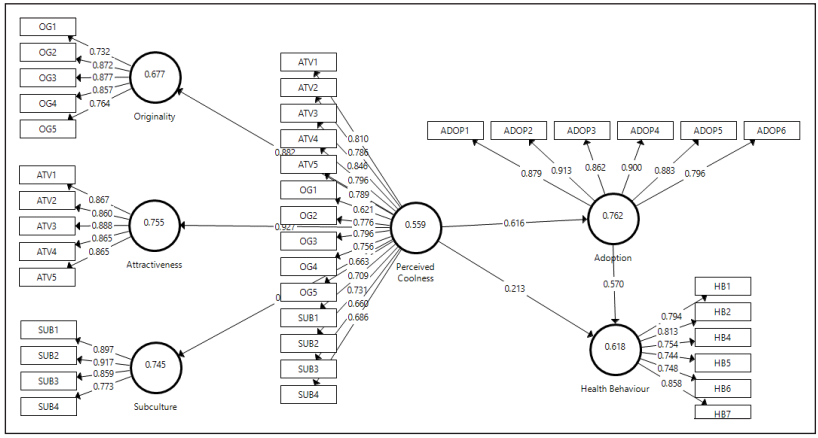


Figure 4 presents the statistical model where the outputs were based on the PLS algorithm, as displayed in Table 3. The perceived coolness construct is the higher-order component (HOC) or second-order construct measured by the lower-order components (LOC), namely originality, attractiveness, and subculture, with a reflective-reflective relationship type, in which the LOCs are reflectively measured and highly correlated but could be distinguished from each other. The construct is also recognised as a hierarchical common factor model as the second-order construct specifies the common factor of numerous particular factors (Becker et al., 2012). A repeated indicator approach was implemented to model the HCM, which would function effectively when the HOC was reflective (Lowry & Gaskin, 2014) and did not serve as a reflective-formative or formative-formative dependent construct (Sarstedt et al., 2019).

The structural model possesses direct paths among perceived coolness, adoption, and health behaviour. As illustrated in Figure 4, two direct paths were demonstrated from perceived coolness to adoption and health behaviour, with another direct path from adoption to health behaviour. In addition, to analyse the indirect effects of perceived

coolness on health behaviour, adoption served as the mediator in the relationship between perceived coolness and health behaviour. The PLS results are portrayed in Table 2, in which all constructs achieved satisfactory Average Variance Extracted (AVE) and Composite Reliability (CR) values with high reliability and validity. All construct loadings also exceeded the conventional threshold value of 0.70 (Hair et al., 2006) and the AVE values were above 0.50 (Fornell & Larcker, 1981), thus establishing discriminant validity when the AVE values of each pair of latent variables were higher than the squared correlation values (Fornell & Larcker, 1981).

Table 2

Findings of Factor Loadings, Cronbach's Alpha, (CR), (AVE), and (VIF)

Construct	Item	Loading	Cronbach's Alpha	CR	AVE	VIF
Adoption	ADOP1	0.879	0.937	0.950	0.762	3.776
	ADOP2	0.913				4.701
	ADOP3	0.862				2.948
	ADOP4	0.900				3.844
	ADOP5	0.883				3.380
	ADOP6	0.796				2.198
Originality	OG1	0.732	0.879	0.912	0.677	1.689
	OG2	0.872				2.848
	OG3	0.878				2.937
	OG4	0.857				2.940
	OG5	0.764				1.777
Attractiveness	ATV1	0.867	0.919	0.939	0.755	2.679
	ATV2	0.860				2.923
	ATV3	0.888				3.296
	ATV4	0.865				2.738
	ATV5	0.865				2.859
Subculture	SUB1	0.898	0.884	0.921	0.745	3.456
	SUB2	0.917				3.882
	SUB3	0.859				2.380
	SUB4	0.773				1.598
Perceived Coolness*	ATV1	0.810	*0.938*	*0.946*	*0.559*	3.018
	ATV2	0.785				3.086

(continued)

Construct	Item	Loading	Cronbach's Alpha	CR	AVE	VIF
	OG2	0.776				3.963
	OG3	0.795				2.885
	OG4	0.754				2.975
	OG5	0.660				1.820
	SUB1	0.711				3.212
	SUB2	0.733				2.937
	SUB3	0.662				2.940
	SUB4	0.687				1.924
Health behaviour	HB1	0.797	0.877	0.906	0.618	3.819
	HB2	0.813				4.015
	HB4	0.747				2.472
	HB5	0.737				1.918
	HB6	0.751				2.006
	HB7	0.862				2.241

Note. Italics are applied to higher-order construct values.

Table 3

The Heterotrait-Monotrait Criterion Results

	1	2	3	4	5	6
1. Adoption						
2. Attractiveness	0.589					
3. Health Behaviour	0.752	0.548				
4. Originality	0.641	0.817	0.633			
5. **Perceived Coolness***	*0.659*	-	*0.616*	-		
6. Subculture	0.535	0.722	0.463	0.619	-	

Note. Italics are applied to higher-order construct values.

The heterotrait-monotrait (HTMT) ratio of correlations method was employed to assess the discriminant validity through the multitrait-multimethod (MTMM) matrix owing to the current study being a self-report one (Henseler et al., 2015). Based on Table 3, the HTMT value was discovered to be under 0.90, hence excluding the perceived coolness (*) construct with relevant subcomponents due to the repeated indicator approach (Sarstedt et al., 2019). The finding established and supported the discriminant validity of the measurement model and the constructs. In addition, multicollinearity was evaluated using the variance inflation factor (VIF), as depicted in Table 3. The results

exhibited that the highest VIF value was 4.701 and under the threshold value of 5.0, therefore indicating no multicollinearity issues.

Based on the Pearson correlation matrix results in Table 4, all first-order constructs (attractiveness, originality, and subculture) possessed significant relationships with perceived coolness, with values exceeding 0.80, although the associations were not measured as per the developed hypotheses. As the first-order constructs are indicators in the HCM, the subcomponents were expected to be highly correlated with perceived coolness. The outer weights of perceived coolness were also assessed, in which the results revealed that all first-order constructs possessed significant relationships with perceived coolness (see Table 5).

Table 4

The Pearson Correlation Matrix of the Constructs

	1	2	3	4	5	6
1. Adoption						
2. Attractiveness	0.547**					
3. Health Behaviour	0.701**	0.503**				
4. Originality	0.576**	0.737**	0.555**			
5. Perceived Coolness	0.617**	**0.927**	0.564**	**0.882**		
6. Subculture	0.488**	0.651**	0.410**	0.549**	**0.808**	

** Correlation is significant at the 0.05 level (one-tailed).

Table 5

Outer Weights of Perceived Coolness

Second-order Construct	First-order Construct	Outer Weight	t-value	p-value
Perceived Coolness	Originality	0.882***	44.84	0.000
	Attractiveness	0.927***	97.56	0.000
	Subculture	0.808***	30.32	0.000

*** $p < 0.001$

Structural Model

The structural model was developed through the SmartPLS 3 software for hypothesis testing. A bootstrapping procedure with 2000

iterations was performed to determine the statistical significance of the subconstruct weights and path coefficients (Ramayah et al., 2018). The outputs are illustrated in Figure 5 and Table 6.

Figure 5

The PLS Bootstrapping Outputs

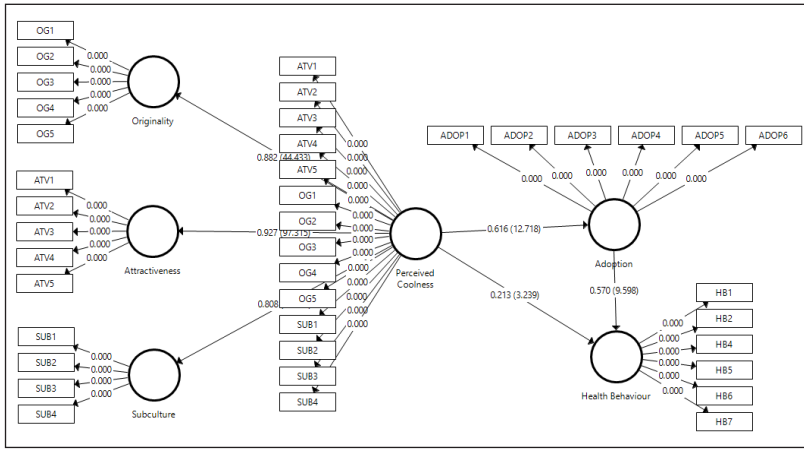


Table 6

Findings of the Direct Effects

No.	Path Analysis	Beta	SE	t-value	p-value	R^2	f^2	LCI	UCI	Q^2	Supported
H_1	Perceived Coolness -> Adoption	0.616	0.048	12.72	0.000	0.380	0.613	0.529	0.689	0.268	Yes
H_2	Adoption -> Health Behaviour	0.570	0.059	9.60	0.000		0.419	0.462	0.658		Yes
H_{3a}	Perceived Coolness -> Health Behaviour	0.213	0.066	3.24	0.001	0.521	0.059	0.109	0.324	0.288	Yes

Note. SE = Standard Error.

The hypothesised relationships proposed in this study were determined by the path analysis results. The statistical significance for individual path coefficients of the latent constructs estimated in the current

model was established as all t-values were demonstrated to be above 1.96 while p-values were below 0.05 in Tables 6 and 7, thus accepting all proposed hypotheses. Perceived coolness was discovered to significantly drive fitness brand adoption upon revealing the beta value of 0.616, t-value of 12.72, and p-value under 0.05. Fitness brand adoption was also discovered to significantly influence health behaviour, with a beta value of 0.570, a t-value of 9.60, and a p-value under 0.05.

R^2 is the percentage of the response variable variation, which a linear model explains. The current study result demonstrated that the R^2 values of the endogenous variables in the inner path model were substantial, with 0.380 (adoption) and 0.521 (health behaviour), respectively. Past scholars also recommended evaluating the size of the R^2 values of the entire endogenous variable and simultaneously calculating the effect size (f^2) (Ramayah et al., 2018). Based on Cohen's (1988) formula, the effect sizes of perceived coolness to adoption (0.613) and adoption to health behaviour (0.419) were significant, whereas the effect size of perceived coolness to health behaviour was small (0.059).

Mediation Effect

In determining the mediating role of fitness band adoption, the findings manifested a beta value of 0.351, a t-value of 7.25, and a p-value under 0.05, as presented in Table 7. Hence, the mediator was significant in the relationship between perceived coolness and health behaviour. Summarily, all current study hypotheses were supported by the findings discovered within the stipulated 0.05 confidence level for all modelling paths.

Table 7

The Mediation Result

No.	Path Analysis	Beta	SE	t-value	p-value	LCI	UCI	Supported
H_{3b}	Perceived Coolness -> Adoption -> Health Behaviour	0.351	0.048	7.25	0.000	0.273	0.434	Yes

Note. SE = Standard Error.

FINDINGS AND DISCUSSION

Perceived coolness from the HCI and health behaviour from health communication were revealed to correspond highly with the DOI theory. As such, all study hypotheses were supported, thus indicating a significant effect of perceived coolness on fitness band adoption ($\mathbf{H_1}$). Correspondingly, the subcomponents of coolness, namely attractiveness, originality, and subculture, were crucial determinants of perceived coolness, as suggested by previous scholars. As fitness bands were considered cool by attractive appearance, capable of creating distinctive subcultures, and an original concept, the adoption rate thus increased significantly.

This study's findings validated the positive impact of fitness band adoption on health behaviour, therefore supporting the second hypothesis ($\mathbf{H_2}$). The underlying rationale for formulating $\mathbf{H_2}$ was that a feasible set of health behaviour would shape and elevate an overall healthy lifestyle. Individuals with major chronic diseases would generally share unhealthy lifestyle characteristics or behaviours. After adopting beneficial health devices, the adopters were anticipated to commence practising self-tracking by utilising the fitness band functions. The R^2 value of fitness band adoption revealed that 38 per cent of the data fit the regression model, while approximately 52 per cent from health behaviour, hence postulating that health communications by innovative technological diffusion would generate significant benefits to users (Haggstrom et al., 2019).

The current study discovered coolness as a driving factor with the potential to be harnessed in promoting health awareness and optimal health practice, which supported the hypothesis ($\mathbf{H_{3a}}$). Self-expression and personality manifested by the coolness perception of the device would be a symbol of character and social identity (Dar-Nimrod et al., 2018). Similarly, the notion that nonconformity was considered as part of coolness where the characteristic primarily emerged in a niche group with nonconforming interests (Dar-Nimrod et al., 2012; Holtzblatt, 2011) would accurately describe heterophilous individuals as explicated in the DOI theory of adoption, therefore vindicating the incorporation of the DOI and perceived coolness in the current study. The significant relationship presented a potential for specific hedonic factors to be further deployed in coordinating health courses with wearable fitness technology. For instance, fitness bands could be

intensively publicised as a 'cool technology' to associate health with coolness.

Past studies scrutinised technology adoption as a mediator to improve health behaviour and demonstrated varied results (Svendsen et al., 2020). In this study, the present hypothesis ($\mathbf{H_{3b}}$) was supported by the findings, thus posting that fitness band adoption possessed a significant influence on health behaviour. The discovered mediating effect suggested that fitness band adoption could increase the health behaviour frequency when adopters perceive the technology to be cool. As such, the supported mediation hypothesis provided more solid evidence than the direct effect between perceived coolness and health behaviour, wherein a user motivated by the coolness of the fitness band would proactively adopt the device before practising various health behaviours. Highlighting the novel function of fitness bands, for example, the inactivity alert, could also expand the marketing strategies to reach larger markets comprised of technophiles and fashionistas who are generally early adopters (Nelson et al., 2019).

The realistic applicability of the findings would only be feasible when the majority of respondents are young adults, educated, and residing in suburbia, fitting the early adopters' typical socioeconomic profile (Rogers et al., 2019). Contrarily, the low utilisation of users with lower educational levels and rural living standards manifested the socioeconomic factors in posing digital divides (Dawood, 2019). Inadequate responses from mature users underscore the concern that digital divides between generations are increasing, which symbolises health disparities and hinders health information dissemination through health technology (Sullivan & Lachman, 2017). Accordingly, the third SDG should address the existing digital divide by improving health awareness and literacy through digital innovations, including fitness bands. The innovation would effectively and efficiently collect relevant data instrumental for health statistics (Haney, 2018).

With Malaysia being ranked fifth in Asia in terms of digital readiness (Bernama, 2018b), the findings highlighted a potential market for fitness band dissemination and a higher likelihood of establishing a healthier society. The current results could serve as a reference for other nations with similar digital readiness, such as Singapore and Brunei (Ingram, 2020) while the theory could be further appraised in Brunei and Thailand with similar obesity and health issues (ASEAN: Obesity Prevalence by Country, 2019).

When applying the current findings, the significant mediation result emphasised the importance of fitness band adoption to encourage health behaviour from the perception of coolness. The device features should be inculcated in all potential users, especially individuals in rural areas, to reduce the gaps present in the existing digital divide and accessibility to health communication. Although some features are regularly perceived as less accurate, the reference would be beneficial as guidelines that could motivate health behaviour. Summarily, the current study empirically contributed to the contemporary knowledge corpus by revealing the specific functions of wearable technology and relevant effects on public health, as concurrent with previous findings. Resultantly, the existing literature gap was successfully bridged.

CONCLUSION

The present study evaluated the coolness factor as a driver of health behavioural change to grasp the effects of the variable on fitness band adoption and health behaviour. The findings contributed to theoretical understanding across different disciplines, including human-computer interaction, health communication, and health behaviour. A key advantage of utilising an interdisciplinary approach to studying social problems is a deeper elucidation of issues through solid cognitive abilities and critical thinking. Methodically, incorporating adoption as a mediator of the relationship between perceived coolness and health behaviour established a positive path analysis that is feasible and interpretable through the PLS-SEM analysis. Simultaneously, employing perceived coolness as a second-order construct contributed to a more parsimonious research model. The managerial implications of the current study findings would assist marketers, developers, and health organisations in initiating health campaigns and programmes to resolve alarming health issues, especially physical inactivity or unhealthy sedentary lifestyle. Perceived coolness and health behaviour are interconnected where wearable technology adoption surpasses beyond usefulness and utilisation in the interconnection by providing the non-technical and psychological aspects in driving the technology diffusion, acceptance, and further usage.

Besides ensuring their devices are user-friendly, practical, and beneficial while focusing on the overall design and hedonistic aspects, developers can also collaborate with health organisations to market the devices with relevant health campaigns to promote fitness and a healthy lifestyle. Using internet superstars or influencers, they may

gain followers and thereby associate 'coolness' with being healthy and fit. Since contemporary wearable technology is projected as a fashion statement by the megatrend of healthy living, the notion that 'it is cool to be healthy' could persuade people to wear fitness bands and develop healthier habits even if they have no interest in exercising. The fitness band's effectiveness as a health communication tool necessitates device integration into health programmes to reach the population with fewer social and economic benefits who possess insufficient health knowledge and awareness. The necessity calls for a higher number of health campaigns on using fitness bands to advocate healthier behaviour while reducing sedentary lifestyles. The NCDs would be effectively lowered to create a healthier population while tackling the Malaysian national issue of being one of the fattest and most obese Asian countries.

Future studies should consider the current study's limitations. The data collected in the current study were based on self-reports without the presence and supervision of a physician to assess the adoption effectiveness. Future studies could perform pertinent supervision and experiment to determine the consistency of the findings. As this study was a Malaysian cross-sectional study, a longitudinal study in another country with a different setting and socioeconomic factors would generate divergent findings. With the rapidly growing wearable device market, past findings and a broader range of user groups should be evaluated and verified in other research contexts to ensure the generalisability of the findings and supportability of developed hypotheses. Nonetheless, the current study could be replicated across cultures, age groups, and individuals with varying educational and technical expertise levels.

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APPENDIX A

Questions
Perceived Coolness
Fitness band is original.
Fitness band is unique.
Fitness band is out of the ordinary.
Fitness band stands apart from similar products.
I find fitness bands as something different from previous technology.
Fitness band is stylish.
Fitness band is current.
Fitness band is on the cutting edge.
Fitness band is appealing.
Fitness band is attractive.
Fitness bands make people who use it different from other people.
People who use a fitness bands are unique.
People who use a fitness bands would be considered a trend setter rather than followers.
People like me use fitness bands.
Fitness Bands Adoption
Fitness band usage has benefited my life.
Fitness band usage has impacted my life.
Fitness band has substantially changed my life.
My fitness band usage is extensive; therefore I continue using it.
My fitness band usage is active therefore I am a frequent user of fitness bands.
I expect my fitness band usage to increase in the future.
Health Behaviour
I estimate my physical health to be improving after adopting fitness bands.
I start to walk a lot.
I often achieve the recommended 10000 steps per day.
My tendency to consume healthy food (e.g. vegetable and fruits) is higher.
My tendency to consume light food products (e.g. low fat or skimmed milk, low fat cheese, fish or lean meat) is higher.
I often push myself to the limit when I exercise (until I get breathless, my heartbeat gets faster and I sweat).
Fitness band has strongly affected my life in improving my health.