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## **Better understand the relationship between self-EXPansion and self-EXTension: an application to connected health**

Abstract: This research uses the theoretical frameworks of self-EXPansion and self-EXTension to shed light on the relationship between individuals and health monitoring devices (use to control physical activity and/or diet). The results of an online survey conducted with 227 individuals that possess a smartwatch show that the agentic and communal buying motivations have a positive effect on self-EXTension with the smartwatch and that this relationship is mediated by self-EXPansion only for the agentic buying motivations. This research contributes to enrich the theoretical fields of extended-self, connected health and the literature on self-EXPansion and self-EXTension strategies. Managerial implications are also proposed based on the results obtained.

Keywords: communal buying motivations, agentic buying motivations, self-EXTension, self-EXPansion, possession, extended-self, health, tracking device, smartwatch.

On September 15, 2020, Apple introduced its new Apple Watch Series 6. This connected watch offers advanced functions such as measuring the oxygen level in the blood or performing electrocardiograms. It also allows to monitor sleep and physical activities like most wearable tracking devices. In the field of health and fitness, this type of wearable devices is very popular among consumers: this industry was valued at \$18 billion in 2016, rising to \$30 billion in 2019 and is expected to reach \$91 billion by 2027 (FBI, 2020).

In general, health monitoring devices can be used to quantify physical activity (such as the number of steps taken or the distance covered), calories burned and consumed, and heart rate (Wu et al., 2016). They are thus considered a motivational tool for improving health (Lewis et al., 2020). However, for the health benefits of these devices to be real and lasting, it is necessary that consumers who have purchased these devices use them over the long term. Research shows that more than a third of users abandon these devices on average only after 6 months of use (Lazar, 2015; Ledger, 2014; Clawson et al., 2015). In order to decrease the abandonment rates and to understand the adoption of a health monitoring device, we wanted to know by what process(es) consumers establish relationships with these objects. As Schweitzer et al. point out (2019 p. 693), "the question of whether consumers establish real relationships with such devices is currently subject to speculation".

To explain the relationship that a human being can have with connected objects, Hoffman and Novak (2018; 2019) propose to look at the EXPansion (Aron and Aron, 1986, 1996, 1997) and the EXTension (Belk, 1988) of the self. These are two self-broadening strategies used by individuals in daily life that affect attachment to their possessions. Self-EXPansion involves the inclusion of other people's resources in the self, with the goal of improving self-efficacy. Self-EXTension consists of projecting and extending our identity onto external entities (objects, possessions), which are then considered part of our identity. However, it turns out that certain factors can play on this "Human-object" relationship. This is the case, for example, of the agency and the communion of individuals (Hoffman and Novak, 2019). An agentic person tends to be solitary and goal-oriented, whereas a communal person is more sociable and warm-hearted. Hoffman and Novak (2019) suggest that agentic characteristics will develop a more positive experience of self-EXTension while communal characteristics will induce a more positive experience of self-EXPansion, again within the context of an individual's relationship with connected objects. If agency or communion define personality traits, each individual, depending on the situation, may have either agentic or communal buying motivations. These buying motivations have been considered in this research because of their effect on consumption behaviors.

Based on the elements cited above, we empirically study the relationship between the purchasing motivations of individuals of a connected watch (agentic or communal motivations), EXPansion and EXTension of the self in the relationship with a physical activity and/or diet monitoring device. These relationships, never tested before, are examined through a quantitative study conducted with Qualtrics in September 2020 on an online panel (Mturk) of 227 English-speaking individuals.

### ***Literature review and hypothesis models***

*Self-EXPansion.* The Self-EXPansion model (Aron and Aron, 1986; Aron, Lewandowski, Mashek, and Aron, 2013) was developed to answer theoretical and practical questions about the basic mechanisms that govern experiences and behaviors in the context of close interpersonal relationships. It examines how humans form social bonds with others and absorb their resources, even going so far as to treat the goods of others as if they were their own by integrating them into the self (Aron et al., 1992; Appendix 1). This model has been used in various research contexts, including romantic relationships (Aron et al., 1986; 1996; 1997; Carpenter and Spottswood, 2013), intergroup relationships (Mao et al., 2019; Dys Steenbergen et al., 2016) and consumer-brand relationships (Reimann and Aron, 2009; Kerviler and Rodriguez, 2019; Huang and Mitchell, 2014). More recently, research on the relationship between humans and objects (especially connected objects) have highlighted that self-EXPansion also takes place with everyday intelligent devices. For example, Hoffner and al. (2016) indicate that people who have had self-EXPansion with their smartphone have greater difficulty detaching from it. In various conceptual works, Hoffmann and Novak (2018; 2019) question the relationship of individuals with their connected objects. For these authors, the EXPansion of the self exists when the consumers treat the emerging capacities of the assembly of connected objects as if they were their own. Thus, the individuals

have more capabilities by being part of the assembly. However, self-EXPansion is a phenomenon that gradually diminishes with time and repeated interaction. For example, in their research on the consumer-brand relationship, Reimann and Aron (2009) argue that the degree of self-EXPansion, and thus the positive effect and value associated with the brand, decreases over time with brands that have been purchased, owned, and used repeatedly.

*Self-EXTension.* In 1988, Belk established for the first time a link between self-EXTension and possessions, introducing the notion of self-EXTension to consumer behavior. Consumers integrate certain products into their lives, personalize or individualize them, and so are attached to them. Belk (1988) explains how individuals consider certain relatives, as well as certain material and immaterial goods as an integral part of the self. Belk (1988) indicates that "consciously or unconsciously, intentionally or unintentionally, we consider our possessions as parts of ourselves" (p.139). Thus, individuals catalyze and extend their identity on these possessions to develop beyond the physical limits of the self (Belk, 2013; Appendix 1). Marketing research has for a long time explored the contexts of application of self-EXTension to possessions, focusing in particular on the influence it has on the individual's attachment to objects (Diesendruck and Perez, 2015; Kiesler and Kiesler, 2005; Jyrinki and Leipämaa-Leskinen, 2005). Later, some research explored self-EXTension in a digital world. Cushing (2011) shows empirically in her work the EXTension and attachment of individuals on different digital possessions (pictures, emails and others). In 2013, in a conceptual paper, Belk talks about the self-EXTension of individuals in a digital world and explains that the self is now extended to avatars with whom the individual strongly identifies, which affects offline behavior. In a similar context, Schweitzer et al. (2019) studied the relationship of users with voice-controlled smart devices. Their results show a phenomenon of EXTension of the self with the object that translates into new expressive abilities and greater interaction with the world around individuals.

*Agency and communion.* Bakan (1966) introduced the terms agency and communion to describe "two fundamental modalities in the existence of living forms, agency for the existence of an organism as an individual, and communion for the participation of the individual in a larger organism of which the individual is a part" (Bakan, 1966, 14-15). Agency is about moving forward. Being agentic is being competent, independent, competitive, ambitious, in control and in search of power. Communion lies in good understanding. Being communal is being warm, honest, compassionate, pleasant and generous (Bakan, 1966). Agency and communion serve their respective adaptive functions by benefiting oneself and others respectively (Abele and Wojciszke, 2007; Cislak and Wojciszke, 2008). These two concepts reflect personal and social motives that may conflict, cooperate or simply coexist, depending on the context or the person. The concepts of agency and communion can be applied to consumers' buying motivations: an individual may buy a product that responds to agentic (e.g., to feel autonomous and confident) or communal motives (e.g., to feel close and connected to others). In this logic, Han et al. (2010) have shown that consumers can use luxury brands authentically to distinguish themselves from others, which corresponds to Bakan's sense of an agentic purchasing motivation.

Based on the theoretical elements mentioned above, this research explores the relation between self-EXPansion and self-EXTension for individuals who possess a connected health device (here, a smartwatch). These devices have the particularity of having both a physical (the watch) and digital existence (the recording and visualization of results). Based on elements from the literature, we propose that agentic buying motivations, (i.e. those oriented towards control and competence) and communal buying motivations (oriented towards harmony and connection with others), lead to an EXTension of the self on the smartwatch. In other words, individuals extend their identity on the smartwatch to develop beyond their physical limits (Belk, 2013). We also propose an effect of agentic purchasing motivations on EXPansion of the self with the device, in a logic of development of the skills necessary to achieve the individuals' goals (Hoffmann and Novak, 2018; 2019). This EXPansion of the self, here with the watch (the absorption and inclusion in the self of the watch's resources), would create the conditions necessary to promote self-EXTension (Belk, 1988). More formally, we propose that:

Agentic **(H1)** and communal **(H2)** buying motivations generate an EXTension of the self on the connected watch. The effect of the agentic buying motivations on self-EXTension is mediated by self-EXPansion **(H3)**.

## Research Methodology

We have empirically and simultaneously tested the effect of agentic and communal buying motivations on self-EXPansion and self-EXTension while controlling the personality (agentic vs. communal) of the individual.

*Participants and procedure.* In order to test the proposed hypotheses, an online study was administered to a sample of Mturkers with a connected watch (227 usable responses). The average age of the sample is 35.71 years (SD = 9.31; range = 19-70 years) and is composed of 62.6% males and 37.4% females. The variables in the hypothesis model were measured using measurement scales from the literature (Appendix 2). Preliminary analyses indicate that all variables have good psychometric qualities.

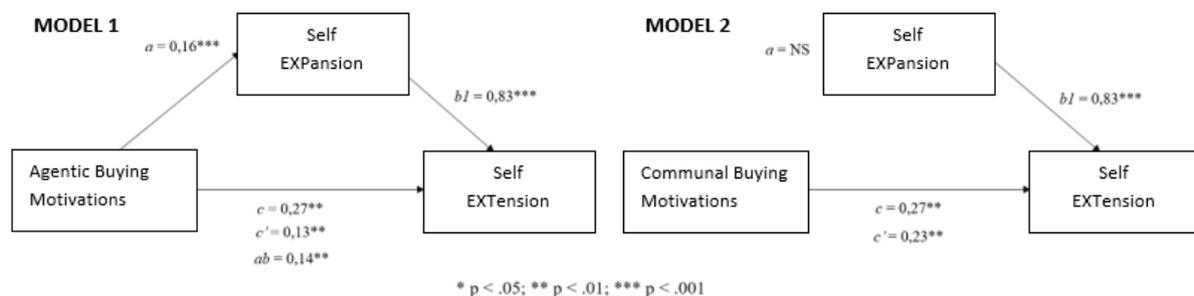
*Tests of mediation models.* The data were analyzed using model 4 of the macro V3 by Preacher and Hayes (2018) with 5000 bootstraps. In order to test the hypotheses, we analyzed two models (named here models 1 and 2; see Figure 1): model 1 tests the effect of agentic buying motivations while controlling for communal motivations as well as communal and agentic traits, and model 2 tests the effect of communal buying motivations and controls for agentic motivations as well as communal and agentic traits. The use of two test models is justified because, to our knowledge, there is no measuring instrument that allows us to position the purchasing motivations (agentic vs. communal) on a continuum. We therefore administered the two measurement scales (agentic and communal motivations) to each individual. The individual's personality trait (agentic vs. communal) was also included as a control in order to specifically study the effect of purchasing motivation.

## Results

*Model 1: The Effect of Agentic Purchasing Motivations.* The results show a significant and positive effect of agentic buying motivations on self-EXPansion ( $a = 0.16$ ;  $p < .000$ ). On the other hand, self-EXPansion has a positive influence on self-EXTension ( $b = 0.83$ ;  $p < .000$ ). Agentic purchase motivations have a positive total effect ( $c = 0.27$ ;  $p < .01$ ), a positive direct effect ( $c' = 0.13$ ;  $p < .01$ ), and a positive indirect effect on self-EXTension through self-EXPansion ( $ab = 0.14$ ; CI [0.04 - 0.25]). **H1 and H3 are validated.**

*Model 2: The effect of communal purchasing motivations.* The results show that communal purchasing motivations have no effect on self-EXPansion ( $a = 0.05$ ; NS). Communal purchasing motivations have a positive total effect ( $c = 0.27$ ;  $p < .01$ ) as well as a direct effect on self-EXTension ( $c' = 0.23$ ;  $p < 0.001$ ). On the other hand, self-EXPansion is not a mediator of this relationship. **H2 is validated.**

**Figure 1: Results**



## Conclusion

The main objective of this research was to explore the relationship between EXPansion and EXTension of the self when a connected health monitoring device (connected watch) is used, considering the role of the purchasing motivations (agentic and communal) of this object. The results of our research indicate

that the purchase of a connected watch resulting from agentic or communal motivations has a positive effect on self-EXTension. Individuals extend their identity over their possession. However, in the case of agentic buying motivations, we observe a sequential process involving first the inclusion of this possession in the self (self-EXPansion) and then extending one's identity on one's possession (self-EXTension). This sequence via the EXPansion of the self is not observed in the case of communal buying motivation.

It was important to understand, for the first time, this relationship between self-EXTension and self-EXPansion because they are two distinct strategies of self-enlargement (Connell and Schau, 2013) through which individuals can develop a relationship with their possessions and in this case, a health monitoring device. Agency refers to goal orientation (Bakan, 1966). Thus, an agentic-motivated purchase implies that the individual will seek to use his or her possession to achieve goals. It is therefore clear that this type of motivation will engender an EXPansion of the self, the primary principle of which is the basic motivation to increase self-efficacy (Aron and Aron, 1986). Individuals that absorbed and included the resources and perspectives of their monitoring device, such as information relating to their physical activity and diet, will subsequently consider them as part of their extended self in the form of immaterial possessions. As Belk (1988) points out in his fundamental article: "*the main categories that are part of our extended-self are: our body, our internal processes, our ideas and our experiences*". Thus, we can say that the resources and information included in the users' self become part of their extended-self. The users then extend their identity onto the connected watch which is the material and physical source through which they have acquired his immaterial possessions. The communal buyers, for their part, having no interest to increase their personal efficiency will not seek to achieve an EXPansion of the self with their device. One of the theoretical contributions of this research also consists in differentiating between the communal and agentic motivations.

The results of this study also have several managerial implications for marketers and manufacturers of this type of device. For example, when promoting health monitoring devices, managers can direct their advertisements depending on their objectives and targets. As mentioned in the theoretical framework, self-EXPansion is a process that decreases with time and frequency of brand interaction (Reimann and Aron, 2009). Therefore, if managers want to promote a new device or target new customers, it is preferable to influence self-EXPansion, thus creating an advertisement that elicits agentic motivations so that the consumers first go through the inclusion of the device's resources before extending their identity on the device.

This research has some limitations, from which future research can be drawn. Firstly, participants completed a cross-sectional snapshot questionnaire measuring their motivations for purchasing the connected watch retroactively. In order to extend the scope of the results obtained, it would be advisable to measure motivations for purchase as close as possible to the act of purchase and to opt for a longitudinal approach, in order to measure the processes of EXPansion and EXTension of the self through a consumer panel. Finally, as this study was conducted on consumers with a connected watch, it would be interesting to work with other connected physical activity and diet monitoring devices to reinforce the external validity.

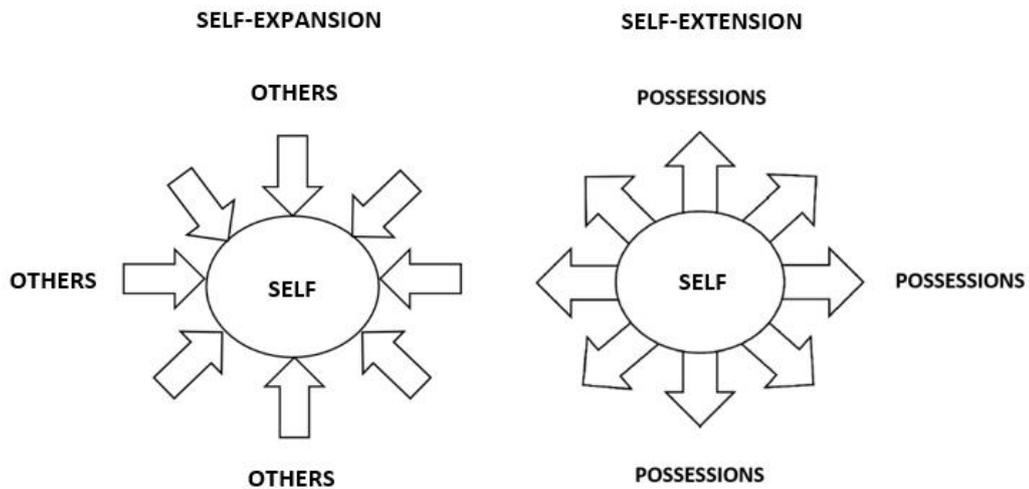
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## Appendix 1: Illustration of the Self-EXPansion and the Self-EXTension Process



## Appendix 2: Measures

Variables	Items	Psychometric qualities
<p><b>Self-EXPansion (SEQ)</b> Lewandowski et Aron (2002)</p>	<p><i>From 1 = Strongly Disagree to 7 = Strongly Agree</i></p> <ul style="list-style-type: none"> <li>- Using your Smartwatch results in having new experiences</li> <li>- Your Smartwatch increase your ability to accomplish new things</li> <li>- Your smartwatch helps to expand your sense of the kind of the person you are</li> <li>- You see your Smart watch as a way to expand your own capabilities</li> <li>- You often learn new things about your Smart watch</li> <li>- Your Smartwatch provide a source of exciting experience</li> <li>- You feel that you have a larger perspective of things because of your Smart watch</li> <li>- Your Smartwatch resulted in your learning new things</li> <li>- Your Smart Watch's strengths (skills, abilities,..) compensate for some of your own weaknesses as a person</li> <li>- Having your Smartwatch increases the respect other people have for you</li> <li>- Having your Smartwatch make you more appealing to potential future mates?</li> <li>- Your Smartwatch increases your knowledge</li> <li>- When you have your smart watch, you have a greater awareness of things.</li> <li>- Having your Smart watch made you a better person</li> </ul>	<p>Cronbach = 0,89</p>

<p><b>Self-EXTension</b> Sivadas et Machleit (1994)</p>	<p><i>From 1 = Strongly Disagree to 7 = Strongly Agree</i></p> <ul style="list-style-type: none"> <li>- My smart watch helps achieve the identity I want to have.</li> <li>- My smart watch helps me narrow the gap between what I am and what I try to be</li> <li>- My smart watch is central to my identity</li> <li>- My smart watch is part of who I am</li> <li>- If my smart watch is stolen from me, I will feel as if my identity has been snatched from me</li> <li>- I derive some of my identity from my smart watch</li> </ul>	<p>Cronbach = 0,88</p>
<p><b>Communal traits</b> Wojciszke (2014)</p>	<p><i>From 1 = Strongly disagree to 7= Strongly agree, how well do those adjectives define you?</i></p> <ul style="list-style-type: none"> <li>- Honest</li> <li>- Loyal</li> <li>- Sociable</li> <li>- Altruistic</li> <li>- Fair</li> <li>- Sincere</li> </ul>	<p>Cronbach = 0,79</p>
<p><b>Agentic traits</b> Wojciszke (2014)</p>	<p><i>From 1 = Strongly disagree to 7= Strongly agree, how well do those adjectives define you?</i></p> <ul style="list-style-type: none"> <li>- Clever</li> <li>- Competent</li> <li>- Efficient</li> <li>- Smart</li> <li>- Expert</li> <li>- Logical</li> </ul>	<p>Cronbach = 0,81</p>
<p><b>Agentic buying motivations</b> ACCMI Friedman <i>et al.</i> (2016)</p>	<p><i>From 1 = Strongly disagree to 7 = Strongly agree, You bought your connected watch to:</i></p> <ul style="list-style-type: none"> <li>- Distinguish yourself from others</li> <li>- Don't look like others</li> <li>- Be original</li> <li>- Be different from others</li> <li>- Be exceptional</li> </ul>	<p>Cronbach = 0,86</p>
<p><b>Communal buying motivations</b> ACCMI Friedman <i>et al.</i> (2016)</p>	<p><i>From 1 = Strongly disagree to 7 = Strongly agree, You bought your connected watch to:</i></p> <ul style="list-style-type: none"> <li>- Integrate yourself</li> <li>- Seek union with others</li> <li>- Search for a connection with others</li> <li>- Seek harmony with others</li> <li>- Be attentive to others</li> </ul>	<p>Cronbach = 0,89</p>

### Appendix 3: Results of PROCESS analyses

MODEL 1		CONSEQUENCES						
		M (SELF-EXPANSION)			Y (SELF-EXTENSION)			
ANTECEDENTS		Coeff.	SE	p		Coeff.	SE	p
X (AGENTIC BUYING MOTIVATIONS)	<i>a</i>	0,16	0,04	.00	<i>c'</i>	0,13	0,05	.01
M (SELF-EXPANSION)		-	-	-	<i>b1</i>	0,83	0,08	.00
COMMUNAL BUYING MOTIVATIONS		0,16	0,04	.00	<i>b2</i>	0,23	0,05	.00
AGENTIC TRAITS		0,29	0,06	.00	<i>b3</i>	-0,12	0,08	.15
COMMUNAL TRAITS		0,06	0,04	.17		-0,02	0,08	.80
Constant	<i>iM</i>	0,41	0,25	.10	<i>iy</i>	-0,26	0,31	.40
R <sup>2</sup> = 0,66				R <sup>2</sup> = 0,72				
<i>F</i> (4,222) = 107,28 ; <i>p</i> < . 00				<i>F</i> (5,221) = 114,99 ; <i>p</i> < . 00				

	Effect	SE	LLCI	ULCI
Total effect of X on Y ( <i>c</i> )	0,27	0,06	0,14	0,40
Direct effect of X on Y ( <i>c'</i> )	0,13	0,06	0,02	0,24
Indirect effect of X on Y ( <i>ab</i> )	0,14	0,06	0,04	0,25

MODEL 2		CONSEQUENCES						
		M (SELF-EXPANSION)			Y (SELF-EXTENSION)			
ANTECEDENTS		Coeff.	SE	p		Coeff.	SE	p
X (COMMUNAL BUYING MOTIVATIONS)	<i>a</i>	0,06	0,04	.17	<i>c'</i>	0,23	0,05	.00
M (SELF-EXPANSION)		-	-	-	<i>b1</i>	0,83	0,08	.00
AGENTIC BUYING MOTIVATIONS		0,16	0,04	.00	<i>b2</i>	0,13	0,05	.01
AGENTIC TRAITS		0,29	0,06	.00	<i>b3</i>	-0,12	0,08	.15
COMMUNAL TRAITS		0,39	0,06	.00		-0,02	0,08	.80
Constant	<i>iM</i>	0,41	0,25	.10	<i>iy</i>	-0,26	0,31	.40
R <sup>2</sup> = 0,66				R <sup>2</sup> = 0,72				
<i>F</i> (4,222) = 107,284 ; <i>p</i> < . 00				<i>F</i> (5,221) = 114,99 ; <i>p</i> < . 00				

	Effet	SE	LLCI	ULCI
Total effect of X on Y	0,27	0,06	0,15	0,40
Direct effect of X on Y	0,23	0,05	0,12	0,33
Indirect effect of X on Y	0,05	0,05	-0,04	0,15