How does the amount of time spend on smartphones influence the physical wellbeing of consumers?

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ABSTRACT
The aim of this paper is to continue the view on how the amount of time spent on a smartphone can influence the wellbeing of a consumer. This will be done through literature, hypotheses and discussion. The impact of the smartphone can be linked to numerous variables. This research explores the time spent on smartphones and how that influences one's physical wellbeing. This is done by following the conceptual model and was conducted through a self-administered survey which resulted in 76 respondents. The research concluded that physical effects have a positive influence on one's physical wellbeing.

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Keywords

Screentime, physical wellbeing, psychological wellbeing, smartphone addiction, social support

1. INTRODUCTION

The number of smartphone subscriptions worldwide are growing and the expectancy is that the number will only increase (Statista, 2023) and the use of smartphones is very high among consumers. Right now people spend on average 6 hours and 58 minutes of screen time per day (Howarth, 2023). While it is recommended by countries, for example Canada, that screen time be limited to two hours per day for youth (Brodersen et al., 2023), people still spend long times on the devices (Crabtree et al., 2003). Since, according to the World Health Organisation (WHO) (Mental Health and Substance Use, 2012), physical health is one of the four domains to have a high quality of life. Research has been focused on either the negative or positive side of the use of screens and not both. The practical contribution will be that there is an overview of what screens do to a person and if consumers see these positive and negative sides of the smartphone it will hopefully help somewhat to make correct decisions regarding the use of the screen.
The overall question "does social media use impact a consumer wellbeing" has been more in the public than ever. We need to look at the different factors that play a role and can help answer the question. The amount of time consumers spent on their smartphones and what positive and negative impacts this has on the consumer.

Further you can read in the paper about the mental and physical effects screentime bring with them and "screentime" itself will be explained. This will be done in the six sections: physical wellbeing, smartphone addiction, psychological wellbeing, social support, physical effects and daily smartphone usage. The literature will be reviewed first including a conceptual model, then there will be a number of hypotheses. The research method is described and the outcome of the data will be presented with discussion. Finally there will be a conclusion.

2. LITERATURE REVIEW

In the literature review there will be a review of some of the existing materials and literature about the negative and positive influence the use of smartphones bring. In the past, especially about the effect during and after covid, there has been a lot of research about the influence.

The conceptual framework is based on the review of the literature. In the literature there will be discussions about the amount spent on screens, also known as screentime, the effects time spent on smartphones have on the mental state of consumers, the physical effects the time spent on smartphones has on consumers and the social support. Firstly this will all be discussed, after that the conceptual model developed will be presented, including discussions of the hypotheses.

2.1 Time spent on smartphone

Digital information and entertainment on screens (screentime) is a major part of contemporary life. (Stiglic & Viner, 2019). There is a constant rise over the last six years of smartphone owners. Smartphones provide easy, practical and non-restricted access to many online services. (Fekih-Romdhane et al., 2023) and consumers use mostly apps on the smartphone, especially social media. Kwon et al. (2013) writes about screentime and the time spent on your smartphone can have an impact, he makes the deviation between weekdays and weekends, since a typical week consists of being busy during the week and being free during the weekend. Duke et al. (2017) examines how smartphones changed the way we live our lives in a daily way. With remarking the positive sides of the internet and technology as well as the negative side and the consequences humans experience because of it. This article specifically focuses on the productivity smartphone use brings. Where this article focuses on the difference between work and free time spent on the smartphone says (the Atlantic) that all activities on a screen can be linked to being less happy and being off your screen can be linked to possible more happiness. But smartphones are considered the most used of these screens (Statcounter Global Stats, n.d., 2020), so in this research I will focus on smartphones specifically.

2.2 Smartphone addiction

Smartphones are in constant connection with the internet and all of its content. Social media, finding information, entertainment and social identity maintenance are just a few things you can do on smartphones. And now you cannot think of the world without smartphones in it. Some people become so attached to their smartphone that it will give anxiety if the phone is not in their pocket or within reach. And research about the smartphone and its effect on consumers has risen in the last few years. It differs per study if smartphones can even be addictive, but some claim one in five students deemed themselves as totally dependent on their smartphone (Project Innovation Austin, z.d.). The overall definition for addiction according to Goodman (1990) defines it as "whereby a problematic behaviour is characterised, failure to control and continuation even despite negative consequences". It depends on the research whether or not smartphones can be 'labelled' as addictive, but it is important to note that smartphones are indeed associated with a number of problems in research, mentally and physically. (Panova, 2018)

2.3 Mental effects of screentime on the consumer

Interaction via numerous social media platforms is one of the most popular daily activities on the internet. In some countries it is even considered a public health problem, the possibility of becoming addicted to the apps and interaction being the main problem. With FoMo, where individuals feel constantly distracted by their day-to-day life, because they are constantly to leave their phone in case they miss something on the numerous social media sites (Bakioğlu et al., 2022) Numerous effects are called out that the use of smartphones bring. Like negatively influencing emotional and social functioning. Depression and anxiety and it interfering with school, work and academic performance. (Daniyal, 2022) But smartphones do not only have a negative effect on its consumers . One study (Meltzer et al., 2023) showed learning via Duolingo, learning a second language, can be linked to improved executive function and delayed onset of dementia. So for educational purposes a smartphone can become quite handy to study language, reading and writing. Another study also showed beneficial sides to learning another language via apps or using it for other educational purposes (Meltzer et al., 2023). But using the screens of smartphones is not the only effect on the mental state. Especially with students the use of substances plays a role (Gilley et al., 2022) This study is not broad enough and has not enough background though to move deeper into the mental state of consumers, especially regarding anxiety and addiction. The mental impact it has on consumers goes further beyond described just here in this paper. But this paper will be focused on the other aspects as well. More research and papers have been done about the subject and will give more detail.

2.4 Social support through screentime Social

support refers to the psychological/material resources that people obtain from their social relationships (Cohen & Wills, 1985). Smartphones and the internet can provide connections between people from all over the world, you can easily reach out to family, friends or acquaintances using social media to keep up with each other's lives. Even though person-to-person smartphone use was associated with greater belonging and tangible support. The study also noted that problematic smartphone use (PSU) can also happen, again showing how addictive smartphones can be (Lapierre & Zhao, 2022). Social support and connecting face to face with individuals is an important factor for human beings (Chan et al., 2020). Without the connections people have a higher rate of potentially dying than individuals that smoke or are inactive (Holt-Lunstad et al., 2010).

2.5 Physical effects of screentime on the consumer

An accepted intervention for the promotion of mental health and wellbeing is physical activity. Research shows evidence that being physically active reduces symptoms of depression and anxiety. (Vella, 2023). Physical activity can be in numerous different settings or constructs. In groups or teams in formal or informal settings. There is continuing evidence supporting the negative effects of the use of smartphones on human physical health. A study showed significant association between the amount of time used on a smartphone and symptoms like neck and back pain, eye strain and weight gain. (Daniyal et al., 2022). On top of that: headaches, fatigue, concentration issues and troubles with memory. Sitting behind a desk all day or laying on the couch watching videos will put your body in a position and normally you do not move for a longer period of time, making your back and neck feel painful if you sit for a longer period of time. Looking at a screen for a longer amount of time makes your eyes strain. Especially looking at a bright screen from close by makes the eyes more tired (NU.nl, 2021).

Using a smartphone more frequently forces the user of the smartphone to change their body in a compromised posture. When consumers stay too long in these positions the postural and musculoskeletal systems change (Torkamani, 2023).

Physical inactivity are major risks for numerous diseases, type two diabetes, certain types of cancer and cardiovascular conditions. (Int. J. Environ. Res. Public Health 2020) The paper showed that mobile health applications (apps) had a positive effect on their physical activity. They can send reminders, keep track of how far you ran and have other things, depending on the app. But the study showed that it was not solely the app(s) that helped motivate and make sure the users were being more active. Diet and education were also factors that contributed to physical effectiveness. During covid times some health and fitness apps saw growth, as the pandemic meant people couldn't always attend gyms or conduct group exercise classes. (Wakefield, 2022). And with some people being too busy with their kids or work, they can more easily access the apps to exercise or diet and stay fit.

3. HYPOTHESIS FORMULATION

3.1 Conceptual model

This paper will investigate how time spent on smartphones affects the physical body of the consumer. Figure 1 is the conceptual model that it shows.

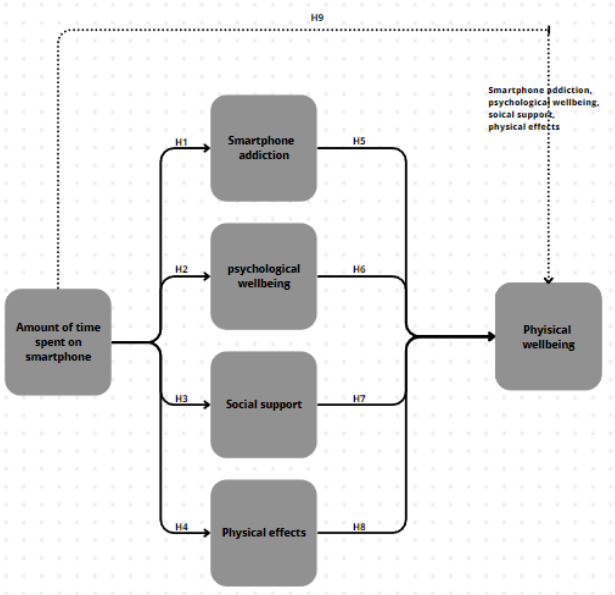

Figure 1: Conceptual model

3.2 Time spent on smartphone and smartphone addiction

Even though smartphones have brought a number of benefits to this day and age and most users of smartphones use them appropriately, there is a number of especially children and youth that may experience smartphone use that is problematic. There are a number of conceptualizations of problematic smartphone use, but it is shown to be multidimensional with a number of directions it can go in. Smartphone addiction is mostly looked at via the smartphone addiction scale (SAS). Several factors like daily life disturbance, withdrawal, overuse, tolerance and cyber spaced-oriented relationships have an influence on the SAS. Excessive smartphone use and negative influence in one's life influences the probability of addiction. (Hamamura et al., 2023). The number of people owning and using a smartphone has risen significantly over the past few years giving consumers access to the internet, social media, apps and other ways to interact with people from all over the world. While the relationship between technology and the use of a smartphone remains inconclusive and uncertain according to Fekih-Romdhane et al. (2023).

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H1: The amount of time spent on smartphones influences your smartphone addiction positively

3.3 Time spent on smartphone and the psychological effects of screentime

Excessive smartphone use can be related to negative outcomes and other consequences consumers can face when using their smartphones. Smartphone use can turn into emotional distress and dysfunction. And technologies have named more negative outcomes to the use of smartphones. Inattention and digital stress and all these factors together can make for mental health problems, depression, or less sleep quality. The challenge for researchers and consumers of smartphones lies in finding the balance of the negative and positive effects of the smartphone and the influence of its screen. You can state that there is a connection between the amount of time consumers spend on their smartphone screens and their psychological wellbeing (Larsen et al., 2022). In extreme cases excessive use of smartphones can even lead to depression, anxiety and stress (Fekih-Romdhane et al., 2023). Problematic smartphone use is the uncontrollable urge to use the smartphone, people suffering from this will not only suffer physically, but also psychologically. Lower self-esteem, higher chances in loneliness, performing worse academically just to name a few (Hao et al., 2023). There is not enough knowledge to go deeper into the psychological side of the subject.

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H2: The amount of time spent on smartphones excessively influences your psychological wellbeing positively

3.4 Time spent on smartphone and social support through screentime

Connecting with people from all over the world has become easier over the years, while becoming lonely has also risen. More people are living alone and channels to communicate like texting and using social media have made it easier to not encounter people in real life. Especially females are more likely to use their phones for texting and social media use (Pierce, 2009). Relying solely on connecting with people via channels on consumers smartphones cannot replace the relationships built and maintained when meeting others in real life. Meeting others online has its perks, anonymity being one of them. Meeting like-minded people is also easier to do online and people without relationships have a higher mortality rate than people that suffer from obesity, smokers or physically inactive people. But there are multiple ways to connect with people via the smartphone. Firstly there is the difference between maintaining relationships and building new ones. Messaging has been proven effective for maintaining relationships, while using WhatsApp did not have a direct effect on the positive influence of a consumers wellbeing, the after effect: the positive thought about the friendship did have a positive effect (Chan et al., 2020). Hao et al. (2023) refers to perceived social support as "the feeling of being supported by families and friends and it assists a person to improve their psychological wellness". People with a higher (perceived) support system are less likely to become dependent on the excessive use of one's smartphone. Seo et al. (2016) also concluded that too much time spent on a smartphone can have the effect of deterioration on personal relationships.

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H3: The amount of time spent on smartphones influences your social support positively

3.5 Time spent on smartphone and physical effects of screentime

"Daily-life disturbance" every day distractions that interfere with your daily life like light-headedness, blurred vision, pain of the wrists or at the back of the neck all are signs that you are spending your time too much on your phone. The more time consumers spend on their phones the more problems they can encounter with their physical wellbeing. Holding your phone in the same way frequently throughout the day forces consumers to adapt to a compromised posture. If this continues for too long of a time it will gradually result in a change of the postural system. Smartphones are used mostly while standing or seated. With the phone in one hand and the other hand is used for touching the screen. Most commonly you see people having their head held forward, also known as forward head posture (FHP), even though this is a bad posture to place your head and neck in. Neck and back pain and or disorders are mostly achieved by static posture and performing tasks repetitively. And being on your smartphone gives you a static posture. Reduced muscle flexibility and limited motion of the neck are also something frequent smartphone users can encounter. Eye strain was also one of the most commonly reported regions in which discomfort was named together with the neck and back, which was already commented about before, the fingers and wrist and shoulders (Torkamani et al., 2023). Excessive smartphone use has been reported to be connected to physical impairments. Even to the point of achieving problematic smartphone use (PSU), where the uncontrollable use of the smartphone causes possible shoulder discomfort and hand dysfunction. (Hao et al., 2023).

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H4: The amount of time spent on smartphones influences your physical effects negatively

3.6 Smartphone addiction and physical wellbeing

Excessive smartphone use and negative influence in one's life influences the probability of addiction. (Hamamura et al., 2023). While other research shows evidence that being physically active reduces symptoms of depression and anxiety. (Vella, 2023). Studies have shown that using your smartphone has positive effects on the supporting of mental and physical wellbeing of its consumers. But excessive use would have negative effects on the users of smartphones. Excessive use can be named addiction, with it getting more name as a psychosocial condition. This study claims to be a close connection between the use of a smartphone and social wellbeing. Excessive use can lead to feeling physically ill, exhausted and even obesity. (Muhammed et al., 2022). Other studies show there is even a connection for the relationship between the amount of time spent on a smartphone and the position of muscles, joints, posture and range of motion. All of them are negatively affected by the excessive use of the smartphone. (Torkamani et al., 2023) Since excessive and frequent smartphone use compels the user to take a compromised stance.

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H5: Smartphone addiction influences your physical wellbeing negatively

3.7 The effect of psychological wellbeing on physical wellbeing

There is a significant connection between physical and mental wellness (Ohrnberger et al., 2017). Not moving around and taking part in physical activity has a negative effect on the quality of one's life and mental health. But partaking in physical activity either, structured, recreational, planned or repetitive it all has the potential to have multiple health-improving benefits (Giandonato et al., 2021). People's decision making processes may be impacted by their mental health, which may limit their access to knowledge about their physical health, prevention and the quality of healthcare providers. On top of that one's mental health is associated with choices in their lifestyle like: smoking, physical activity, drinking alcohol and dieting, causing either a negative or positive effect on their physical and mental wellbeing. Besides smoking, physical activity has the main mediating factor according to Ohrnberger et al., (2017) on physical and mental wellbeing. And when individuals have a better mental and physical health, they are more likely to exercise.

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H6: psychological wellbeing influences your physical wellbeing positively.

3.8 The effect of social support on physical wellbeing

Social interaction is critical for your mental and physical wellbeing. Social isolation and loneliness were associated with physical and mental health. More isolation and loneliness showed a higher mortality risk, while simultaneously controlling the baseline for both physical and mental health. (Steptoe et al., 2012). There are general and more specific indicators of health. But there has been a long-noted association between social relationships and support and physical health. (Uchino et al., 2018). Social support can predict significant health outcomes. People sometimes assume that they can do nothing to improve relationships and the social support system, but individuals can take steps to improve their social support system. By improving one's social support system individuals can live happier and healthier lives. (Uchino et al., 2018).

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H7: social support influences your physical wellbeing positively.

3.9 The physical effects on physical wellbeing Incorrect posture can result in overuse pain. (Correia et al., 2023). Pain is one of the most common experiences reported by individuals that are reporting it to their doctor. Pain has many forms and causes. There is a difference between acute pain through for example an incident like an accident and non-acute pain. Pain has a different meaning to patient, doctor and physiologist (Świeboda et al., 2013). Recurring pain is one of the most common conditions and this can influence daily life and activities negatively. Pain restricts someone's life and lessens health-related quality of life. Especially people that experience recurring pain young increases the chance of someone having physical health problems later in life. (Sollerheid et al., 2013)

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H8: physical effects influence your physical wellbeing positively.

3.10 The amount of time spent on smartphone on physical wellbeing

Being physically active has been recognized for long that it is key to a healthy lifestyle. Continually engaging in recommended physical activity can be linked to several health benefits. One of the main factors linked to individuals not achieving the recommended 150 minutes of exercise a week has been the electronic media, one of which, the smartphone. When using a smartphone the intensity of exercise was lowered, however the study showed some benefits to the use of smartphones during exercise. The awareness spread when tracking your performances may positively influence the physical activity in individuals. There is still an area of concern, with underreporting the time spent on smartphones and overreporting the amount of physical activity. With researchers being afraid spending excessive time on a smartphone or other screen can lead to increased fat percentage, decreased fitness and low self-esteem (Penglee et al., 2019). Other research done by Brodersen et al. (2023) showed that there is well documented information that behaviours around screens have been strongly associated with poorer physical fitness and higher weight status among adults.

Based on the literature mentioned above, this analysis suggests the following hypotheses.

H9: The amount of time spent on smartphone influences the physical wellbeing negatively

4. METHODOLOGY

4.1.1 Population and sampling

To investigate the relevant topic, qualitative research was conducted. With the use of an online survey consisting of eight topics, consisting of a number of items. Snowball sampling and random sampling to collect the answers for the survey will be used. Snowball sampling is used to mean that other units recruit new units to, in this case, fill in the survey. Snowball sampling means that every participant can possibly send the survey to another participant (Nikolopoulou, 2022). Whereas random sampling means that every member of the population could possibly be selected and has an equal chance to get chosen to participate in the study. (Thomas, 2022)
For this quantitative study an online questionnaire was distributed. The purpose of the survey was to get information about the influence of the usage of smartphones on the physical wellbeing of consumers. There were a total of 76 respondents. Every one of those owns and uses a smartphone so they were eligible for the study. Ahmed (2019) explains how smartphone time impacts their day to day on a typical day. So taking into consideration the articles mentioned above is why I want to use the question from Ahmed (2019): "amount of time spent in a typical day using the smartphone" rewriting it to the question: "how much time do you spend on your smartphone on a typical day (in hours)?" The articles mentioned above mention times consumers spent on their phones combined with their research.

4.1.2 Survey instrument and measures The items used in this paper are drawn from literature of other published papers: Ahmed (2019), Ostic et al., (2021), Kwon et al. (2013), Correia et al. (2023), Stults-Kolehmainen et al. (2020). In the appendix it shows where the examined constructs come from this paper, their definitions and the original source of where the items where used. The survey was conducted in 8 parts. The first section included a few screening questions to make sure to exclude people without a smartphone. In the last section the participants were asked to provide some demographic information regarding their gender, age and level of education.

4.1.3 Data collection and analysis
The people taking the survey were asked to answer from the 5 point Likert scale (Shrestha, 2021) on the several items, where the options: strongly agree, agree, neutral, disagree and strongly disagree. The data was gathered via a link sent to numerous group chats on WhatsApp and a link via Instagram, asking to fill in the survey and to spread the link to others. The opening statement reminded everyone that they could withdraw from the survey at any moment and the anonymity and confidentiality of the survey was also reminded. statistical software (SPSS) was used to analyse the data. The data collection started in February 2024 and took around two weeks. Participants who did not fill in to own and use a smartphone were excluded from the data analysis. An exploratory factor analysis was performed (table 2), as well as a correlation (table 3) and regression analysis (table 4). The reliability was tested using Cronbach's Alpha (Table 2). The demographic information can be found in table 1.

5. RESULTS

5.1 Demographics

This paper collected data on the gender, age and educational background of the participants. From the 76 respondents, everyone correctly filled in the survey and came through the screening questions. 28.95% were male and 69.74% were female. And 1.32% selected non binary, other or rather not say. None of the participants that filled in were younger than 18 (0%), the majority of 64 (84.21%) filled in to be between the ages of 18 and 25, two people were between 36 and 45 (2.63%), two respondents were between 46 and 55 (2.63%), one respondent was between the ages of 56 and 65 (1.32%), one respondent was between the ages of 66 and 75 (1.32%) and no one was older than 75 (0%). Lastly the participants were asked about their level of education. The majority of the respondents were bachelor students at the university (44.74%) with 34 responses. One respondent had primary school (1.32%), eleven respondents filled in high school as their highest level of education (14.47%), eight respondents answered MBO (10.53%), nine respondents filled in HBO (11.84%) and ten respondents filled in a master at the university (13.16%), one PhD (1.32%) and one respondent who preferred not to say (1.32%). An overview of this survey can be found in table 1.

Variable	Value	Count	%
Gender	Male	22	28.95
	Female	53	69.74
	Non-binary	0	0
	Prefer not to say	1	1.32
Age	<18	0	0
	18-25	64	84.21
	26-35	6	7.89
	36-45	2	2.63
	46-55	2	2.63
	56-65	1	1.32
	66-75	1	1.32
	>75	0	0
Level of education	Primary school	1	1.32
	High school	11	14.47
	MBO	8	10.53
	HBO	9	11.84
	University bachelor	34	44.74
	University master	10	13.16
	PhD	1	1.32
	Other	1	1.32
	Prefer not to say	1	1.32

Table 1: *Demographic characteristics of the respondents*

5.2 Exploratory factor analysis and reliability analysis

Factor analysis is a set of methods explaining the correlations separated into more fundamental components called factors (Cudeck, 2000). This Exploratory factor analysis (EFA) was done to investigate the influence of items on the variables. To determine if survey items were stable enough to use for further use, the items were investigated. With a score of 0.3 and higher in the component matrix, the scores were strong enough to use further. The Kaiser-Meyer-Olkin (KMO) measure is a tool used to assess if data are appropriate for factor analysis. In other words, it evaluates if the sample size is adequate. The test evaluates the model's overall sampling efficiency as well as the sampling efficiency for each variable. KMO values vary from 0 to 1. If the value lies between 0.7 to 0.79 they are middling. Values between 0.6 and 0.69 are mediocre and values less than 0.6 indicate a not adequate sampling and corrective action should be taken. After the KMO the Cronbach's alpha needs to be checked for reliability, which should be higher than 0.7 to be acceptable and shows that the items used in the test are highly correlated (Shrestha, 2021). Most of the constructs showed Cronbach's alpha higher than 0.7, except the second construct, which scored a .658. This score falls in the category "adequate" according to Keith S. Taber (2018). The construct's validity would be considered as reliable. The scores of the Cronbach's alpha of all the constructs can be found in table 2.

5.3 Correlation analysis

correlation analysis is in the wide sense a measurement of the association between variables. Where zero means no correlation and towards 1 or minus 1 means getting stronger, either positively or negatively in direction with (minus) one being perfectly correlated (Schober et al., 2018). To measure the strength an outcome of more than 0.3 would give the

evidence of correlation (Shrestha, 2021). Smartphone addiction has a positive correlation with physical wellbeing (.377), psychological wellbeing has a positive correlation with psychological wellbeing (.346) and a negative relation with smartphone addiction (-.498). Social support has a positive relation with physical wellbeing (.342) and a positive relation with smartphone addiction (.361) and a strong positive relation with psychological wellbeing (.597). Physical effects has a positive strong relationship with physical wellbeing (.515), a slightly positive relation with smartphone addiction (.263), a positive relation with psychological wellbeing (.412) and lastly a small positive relation with social support (.276).

5.4 Hypotheses testing

Multiple regression analysis was used to examine the hypothesis (see table 4). Out of the nine hypotheses in this paper, only one was supported, H8: physical effects influences your physical wellbeing positively ($\beta = .425$, $p = <0.001$) with a significant coefficient and a statistically significant influence. Amount of time spent on a smartphone has a slight negative, but no significant influence on either smartphone addiction ($\beta = -.138$, $p =$ n.s.), slightly positive but no significant influence psychological wellbeing ($\beta = .037$, $p =$ n.s.), social support, which is slightly positive, but no significant influence ($\beta = .090$, $p =$ n.s.) or physical effects, which is slightly negative, but not significant ($\beta = -.053$, $p =$ n.s.). Which means hypotheses 1 through 4 are not supported. Smartphone addiction is slightly positive, but has no significant effect on physical wellbeing ($\beta = .013$, $p =$ n.s.). So hypothesis 5 is also not supported. Psychological wellbeing has a slightly negative, but no significant effect on physical wellbeing ($\beta = -.021$, $p =$ n.s.), so hypothesis 6 is not supported. Social support has a slight positive influence, but no significant effect on physical wellbeing ($\beta = .184$, $p =$ n.s.), so hypothesis 7 is not supported. Hypothesis 9 is the last hypothesis checked and this one is not supported, there is a small positive effect, but not significant ($\beta = .180$, $p =$ n.s.).

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Constructs	Items	Item Loadings	α	CR
Smartphone addiction	SA1	.732	.701	0.833
	SA2	.680		
	SA3	.737		
	SA4	.678		
	SA5	.703		
Mental wellbeing	MWB1	.440	.658	0.791
	MWB2	.802		
	MWB3	.656		
	MWB4	.707		
	MWB5	.498		
	MWB6	.601		
Social support	SOSU1	.613	.787	0.865
	SOSU2	.861		
	SOSU3	.868		
	SOSU4	.742		
	SOSU5	.642		
Physical effects	PHE1	.756	.775	0.846
	PHE2	.614		
	PHE3	.593		
	PHE4	.848		
	PHE5	.788		
Physical wellbeing	PW1	.800	.733	0.840
	PW2	.862		
	PW3	.503		
	PW4	.817		

Table 2: *Factor loadings*

Table 3: Descriptive Statistics and Pearson Correlation (n=)	M	SD	1	2	3	4	5	6
1. Phys_Well	14.3600	2.93460	-					
2. Smartph_Add	16.1184	3.45627	.377**	-				
3. Psych_Welb	24.5263	3.00876	.346**	-.498**	-			
4. Soci_Supp	20.1579	3.05091	.342**	.361**	.597**	-		
5. Phys_Eff	19.0667	3.84614	.515**	.263*	.412**	.276*	-	
6. Daily smartphone usage (hours)	4.55	2.211	-.031	-.138	.037	.090	-.053	-

Variable 1 through 5 are measured on a 5-point Likert scale, variable 6 is measured in hours.

** . Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

Table 3: *Descriptive Statistics and Pearson Correlation*

H#	Variable		Coefficient	t	p	Results
	Smartphone addiction					
H1		Amount of time spent on smartphone	-.138	-.1.170	.246	Not supported
	Psychological wellbeing					
H2		Amount of time spent on smartphone	.037	0.311	.757	Not supported
	Social support					
H3		Amount of time spent on smartphone	.090	.761	.449	Not supported
	Physical effects					
H4		Amount of time spent on smartphone	-.053	-.440	.661	Not supported
	Physical wellbeing					
H5		Smartphone addiction	.013	.1025	.919	Not supported
	Physical wellbeing					
H6		Psychological wellbeing	-.021	-.155	.878	Not supported
	Physical wellbeing					
H7		Social support	.184	1.503	.137	Not supported
	Physical wellbeing					
H8		Physical effects	.425	3.959	<0.001	Supported
	Physical wellbeing					
H9		Amount of time spent on smartphone	.180	1.569	.121	Not supported
	Physical wellbeing					

Table 4: *Multiple regression analysis*

6. DISCUSSION

The purpose of this paper was to explain and understand to what extent the amount of time consumers spend on their smartphones has on the physical wellbeing of the consumers. This was done by measuring: how much time consumers spent on their smartphones, smartphone addiction, psychological wellbeing, social support and physical effects and how this has an effect on physical wellbeing. After reviewing the literature mentioned earlier in this study about the amount of time consumers spent on their smartphones and the effect is has on the physical wellbeing of the consumer, getting hypotheses from theories, studies and literature and after taking into consideration the 76 valid respondents and the multiple tests that were done, eight hypotheses were not supported and one was supported.

Hypothesis 1: "The amount of time spent on smartphones influences your smartphone addiction positively" Contrary to expectations, the Multiple Regression Analysis revealed a slight negative relation. Researcher Hamamura et al., (2023) shows that excessive smartphone use influences the possibility of getting addicted. The amount of people that were investigated in the research of Hamamura was much higher than my research and the study was done among Japanese students, who were asked to fill in questionnaires three times at different times in the year. Which is why my results could differ from the outcome of that research.
Hypothesis 2: "The amount of time spent on smartphones excessively influences your psychological wellbeing positively" When consumers spend more time on their smartphone, it influences their psychological wellbeing in the negative sense. It has been related to negative outcomes and my regression showed a very slight correlation, but not being significant. This could be explained by how and when the smartphone is used excessively. There is a balance to be found between using it for positive things and negative things and how much the smartphone is used (Larsen et al., 2022). In my research less people could be considered for the excessive use of a smartphone and the participants were not asked on how they spent their time on their phone. Excessive use is hard to measure in hours, once it interferes with performance in school or work or turns into emotional distress it becomes excessive (Hao et al., 2023). Respondents to my survey showed to not feel as though they were excessive users of smartphones with the effect on their mental wellbeing. So even though my respondents were not extreme cases and did not feel that

they were excessively busy with their smartphone and mentally affected by their smartphone, other research (Fekih-Romdhane et al., 2023) showed that there are extreme cases where excessive smartphone use can lead to affecting one's mental wellbeing.

Hypothesis 3: "The amount of time spent on smartphones influences your social support positively". Research that has been done with the focus on the negative and positive outcomes of smartphone use concluded that overuse of smartphones can lead to deterioration of personal relationships (Seo et al., 2016). This study focused on the dependence of the smartphone and this is associated with time spent on smartphones, but not the same. My research showed a small positive relation, but it was not significant. Pierce (2009) also saw a gender difference for the dependence on the smartphone, females were more likely to use their phones for texting and social media than males, my study did not investigate a comparison, as a possible result differing conclusions. Chan et al., (2020) focused mostly on chatting with others and that effect on social support, where my research focused more in general on the time consumers spent on their smartphones, there were no questions asked to specify on what platform the time was spent on the smartphone, resulting in a more general and thus possibly resulting in different outcomes.

Hypothesis 4: "The amount of time spent on smartphones influences your physical effects negatively." Although the hypothesis is not supported and has no significance, there is a small negative association between the two. The majority of the respondents did not experience any physical effects the smartphone has on their daily life. Torkamani et al., (2023) claimed that with excessive use of the smartphone the likelihood of having physical effects like: eye strain, neck and back pain and blurred vision could show. Having little respondents that feel like their smartphone impacts this and seeing that less people respond with excessive smartphone use could explain why there is such little correlation.

Hypothesis 5: "Smartphone addiction influences your physical wellbeing negatively." The hypothesis was not supported, but it showed a slim negative impact. When consumers spend their time being active with physical activity the benefits to their health are not to argue with according to Darren E.R. Warburton et al., (2016) with not being physically active being the fourth leading risk factor in mortality rate. When you are playing sport you cannot be active on the smartphone and vice versa. When there is excessive time spent on a smartphone, there is not enough time left to be active in a day. The results of the survey could be influenced by the fact that the majority of respondents were not excessive users and thus would be less likely to score as 'addictive'. Thus possibly resulting in a lower outcome in the multiple regression.

Hypothesis 6: "psychological wellbeing influences your physical wellbeing positively." The hypothesis was not supported and was not significant. Most conceptual models identify behavioural, physiological and psychological processes as basic pathways for being supporting qualities in affecting physical health (Gruenwald et al., 2010). Since psychological wellbeing is hard to measure in 'just' one study and it goes far more further than 'just' six questions in a survey, plus the writer is not an expert in the field, the results can be less well interpreted, which could explain the difference in results.

Hypothesis 7: social support influences your physical wellbeing positively. There was a small positive impact, which is consistent with the findings of Gruenewald et al., (2010). They claim that there is a long recognized risk factor for poor physical health outcomes when there is a lack of social ties. Research by Swann et al., (2018) found out that feeling supported by friends and family to be active and stay fit is what is an important factor on the wellbeing. There was a slight positive correlation, but it was not significant enough. Which could be explained by the fact that the respondents were asked more about their online friends and relationships than their 'real-life' friendships.

Hypothesis 8: "physical effects influence your physical wellbeing positively". The regression analysis concluded that there is a significant impact of physical effects on the physical wellbeing, thus hypothesis eight is supported. This is consistent with the conclusion of Correia. (2023). When there is excessive use of a smartphone, more physical effects can be measured. So when there is less smartphone use there can be less signs of physical effects. The study of Correia (2023) focused more on the excessive use of the smartphone and the effects. Which is why the results could possibly differ.

Hypothesis 9: "The amount of time spent on a smartphone influences physical wellbeing negatively". There is a small relation found between the time of smartphone use and its influence on physical activity, but not enough significance. The positive relation is consistent with the research done by Penglee et al. (2019) and Brodersen et al. (2023). Where physical wellbeing in combination with smartphone use remains an area of concern. The research also talked about the positive effects a smartphone can have on the physical wellbeing of consumers, hence the discrepancies in findings may be explained further by the differences in the context.

6.1 Future research

The fact that smartphone usage is expected to rise even more over the next few years (Statista, 2023), makes it interesting to research the subject further. Especially the positive results could be explored more in research, since the overall consensus lies in the negative impact screens have on one's wellbeing. More research can be done about how you spend your time on the smartphone and when exactly the impact gets negatively in more different types of situations. A bigger sample size could have been a better indicator for the variables and the impact it had on one another. Since most of the hypotheses were rejected, investigating the influence for both groups (one with excessive smartphone use and one without) separately could be interesting.

6.2 Limitations

Even though this study gives insights into the effect smartphone usage has on consumers' wellbeing, there are some limitations that could be named. The first one is that there was no distinction asked between using your phone for passive and active use, so "work or play" is almost, time you 'have' to spend on your phone versus the amount of time you are scrolling through social media. This inclusion would give a better insight in how your smartphone use could impact your physical wellbeing. The demographic group was also very specific to mostly university students, which contained more than half of the respondents. There were more female respondents than male respondents, however this study was not focused on the difference between male and female, there is conflicting evidence on gender differences. Lastly, individuals tend to overreport their physical wellbeing and underreport their use of smartphones (Penglee, 2019).

7. CONCLUSION

Research could argue that there is more to the impact of the smartphones on physical wellbeing than "just" how much hours of time consumers spent on their phone, how and why they interact with their smartphones is a very interesting question that should be investigated more to provide a bigger perspective in the upcoming rise for smartphone use. Literature gives consistent response to the fact that when a smartphone is used excessively it can lead to negative impact. Smartphone addiction (Muhammed et al., 2022) or mental health problems (Larsen et al., 2022) to name two. The respondents in this study leaned towards "normal" smartphone usage in hours and less to excessive use, which is why we can make sense with literature that they did not experience higher amounts of physical effects/mental/addiction etc. In an attempt to investigate the research question:

"How does the amount of time spent on smartphones influence the physical wellbeing of consumers?"

The amount of time spent on your smartphone affects consumers that use their smartphone excessively more than those who use their smartphone less. The hypotheses investigated showed there was positive influence on the physical effects of one's physical wellbeing.

8. ACADEMIC RELEVANCE

This study aims to contribute to empirical research about the topic and the relations named in literature. It will help understand the influence the smartphone has on consumers even more with a focus on physical wellbeing. Measuring the time spent on the smartphone, smartphone addiction, mental wellbeing, social support, physical effects and physical wellbeing with the use of a conceptual model. This could be applied to other research and to build further on the impact smartphones have on the consumers.

9. PRACTICAL RELEVANCE

Nowadays people are spending more time on their smartphones than ever before. This bachelor thesis paper explores the academic relevance of studying the impact of screen time on physical wellbeing. This research addresses health concerns, policy-making and helps individuals make more informed choices. Investigating the impact of the time spent on smartphone screens on physical wellbeing can be helpful in informing people. It might help people make more healthy choices in this day and age in which smartphones are more used than ever.

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APPENDIX

Appendix 1: Survey

Dear participant,

I am a third-year International Business Administration student at the University of Twente. I want to thank you in advance for filling in the survey for my bachelor thesis. The survey will contain questions about the effect of the time spent on smartphones on the physical wellbeing. All the responses will be kept anonymous. This survey consists of eight components and should take approximately five minutes to complete. Please read the questions carefully and answer to the best of your abilities.

Please read each question carefully and choose the option that best describes your situation.

Screening questions

SC1: Do you use a smartphone	Yes / No
SC2: Do you own a smartphone	Yes / No

Time spent on smartphone – Ahmed (2019)

TSS1: My smartphone usage on a typical day is (in hours):

<1 hour / 1-2 hours / 2-3 hours / 3-4 hours / 4-5 hours / 5-6 hours / 6-7 hours / 7-8 hours / >8 hours

	Strongly agree	Agree	Neutral	Disagree	Strongly agree
Smartphone addiction – Ostic et al. (2021)	1	2	3	4	5
SA1: I am always preoccupied with my mobile phone	1	2	3	4	5
SA2: I cannot stay even for a moment without my mobile phone	1	2	3	4	5
SA3: I am no able to control myself from frequent use of mobile phone	1	2	3	4	5
SA4: I am always preparing my charging pack to make sure my smartphone is charged all the time	1	2	3	4	5
SA5: I am always thinking that I should shorten my smartphone use time	1	2	3	4	5
SA6: The people around me tell that I use my smartphone too much					

Mental wellbeing – Kwon et al. (2013)

MWB1: I feel tired and lacking adequate sleep due to excessive smartphone use	1	2	3	4	5
MWB2: there is nothing other than smartphone use that is fun to do in life	1	2	3	4	5
MWB3: my life would be empty without my smartphone	1	2	3	4	5
MWB4: smartphone use is the most fun thing to do	1	2	3	4	5
MWB5: being stressed out when I am not in a hot zone (an area with WiFi)	1	2	3	4	5
MWB6: feeling bored while doing other stuff without my smartphone	1	2	3	4	5

Social support – Kwon et al. (2013)

SOSU1: I feel great meeting people more via smartphone use	1	2	3	4	5
SOSU2: feeling that my relationships with my smartphone buddies are more intimate than my relationships with my real-life friends	1	2	3	4	5
SOSU3: feeling that my smartphone friends understand me better than my real life friends	1	2	3	4	5
SOSU4: my life would be empty without my smartphone	1	2	3	4	5
SOSU5: constantly checking my smartphone so as not to miss conversations between other people on social media like Twitter or Face	1	2	3	4	5
SOSU6: not being able to use my smartphone would be as painful as losing a friend	1	2	3	4	5

Physical effects – F. de Jesus Correia et al. (2023)

PHE1: I experience neck pain	1	2	3	4	5
PHE2: I experience pain in my upper limbs	1	2	3	4	5
PHE3: I feel pain in the wrists while using a smartphone	1	2	3	4	5
PHE4: I feel pain at the back of the neck while using a smartphone	1	2	3	4	5
PHE5: I feel light headedness or blurred vision due to excessive smartphone use	1	2	3	4	5

Physical wellbeing – Stults-Kolehmainen et al. (2020)

PW1: I feel "dead tired"	1	2	3	4	5
PW2: I feel confused/disoriented	1	2	3	4	5
PW3: I feel highly energized, "must move"	1	2	3	4	5

Demographics

ID1: What is your age?
<18 / 18-25 / 26-35 / 36-45 / 46-55 / 56-65 / 66-75 / >75

ID2: What is your highest level of education?
Primary school / high school / MBO / HBO / University Bachelor / University Master / PhD / Other / Prefer not to say

ID3: What is your gender?
Male / Female / non-binary or third gender / prefer not to say

This is the end of the questionnaire.
Feel free to leave any remarks or comments
If you have any further questions or remarks about the survey you can send me an email at g.j.ax@student.utwente.nl

Thank you for participating!
Sincerely,
Geraldine