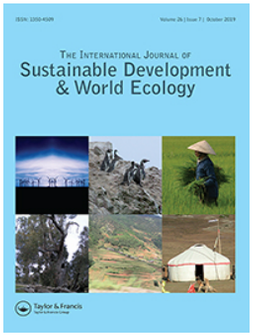

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Values and willingness-to-pay for sustainability-certified mobile phones

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ABSTRACT

This study investigated whether endorsement of personal values is associated with willingness to pay more for mobile phones with an environmental or social sustainability label. Participants were students in Sweden, Norway and Germany. A self-report inventory was used to measure willingness to pay and the importance attached to values of Schwartz's circular model. In Sweden and Norway, participants were willing to pay, on average, 18% extra for a mobile phone with labels for environmental or social sustainability. In Germany, the corresponding share was 12%. To strive for self-enhancement values, that is, social status and prestige, as well as control and dominance over people and resources, was associated with a lower willingness to pay for mobile phones with labels for environmental or social sustainability in all three countries. Furthermore, women were willing to pay more than men for mobile phones with both kinds of sustainability labels. In Sweden and Norway, participants were, on average, willing to pay more for a mobile phone with a label for social sustainability compared to a mobile phone with a label for environmental sustainability.

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Consumer behavior; mobile phones; personal values; sustainability labels; willingness to pay (WTP)

A number of factors may influence why consumers prefer one mobile phone over another. Brand (Karjaluoto et al. 2005; Ebrahim et al. 2016) and interface simplicity are examples of factors that consumers deem important (Lee et al. 2015). Processing power, graphics, and memory performance are other influential factors (Arnkvist 2014). In several studies, preference for a particular operating system, such as Android, has been found to be more important than any other factors in the choice of a new mobile phone (Arnkvist 2014; Böhm et al. 2015).

The starting point for the present study was the notion that consumers' preferences for mobile phones may also be influenced by considerations of the products' environmental and social impacts. That is, the situation affords a possibility for demonstrating or acting on one's personal values. From a theoretical perspective on situations proposed by Reis (2008), a situation consists of social affordances – behavioral options – giving the possibility for expressing certain views, values or acting in accordance with one's personality. In the present context, choosing to buy a new mobile phone could give a person an opportunity to show consideration for the product's environmental and social impacts. For example, minerals necessary for producing phones such as tin are mainly mined in developing countries with enormous negative impacts on the environment. Workers in the mining process are sometimes underage, often poorly paid and exposed to toxic chemicals without appropriate safety equipment. In addition, the mining is partly located in areas of armed conflicts such as eastern D.R. Congo and the profits made by warlords and army commanders are used to finance further violent conflicts (Eichstaedt 2011; Epstein and Yuthas 2011). An overview of environmental and social consequences associated with the production of mobile phones is provided by Link (2013), Mooallen (2016), O´Rourke (2016), and Suckling and Lee (2015), as well as in more popular scientific contributions such as the movie 'The Secret Life of Cell Phones' (The Secret Life Series 2008). There are also campaigns to educate the public about the lifecycle of small electronic devices including mobile phones. Prominent examples are the animations by Eco Innovators (Disrupt Design 2010) a design and sustainability consultancy founded by the award-winning designer Leyla Acaroglu.

Although reports on negative consequences have been around for a number of years in newspapers, TV, and social media, little is known about how many people, in general, know about and to what degree they consider these issues in their purchasing decisions.

A plausible assumption might be that increased knowledge about a problematic situation will result in changes in attitudes and behavior. A linear model, with increased knowledge about environmental problems as a first step, followed by the development of more positive attitudes toward a more pro-environmental behavior (as a second step), and

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more frequent engagement in such behavior (as a third step), was an early attempt of conceptualizing this assumption (Kollmuss and Agyeman 2002). However, research from the 1970´s and on has indicated that knowledge may not be associated with behavior in such a direct and straightforward way (see, e.g. the aforementioned reference to Kollmuss and Agyeman 2002). For example, one study investigated the purchasing of organic products among high school students and found that the degree of knowledge of the products origin did not explain purchasing behavior (Gotschi et al. 2010). Moreover, research focusing on promoting pro-environmental behavior shows that increased knowledge may not necessarily lead to behavior change (Schultz and Kaiser 2012; Schultz 2014). Such research indicates that increasing knowledge about sustainable development-related problems is insufficient to transform attitudes, intentions, preferences, and behaviors. Knowledge about sustainable development-related problems may, however, be indirectly related to sustainable behavior. Support for this assumption comes from evidence suggesting a causal link from knowledge to more direct predictors of behavior, such as efficacy beliefs (see, e.g. Milfont 2012).

Personal values

Rokeach (1973, p. 5) defines a personal value as follows: 'A value is an enduring belief that a specific mode of conduct or end-state is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence'. According to Schwartz and Bardi (2001) values can be regarded as goals that guide people's actions, where goals refer to what people consider important in their lives. Schwartz and Bardi (2001) distinguish between 10 basic human values that can be ordered in a circular model along two independent axes. The axis representing 'self-transcendence' and 'self-enhancement' values is the focus of the present study. Arguably, this axis is relevant because the individual importance attached to these two opposing types of values reflects the degree to which people prioritize the interests of all humans and other living-beings (self-transcendence) versus their own personal interests (self-enhancement) in everyday decisions and behavior.

Self-enhancement and self-transcendence values can be further distinguished in more specific types of values. Two types of self-enhancement values are distinguished, each with distinct motivational goals (Schwartz and Bardi 2001, p. 270):

- Universalism (motivating goals: understanding, appreciation, tolerance, and protection for the welfare of all people and for nature)
- Benevolence (preservation and enhancement of the welfare of people with whom one is in frequent personal contact)

There are also two types of self-transcendence values with different motivational goals:

- Power (social status and prestige, control or dominance over people and resources)
- Achievement (personal success through demonstrating competence according to social standards)

Schwartz´s circular value model, presented in Figure 1, is generally supported by empirical evidence (e.g. Schwartz 1992; Schwartz and Bardi 2001; Knafo et al. 2011; Seligman et al. 2013). Evidence that personal values predict sustainable behaviors comes from research that has conceptualized the situation when deciding between conventional and sustainable consumption options as social dilemmas (e.g. Joireman et al. 1997; Doran et al. 2017). These studies typically investigate variables that have been shown to influence decisions in laboratory experiments on abstract social dilemma tasks, such as the prisoner's dilemma. Another line of evidence comes from studies on associations between importance attached to personal values and willingness to pay (WTP) a premium for Fairtrade certified products (Doran 2009, 2010; Ma and Lee 2012; Grankvist and Kajonius 2015), as well as attitudes towards different environmental philosophies (Schultz and Zelezny 1999; Nordlund and Garvill 2002; Grankvist 2015). In general, higher levels of self-transcendence values have been found to be associated with higher environmental concern and more positive attitudes towards socially sustainable or Fairtrade-related aspects (Steg and de Groot 2012; Grankvist and Kajonius 2015).

The present study investigates consumers' WTP a premium for mobile phones with pro-environmental or social sustainable development attributes. The overall aim of the study was to determine to what degree this WTP is as a function of consumers' socio-demographic characteristics (age, gender, and nationality), self-rated knowledge about working conditions and environmental consequences associated with the production of conventional mobile phones, and importance attached to self-transcendence and self-enhancement values.

Although WTP measures have been employed frequently in social sciences they are not without critics, see, e.g. Knetsch and Sinden (1984); Hanemann (1991); Carlsson and Martinsson (2001); Sexton and Sexton (2014); Tully and Winer (2014). Ritov and Kahneman (1997) have questioned the fundamental validity of WTP measures and argued that self-reported WTP does not offer a good or trustworthy

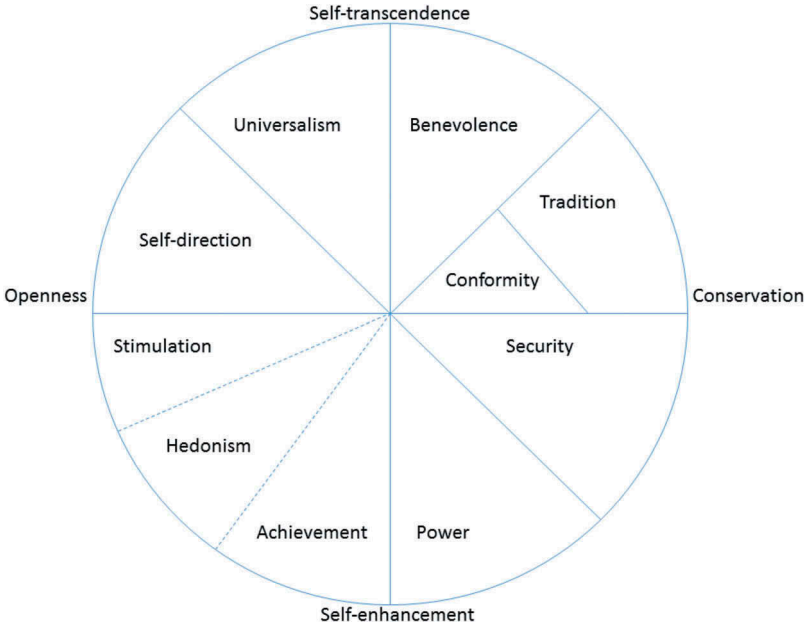

Figure 1. Adapted from Schwartz´s value model (1992, p. 14).

appraisal of how much an individual would actually be prepared to pay. They have argued that WTP should only be interpreted as an indication, or a rough measure, of attitudes toward the service or product. However, in a few studies, concrete and real-world measures of WTP have been used. One such study (Prasad et al. 2004) found that about 30% of the respondents were willing to pay a premium of 5–40% for low-priced socks with a Fairtrade resembling label. Another study (Hiscox et al. 2011) found that an average premium of 23% was paid for a Fairtrade-labelled coffee in an auction on eBay. In the present study, WTP is interpreted both as a rough measure of actual WTP and as a proxy for attitudes toward, or preference for, sustainability-labeled mobile phones.

Sustainability labels

It should be noted that in contrast to factors such as brand, interface simplicity and operating system, environmental and social impacts associated with mobile phones are not directly observable or visible. To make such otherwise invisible product attributes visible to consumers, different labeling systems have been introduced. Eco-labels are associated with claims that the labeled product was produced under environmentally more benign conditions (Thøgersen et al. 2010; Sønderskov and Daugbjerg 2011; Delmas et al. 2013). The social impact, or Fairtrade initiative, claims that the labeled products have been produced under conditions that benefit poor workers and farmers in developing countries, for example, by guaranteeing farmers above-market prices for their products, better working conditions, and the right to form trade unions (Grankvist 2013; Hainmueller et al. 2014). Different types of products are labeled by the Fairtrade initiative, including groceries, textiles, and cosmetics. However, electronic devices are so far very sparingly covered by the initiative. An example of a labeling system for electronic devices is TCO (tcocertified.com), which takes into account both environmental and social impacts associated with product lifecycles. To our knowledge, the only TCO-certified mobile phone so far is the Samsung GALAXY S4. Other examples of available mobile phones that adhere to high environmental and social/ethical standards are those manufactured by Fairphone (www.fairphone.com) and Shiftphones (www.shiftphones.com).

Several studies have been conducted on consumer attitudes towards products with eco- and Fairtrade labels, as well as environmental and social issues related to everyday commodities (e.g. Nordlund and Garvill 2002; Tanner and Kast 2003; Pepper et al. 2009; Doran 2010; Hanss and Böhm 2012; Markowitz et al. 2012; Runyan et al. 2012; Grankvist 2015; Ladhari and Tchetgna 2015). Many of these studies have focused on groceries, while relatively little is known about consumers' attitudes toward and preferences for sustainability-labeled electronic devices. One of the few existing studies found that a cluster of university students in Finland were more positive toward and willing to pay a premium of at least 10% for a mobile phone with environmentally and socially sustainable development attributes (Bask et al. 2013). In some studies, respondents have been asked to rate the importance of a number of environmental and social aspects related to a good or service. A common finding is that social aspects dealing with employee rights, in particular the banning of child labor, are

rated equally or more important than environmental aspects, in particular environmentally friendly means of production (Auger et al. 2003, 2007; Carrigan et al. 2005).

Hypotheses

In line with the research findings outlined above, we formulated the following hypotheses:

Hypothesis (A): WTP a premium for environmentally friendly or socially sustainably labeled mobile phones is positively associated with self-transcendent values and negatively associated with self-enhancement, values.

Hypothesis (B): WTP for mobile phones with labels for social sustainability is higher than WTP for mobile phones with labels for environmental sustainability. This hypothesis was derived from research on the relative importance of different sustainable development-related product attributes (e.g. Auger et al. 2003, 2007; Carrigan et al. 2005).

In addition, we explored associations between self-reported knowledge about environmental and social consequences of the lifecycle of mobile phones and WTP a premium mobile phones with labels for environmental or social sustainability. Since previous research in this area (Kollmuss and Agyeman 2002; Gotschi et al. 2010; Schultz and Kaiser 2012; Schultz 2014) did not present a coherent argument, we did not formulate a directed hypothesis.

Method

Participants and procedure

In total, 767 individuals participated in the study. All data were collected in 2015, and participation was voluntary and anonymous.

The Swedish sample included 247 students at University West (70% female). Data were collected through paper and pencil questionnaires. About 100 of the respondents were psychology students, about equally many studied economics, and the remaining studied computer science. They were between 18 and 48 years of age, with a mean age of 24 years.

The Norwegian sample included 196 students at Lillehammer University College (69% female). All data were collected through paper and pencil questionnaires. The respondents were between 18 and 46 years of age, with a mean age of 21 years.

The German sample included 276 individuals (52% female), aged 18 to 27 years, with a mean age of 22 years. In the German survey, respondents could choose between a paper and pencil and an online version of the questionnaire. The paper and pencil version was completed by 164 respondents (59%), and the online version was completed by the remaining 112 respondents. All participants were students at one of the three universities in the city of Darmstadt: Hochschule Darmstadt – University of Applied Sciences, Technische Universität Darmstadt, and Evangelische Hochschule Darmstadt.

Instruments

Nine items from the Portrait Value Questionnaire IV (PVQ-IV; Schwartz 2009) were used to measure the importance attached to four personal values as determined by the resemblance of a respondent to the described portrait. Items were scored on a 6-point Likert scale, ranging from 'Not like me at all' to 'Very much like me'.

In the Swedish sample, the item-total correlations of the value type scales were as follows: universalism (3 items and between .32 and .42), benevolence (2 items and .33), power (2 items and .33), achievement (2 items and .56). In the Norwegian sample the corresponding item-total correlations were: between .32 and .43, .36, .34 and .60. In the German sample, the numbers were: between .20 and .31, .20, .36, and .45.

Although the number of items used to measure each of these values may seem low, it seems noteworthy that the European Social Survey (ESS) (Human Values (Core – All rounds), 2016) used the exact same number and selection of items to measure each of these values. Following Schwartz's (2009) recommendation, each respondent's mean ratings for all values were calculated and then used to control for the tendency to respond at the left or right end of the scale.

In addition, age, gender, nationality, and self-reported knowledge about environmental and social consequences associated with the production of mobile phones were measured. The following two items were used to measure self-reported knowledge: 'How much do you know about how the production of mobile phones, smartphones, and the like affects the environment?' and 'How much do you know about the working conditions of those who participate in the various parts of the production of mobile phones, smartphones, and the like?'. These items were scored on a 5-point scale with response options; 'nothing', 'a little', 'some', 'a good deal', and 'a lot'.

WTP was measured by asking respondents to respond to the following scenarios: Scenario 1 (label for environmental sustainability): Assume that a mobile phone, smartphone, or the like, costs 4000 SEK (in Sweden; 4000 NOK in Norway; 365 Euro, in Germany, respectively). How much are you be willing to pay for a phone with the same features if it is labeled with a label for environmental protection? Scenario 2 (label for social sustainability) was identical to Scenario 1 with the exception that 'a label for environmental protection' was replaced by 'a label

for social responsibility (e.g. Fairtrade)'. Participants could name any purchase price above or below the given price for a regular mobile phone. The given prices (see above) represented the average purchase price for mobile phones in the respective countries of data collection, calculated from publicly available statistics.

Results

In the Swedish and Norwegian samples, participants were willing to pay, on average, 18% more for a mobile phone with labels for environmental or social sustainability. In the German sample, the corresponding number was 12%.

Swedish sample

In the Swedish sample, significant correlations were found between the importance attached to values and WTP (see Table 1). In line with our first hypothesis, the self-transcendence value universalism was positively correlated with WTP, and the self-enhancement value power was negatively correlated with WTP. Self-rated degree of knowledge of environmental and social consequences was not correlated with WTP.

The four values included were strongly correlated and to avoid multicollinearity a variable Self-enhancement = (Power + Achievement) – (Universalism + Benevolence) was used as a predictor in a regression analysis.

Women were willing to pay significantly more than men for both kinds of labeled mobile phones. In line with our second hypothesis, a higher WTP was found for mobile phones labeled socially compared to environmentally sustainable. A pair-wise *t*-test gave a *p*-value of .008, and Cohen´s *d* of .17. With transformations done according to Cohen (1988) and Rosenthal (1994) this 'equals' a correlation of .08.

Table 1. Pearson correlation coefficients (r) and standardized beta coefficients from multiple regression analyses with willingness to pay for eco-labeled ('eco') and socially labeled ('social') smartphones as dependent variables. For gender (1 = female, 2 = male) the eta correlation coefficient was used. Swedish sample (N = 247).

	r		beta	
	eco	social	Eco	social
Knowledge	.04	.01	.06	.06
Self-enhanc	−.19**	−.25**	−.16*	−.23**
Benev	*.01*	*.07*		
Univ	*.22***	*.26***		
Achiv	*−.07*	*−.09*		
Power	*−.24***	*−.31***		
Age	.03	.03	−.02	−.04
Gender	−.18*	−.20**	−.17*	−.18**
R^2_{adj}			.05	.08
F			3.80**	5.90**

* = $p < 0.05$, ** = $p < 0.01$.

Norwegian sample

In the Norwegian sample, significant and positive correlations were found between importance attached to both self-transcendence values (universalism and benevolence) and WTP (see Table 2). Both self-enhancement values (power and achievement) were significantly and negatively correlated with WTP. These results are in line with our first hypothesis. Quite similar to the findings from the Swedish sample, self-rated degree of knowledge of environmental and social consequences was not correlated with WTP.

Women were willing to pay significantly more than men for both kinds of labeled mobile phones. In line with our second hypothesis, a higher WTP was found for socially compared to environmentally labeled mobile phones. A pair-wise *t*-test gave a *p*-value of .000, and Cohen´s *d* of .28, which could be transformed into a correlation of .14.

German sample

In the German sample, WTP was positively correlated with the value universalism and negatively correlated with the value power (see Table 3). However, these correlations were considerably weaker than those found in the Swedish and Norwegian samples. In line with the findings from the Norwegian and Swedish samples, self-rated degree of knowledge of environmental and social consequences was not correlated with WTP.

In the German sample, women were not willing to pay more than men for labeled mobile phones. We, furthermore, did not find a difference in WTP for mobile phones labeled socially compared to environmentally sustainable. A pair-wise *t*-test gave a *p*-value of .13, and a Cohen´s *d* of .09, which was transformed, as described above, into a correlation of .05.

Summary of results

Table 2. Pearson correlation coefficients (r) and standardized beta coefficients from multiple regression analyses with willingness to pay for eco-labeled ('eco') and socially labeled ('social') smartphones as dependent variables. For gender (1 = female, 2 = male) the eta correlation coefficient was used. Norwegian sample (N = 196).

	r		beta	
	eco	social	Eco	social
Knowledge	.00	.00	−.04	.00
Self-enhanc	−.28**	−.26**	−.26**	−.24**
Benev	*.18**	*.20***		
Univ	*.25***	*.21***		
Achiv	*−.25***	*−.23***		
Power	*−.22***	*−.19**		
Age	.04	.00	.10	.04
Gender	−.24**	−.23**	−.23**	−.21**
R^2_{adj}			.11	.09
F			6.71**	5.16**

* = $p < 0.05$, ** = $p < 0.01$.

Table 3. Pearson correlation coefficients (r) and standardized beta coefficients from multiple regression analyses with willingness to pay for eco-labeled ('eco') and socially labeled ('social') smartphones as dependent variables. For gender (1 = female, 2 = male) the eta correlation coefficient was used. German sample (N = 276).

	r		beta	
	eco	social	eco	social
Knowledge	.02	.01	.02	−.02
Self-enhanc	−.09	−.08	−.10	−.08
Benev	*.03*	*.01*		
Univ	*.11*	*.11*		
Achiv	*−.02*	*.01*		
Power	*−.12**	*−.14**		
Age	.00	−.02	−.01	−.02
Gender	.04	.03	.03	.00
R^2_{adj}			.00	.00
F			.73	.57

* = $p < 0.05$, ** = $p < 0.01$.

These results, although partially different between the three-country samples, reveal some general tendencies regarding associations between the focal variables. In line with our first hypothesis, the importance attached to self-enhancement values of Schwartz's (1992) circular model was associated with a lower WTP. As an answer to our exploratory research question, none of the three samples revealed any tendencies towards an association between the self-rated degree of knowledge of environmental and social consequences and WTP. Furthermore, and in line with our second hypothesis, in two of three samples, there was a clear tendency that social and work-related aspects associated with the production of mobile phones were viewed as more important than environmental aspects.

Discussion

To our knowledge, the present study is the first to explore associations between importance attached to personal values and WTP a premium for mobile phones with labels for environmental and social sustainability. Students from three countries, Sweden, Norway, and Germany participated in this study. On average they were willing to pay between 12% and 18% extra for labeled mobile phones. Our study showed that there was a clear relation between the importance attached to personal values and WTP for these labeled mobile phones. Specifically, the values universalism and power were associated with being willing to pay more, and less, respectively. That is, participants who attached more importance to the universalism value, one of the self-transcendence values in Schwartz's (1992) circular model, representing the goals of striving for understanding, appreciation, tolerance, and protection for the welfare of all people and for nature, reported higher WTP. Those who, on the contrary, reported to strive for power, one of the self-enhancement values in the model, representing the goals of social status and prestige, control or dominance over people and resources, reported lower WTP for mobile phones with labels for environmental and social sustainability. These results are in line with other studies on personal values and preference for environmentally friendly and pro-social or 'Fairtrade-like' product alternatives (Joireman et al. 1997; Schultz and Zelezny 1999; Nordlund and Garvill 2002; Doran 2009, 2010; Hanss and Böhm 2012; Ma and Lee 2012; Steg and de Groot 2012; Grankvist and Kajonius 2015; Grankvist 2015).

There is an opportunity here for manufacturers and businesses to align their values with those of their (potential) customers. For example, one might interpret the findings of the present study to indicate a potential for signaling corporate social and environmental responsibility through offering products and services with certifications associated with relevant human values and ethical considerations. Moreover, purchasing a new phone may be an opportunity for consumers to demonstrate their personal values to their social environments.

We also found a small but detectable difference between WTP for mobile phones with labels for social sustainability and mobile phones with labels for environmental sustainability. The participants were essentially willing to pay more for social sustainability. A similar tendency has been found in previous studies (Auger et al. 2003, 2007; Carrigan et al. 2005), indicating that consumers, on average, may view human, or work and socially related aspects as equally or more important compared to environmental aspects.

In the Swedish and Norwegian samples, women were willing to pay a higher price than men were for mobile phones with sustainability labels. In these samples, gender explained almost as much of the variation in WTP as personal values did. One implication for the mobile phone industry is that women – at least initially – could be a promising target group for mobile phones with sustainability labels.

Limitations

This study has several limitations that deserve mentioning. First, our samples were convenience samples that should not be considered representative of the broader student or societal populations. Second, the method of data collection was not identical in all three countries. In the German sample, data were collected by both paper and pencil and online questionnaires, whereas in Norway and Sweden data were collected by paper and pencil questionnaires only. Third, item-total correlations of the measure of the personal values were quite low. Future studies should consider using additional items of the PVQ in order to increase reliabilities of the value scales. Despite these limitations, the present study is an important addition to the literature as it is the first international investigation of WTP for mobile phones labeled sustainable as well as associations with personal values, demographic characteristics and self-reported knowledge about the environmental and social issues related to the lifecycles of mobile phones.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Compliance with Ethical Standards

All procedures in this study were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

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