



# Tap versus bottled water consumption: The influence of social norms, affect and image on consumer choice

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## ABSTRACT

What drives consumers to choose bottled water instead of tap water where the latter is safe, accessible, costs far less, and in spite of its environmental impacts? This research investigates the influence of hitherto unexplored psychological drivers in an attempt to generate a more holistic understanding of the phenomenon, and strategies for designing more effective consumption reduction campaigns. Using data from an internet survey of Swiss and German respondents ( $N = 849$ ) we investigated the role of, social norms, affect and image on water consumption. Results suggest that these psychological factors play a role in water consumption choice. Convenience was the only contextual predictor - the inconvenience of transporting bottled water has a negative effect on its consumption, and a positive effect on tap water consumption. Although concern about the effect of bottled water on the environment was not a significant predictor of tap water consumption, we found that for some people, a link exists between environmental concern and consumption choice. Ways through which consumers may be more effectively influenced towards environmentally-friendly consumption are discussed.

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## 1. Introduction

Bottled water<sup>1</sup> represents one of the fastest-growing drinks market in the world and recent projections indicate that it is likely to overtake soft drinks and become the largest beverage category by volume. Even in countries where tap water is perfectly safe, bottled water consumption is still high. This raises questions regarding why consumers with perfectly safe tap water, that costs far less, opt for a more expensive and environmentally-deleterious option like bottled water. Recent data show that the 2015 annual consumption of U.S. residents stood at 44.3 billion litres, an increase of more than 47% compared to 2005 consumption (Rodwan, 2016). Across the Atlantic, residents of Italy, Germany and France have the highest bottled water consumption: up to 188.5, 177.3 L and 139.3 L per capita (Rodwan, 2016). What drives consumers to choose bottled water, despite access to a cheaper and equally high-quality option, is the subject of this investigation.

It takes about 3 L of regular water to produce 1 L of bottled water (Pacific Institute, 2007). This translates to more than 100 billion

litres of water being wasted every year in the production of bottled water (van der Linden, 2015), at a time when the global water situation is described as being in crisis and many in the developing world have no access to any form of safe water. The World Health Organisation estimates that only 24% of the population in Sub-Saharan Africa has access to safely managed, uncontaminated water (WHO & UNICEF, 2017). The energy demand for bottled water production is also enormous: per litre of water produced, bottled water requires 2000 times more energy than tap water (Gleick & Cooley, 2009). The fossil fuel consumption and CO<sub>2</sub> emissions at various stages of the supply chain from the manufacture of plastic bottles to their transportation, and the pollution caused by improper disposal of plastic bottles, also have enormous environmental impacts. Unlike developing countries where tap water can present health risks, this option is safe and widely accessible in developed nations (Ward et al., 2009; Wilk, 2006). So, what drives bottled water consumption in such situations?

Previous research shows that water consumption behaviour is influenced by both contextual (i.e. objective characteristics e.g. cost) and psychological factors (Dolnicar, Hurlimann, & Grün, 2011; Ross, Fielding, & Louis, 2014; Russell & Fielding, 2010). Thus, home ownership, higher income, living in an urban area, the presence of children under 5 years in the household and the convenience of bottled water transportation due to car ownership were correlated

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<sup>1</sup> In this paper, bottled water refers to both still and sparkling water.

with higher bottled water consumption (Johnstone & Serret, 2012; OECD, 2014; Yoo & Yang, 2000).

Psychological factors, on the other hand, refer to subjective individual characteristics which influence individuals' perceptions e.g. values (Perlaviciute & Steg, 2014). Previous studies have identified a number of psychological factors influencing water choice including concerns about chemicals e.g. chlorine, fluoride, and lead and beliefs around the health benefits of minerals in bottled water, (Doria, 2006; Doria, Pidgeon, & Hunter, 2009; Levallois, Grondin, & Gingras, 1999; Platikanov et al., 2017; Ross et al., 2014; Santos & van der Linden, 2016; Saylor, Prokopy, & Amberg, 2011; Turgeon, Rodriguez, Thériault, & Levallois, 2004; Ward et al., 2009). A growing body of evidence also suggests that tap water consumption is significantly correlated with consumers' trust in water suppliers (Doria et al., 2009; Ross et al., 2014). Parag and Roberts (2009) argue that decisions to replace tap with bottled water are emanate from a lack of trust in the institutions responsible for tap water provision; evidence of which was seen in the increase in bottled water consumption that accompanied the sharp fall in public trust of the Sydney water Board following the 1998 *Cryptosporidium* and *Giardia* outbreak in Sydney, Australia (Stein, 2000). Institutional trust is therefore a significant determinant of bottled water consumption.

However, a close look at data reveals significantly high consumption of bottled water even in countries not characterised by the issues described above. European consumers, for example, consume large quantities of bottled water despite being generally satisfied with the quality of their tap water, trusting institutions responsible for water provision, and perceiving no health risks from tap water (OECD, 2014). A recent study of German consumers found that more than 80% were extremely satisfied or satisfied with their drinking water quality (Profile of the German Water Sector, 2015), yet German bottled water consumption is the second highest in Europe (Rodwan, 2016). A similar scenario characterises the Swiss population where more than 65% are satisfied with tap water quality (OECD, 2014). This implies the existence of other drivers of bottled water consumption, besides those presented in the literature cited above. To delineate these factors, we directed our investigation towards factors known to influence consumer behaviour e.g. image, social norms and affect, but which have not been investigated with specific reference to water consumption choices.

### 1.1. Image

Personal and product image are important factors in consumption choice. People often choose products whose image conforms to their view of themselves or whose image they respect, admire or aspire to (Allen, 2002; Barker, Tandy, & Stookey, 1999). Historically, mineral water was sourced from underground in spas and was almost exclusively accessible to only the rich or people of high social status (Ferrier, 2001). Access was therefore a status symbol. Today, some of this symbolism of status and wealth persists in the form of exclusive shops for bottled water costing as much as €50 for a 37 mL bottle (Brei & Tadajewski, 2015).

It is not possible to talk about the image associated with bottled water without acknowledging the role of advertising in crafting this image. Past and present advertising has employed symbolisms of youth, vitality, trendiness, and nature, implying that drinking the bottled water magically transfers these qualities to the consumer (Brei & Tadajewski, 2015; Olson, Poling, & Solomon, 1999). It is plausible that for some segments of the consumer market, consumption decisions are based, to some extent, on aspirations for these qualities. Not only does the image associated with bottled water affect consumption choices, the image one wishes to portray

of themselves also plays a major role. For instance, in social contexts, people are more concerned about appearing friendly and likeable and honest because these qualities make them a more desirable partner for socialising (Nezlek, Schütz, & Sellin, 2007). Individuals can, therefore, influence their likeableness by what they choose to consume personally or what they offer guests.

Thus, both the image associated with bottled water, and the image consumers wish to portray of themselves, have the potential to influence water consumption decisions.

### 1.2. Norms

The rules that societies establish to define appropriate behaviour are important determinants of consumer choice (Higgs, 2015). Norms significantly influence consumer choice not only because norm-congruent consumption enhances group affiliations, it also helps to avoid undesirable social judgements and embarrassment (Fehr & Fischbacher, 2004). Crescive norms are norms that are practiced by members of particular social unit but which may not be known to non-members (Solomon, Bamossy, Askegaard, & Hogg, 2007). With respect to water, for example, the crescive norms within societies may prescribe the type of water considered appropriate for occasions, to accompany particular foods, or that is to be offered to different guests, invalids and infants (Brei & Tadajewski, 2015).

### 1.3. Affect

Our everyday experiences leave little doubt that affect can influence the decisions we make. Defined as the positively or negatively valenced subjective reactions experienced as either negative or positive feelings, affect often reflects learned meanings (Wyer, Clore, & Isbell, 1999, pp. 1–77). For example, if one experiences a positive reaction the first time they consume a particular food, they are likely to have the same feeling during later consumption episodes or even from just seeing pictures of the food again. This initial positive reaction may be due to expressions one observes from others during consumption or associations one makes with occasions where the item was first consumed or is frequently consumed.

The role of affect in consumer choice has been recognised for several decades now. Wright (1975) showed that consumers sometimes rely on previously formed evaluations stored in memory in a process called affect-referral. Later, Schwarz & Clore (1983, 1988) put forth a suggestion based on the notion that feelings are sources of information. For example, people interviewed on a sunny day reported being in a better mood and being happier with life than people interviewed on rainy days. Similarly, people who had a good mood induced by finding a dime on a copy machine reported being happier and more satisfied with life than individuals who hadn't found a dime. This suggests that people use their feelings as a heuristic so that instead of evaluating their life as whole, for which too many facts would be needed, subjects evaluated the target (life as a whole) in light of their present affective state. In other words, people base their evaluations of objects on their affective reactions at the time of judgment; and even though these affective reactions may have been caused by external stimuli, they are interpreted as feelings about the object being evaluated. Forgas (1995) suggested that affect is used a heuristic when people are unable or unmotivated to think through other information available (see also (Pham, Cohen, Pracejus, & Hughes, 2001; Shiv & Fedorikhin, 1999; Slovic, Finucane, Peters, & MacGregor, 2007).

However, relatively little is known about the role of affect in water consumption. Inferences can, nevertheless, be drawn from studies showing that people assigned greater weight to affective

considerations when consumption was primarily for enjoyment than when it was instrumental (Pham, 1998). People with instrumental motives were less likely to let feelings towards the target influence their decisions. Thus, when utilitarian criteria were being considered, the affect experienced had no impact on assessments. In contrast, consumers with consummatory motives were not only more likely to regard their feelings at the moment of judgement relevant, they were also more likely to incorporate them into their decision. Seemingly, consummatory motives heightened concern for affective experience.

Extending this to the water domain, it could be argued that whereas the act of drinking water can serve an instrumental purpose i.e. quenching one's thirst, it may also be driven by consummatory intentions such as when deciding the type of water to accompany a particular meal. Thus, water consumption is on some level always consummatory because enjoyment is usually expected during, or as a result. This introduces the prospect that affect has a significant, hitherto undescribed influence, on water choice.

#### 1.4. Study aims

The aim of this study was to delineate factors influencing bottled water consumption where hitherto described factors do not sufficiently describe the phenomenon. Germany and Switzerland are ideal for such a study because of their by high bottled water consumption, despite not being characterised by factors identified from previous research e.g. institutional trust. In doing this, we hope to expand existing understanding of the bottled water consumption phenomenon and, in this way, inform strategies aimed at encouraging more environmentally-friendly consumption.

## 2. Methods

### 2.1. Data collection and participants

Online surveys were conducted in Germany and the German-speaking region of Switzerland using internet panels from a commercial company (Respondi AG) that financially compensated respondents for completing the questionnaire. A quota sample with the variables gender and age was used and the final sample consisted of 424 respondents from Switzerland (50% males) and 425 respondents from Germany (51% males). The average age of respondents from Switzerland was 46.2 (SD = 15.0) years while that of German respondents was 45.3 (SD = 17.0) years. Basic education levels of respondents from the two countries were largely similar (8.0% and 9.4% for Switzerland and Germany, respectively) but a much higher proportion of German than Swiss respondents (31 vs. 19%) reported having a university education.

### 2.2. Measures

A structured questionnaire was developed for this study based on information gathered from semi-structured interviews conducted with a convenience sample of 8 individuals (18–42 years old, 25% male). The interviews followed carefully designed guidelines (Morgan, Fischhoff, Bostrom, & Atman, 2002) and proceeded from open questions about consumption choices at home, work, dining out or while entertaining guests, to more in-depth questions about what informed these choices. Data from these interviews was then subjected to a thematic analysis which from which the following nine themes were identified: personal image, norms, environmental concern, concerns about chemicals in tap water, health beliefs associated with minerals in bottled water, organoleptic preferences, convenience, the image associated with bottled water (both still and sparkling) and impression consciousness. A

questionnaire comprising 47 items was then formulated.

Factor analysis with varimax rotation resulted in 11 factors with eigenvalues above 1, explaining 50% of the variance of the data. Two factors were subsequently excluded because they each had only two items loading on them. The Cronbach's alpha values of the 9 remaining factors were all  $\geq 0.66$ . The scales, their definitions along with the items comprising them are presented in the appendix.

Responses to survey items were recorded on a 6-point Likert scale with 1 corresponding to "completely disagree" and 6 to "completely agree". The affect elicited by tap and bottled water was rated on a 7-point scale ranging from  $-3$  (very negative) to  $+3$  (very positive). Information on respondents' consumption of the three water options was solicited using the following statement: 'Please indicate your daily consumption of water in the following situations during the past month.' The options were (i) at home, (ii) at work, and (iii) outside/on the go, and respondents reported their consumption in terms of the number of 0.2 dL glasses consumed per day in response to the statement. Evaluations of tap, still and sparkling water were also measured on a seven-point differential semantic scale with 11 variates of oppositely valenced attributes including environmentally friendly/not environmentally friendly, trendy/not trendy, practical/cumbersome, healthy/unhealthy, free of chemicals/contains chemicals, free of contaminants/contains contaminants, tastes good/tastes bad, expensive/cheap, pure/impure, refreshing/not refreshing and natural/unnatural.

### 2.3. Data analysis

Data on the consumption of tap, still and sparkling water were converted to percentages of the total. Comparisons of consumption in the two countries were made using independent samples *t*-tests while differences within countries were assessed using ANOVA. Ratings of the affect elicited by tap and bottled water were evaluated based on confidence intervals of the means and linear regression analysis with forced entry was used to resolve what factors were significant for predicting water consumption. Semantic differential data was analysed using MANOVA.

## 3. Results

There were differences in water consumption between the two countries. The Swiss consumed significantly more tap water than the Germans,  $t(621) = -6.24$ ,  $p < 0.001$ , while the Germans consumed significantly more sparkling water than the Swiss,  $t(621) = 7.96$ ,  $p < 0.001$ . Differences in still water consumption in the two countries were, however, not significant,  $t(616) = -1.41$ ,  $p = 0.159$ . For both countries, ~60% of people consumed no still water at all. The data also indicate that Swiss consumption followed the order Tap water > Sparkling water > Still water while that of the Germans followed the order Sparkling water > Tap water > Still water. Results from the ANOVA revealed that differences in preferences for the three categories of water were significant in both countries:  $F(2, 649.41) = 114.64$ ,  $p < 0.001$  for Swiss consumers and

**Table 1**  
Relative consumption of tap, still and sparkling water in Switzerland and Germany. Different letters indicate significant differences in consumption within the country ( $p < 0.05$ ).

	Swiss		German	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Tap water	323	47.50 (34.17) <sup>a</sup>	353	25.40 (31.45) <sup>A</sup>
Still water	363	13.97 (23.51) <sup>b</sup>	364	16.63 (26.82) <sup>B</sup>
Sparkling water	351	30.73 (33.64) <sup>c</sup>	345	47.77 (38.36) <sup>C</sup>

$F(2, 685.65) = 77.72, p < 0.001$  for German consumers (Table 2). Posthoc Games-Howell tests showed that for both countries, consumption differed significantly between all water pairs ( $p < 0.001$ ).

Gender differences in consumption patterns were also observed although these were significant only in the Swiss population (Table 2). Swiss females consumed more tap water than males while Swiss males drank almost double the amount of sparkling water consumed by females. Nevertheless, age and level of education did not have a significant relationship with consumption choices ( $p = 0.34$  and  $0.22$ , respectively).

### 3.1. Semantic evaluations

Assessments based on semantic differentials provide an in-depth view of how Swiss and German respondents rated the different water options. Swiss respondents rated tap water more positively than German respondents on all 11 variates assessed (Fig. 1). Multivariate analyses of variance showed that except for concerns about chemicals in drinking water, respondents from the two countries rated tap water on all other attributes significantly differently,  $V = 0.103, F(11, 837) = 8.78, p < 0.001$ .

On the other hand, opinions about still and sparkling water were more similar. Although results of multivariate tests showed significant differences overall ( $V = 0.043, F(11, 837) = 3.42, p < 0.001$  for still water, and  $V = 0.047, F(11, 837) = 3.79, p < 0.001$  for sparkling water), univariate tests revealed that differences were significant only with respect naturalness, cost and environmental friendliness.

### 3.2. Affect

Amongst the Swiss, tap water elicited the most positive affect. In contrast, sparkling water elicited the most positive affect for German respondents (Table 3). The affect elicited by tap water amongst respondents from the two countries was significantly different. Similar differences were seen for still water but differences in sparkling water affect were not significant. Taken together with consumption figures (Table 1), these data suggest that affect was related to water choice. The Swiss reported the most positive affect from tap water and consumed it more compared to the other options, and the same can be said about Germans with respect to sparkling water consumption and the affect elicited by it.

### 3.3. Convenience

Convenience proved to be a major factor in decisions over whether to consume tap or bottled water. For respondents from both countries, the cost of bottled water was not an impediment to its consumption (Table 4). However, this was the only point for which differences in opinion by respondents from the two countries were not significant. Significant differences existed with respect to how cumbersome transportation of bottled water was considered to be, and the effect of this on consumption. More Swiss than German people found the transportation of bottled water

cumbersome and felt that transportation from the store limited their consumption. The Swiss were also more driven to tap water consumption due to this inconvenience than were the Germans.

### 3.4. Norms

The norms associated with bottled water had a negative effect on tap water consumption (Table 4). In both countries, tap water consumption at special occasions was inappropriate and mineral (bottled) water was considered a more appropriate accompaniment to meals than tap water. Offering the tap water to one's guests was construed as expressing less regard than an offering of bottled water would and mineral water was considered more appropriate for invited dinner guests. It must be mentioned, however, that the inappropriateness of offering tap water to guests was stronger amongst Germans compared to Swiss respondents. Significantly more German than Swiss people also thought that tap water was not a suitable accompaniment to certain foods.

### 3.5. Environmental impact of bottled water

There were significant differences in opinion on the impact of bottled water on the environment among respondents from the two countries (Table 4). Compared to the Germans, Swiss people felt that the environmental effects of bottled water production were more negative than those of tap water. They also felt more strongly about the negative effect of bottled water transportation and consumption on the environment. Taken together, these data suggest that, compared to Germans, Swiss respondents perceived greater negative environmental effects by bottled water.

### 3.6. Personal image, still water image and concerns about chemicals and contamination

The image portrayed by bottled water consumption was judged significantly differently in the two countries. The Swiss, more than the Germans, associated still or sparkling water consumption with higher social status while Germans felt that still water consumption was less congruent with their personal image. Germans rated still water as less trendy and less symbolic of youth or sporting activity.

Regarding contamination, Germans were more concerned about contamination from chemicals, reticulation infrastructure, and terrorist activity. Nevertheless, both the Swiss and Germans were confident that contamination of tap water would be easily detected and contained and that tap water did not contain harmful chemicals. There were also no significant differences amongst the two countries with respect to health beliefs, taste, and the image associated with sparkling water.

### 3.7. Predictors of consumption choice

A multiple regression analysis was conducted to determine the influence of the nine factors *viz.* image, environmental concern, concern about chemicals, convenience, health beliefs, taste, norms

**Table 2**  
Consumption patterns by gender. Different letters indicate significant gender differences in consumption within the country ( $p < 0.05$ ).

		Tap water		Still water		Sparkling water	
		n	Mean (SD)	n	Mean (SD)	n	Mean (SD)
Swiss	Male	165	41.94 (33.31) <sup>a</sup>	184	11.41 (22.17) <sup>a</sup>	169	40.72 (35.57) <sup>a</sup>
	Female	158	53.31 (34.19) <sup>b</sup>	179	16.61 (24.59) <sup>b</sup>	178	21.94 (29.78) <sup>b</sup>
German	Male	169	23.80 (30.51) <sup>a</sup>	183	14.95 (26.89) <sup>a</sup>	166	50.86 (38.49) <sup>a</sup>
	Female	185	26.72 (31.58) <sup>a</sup>	181	18.34 (26.76) <sup>a</sup>	180	44.65 (38.17) <sup>a</sup>

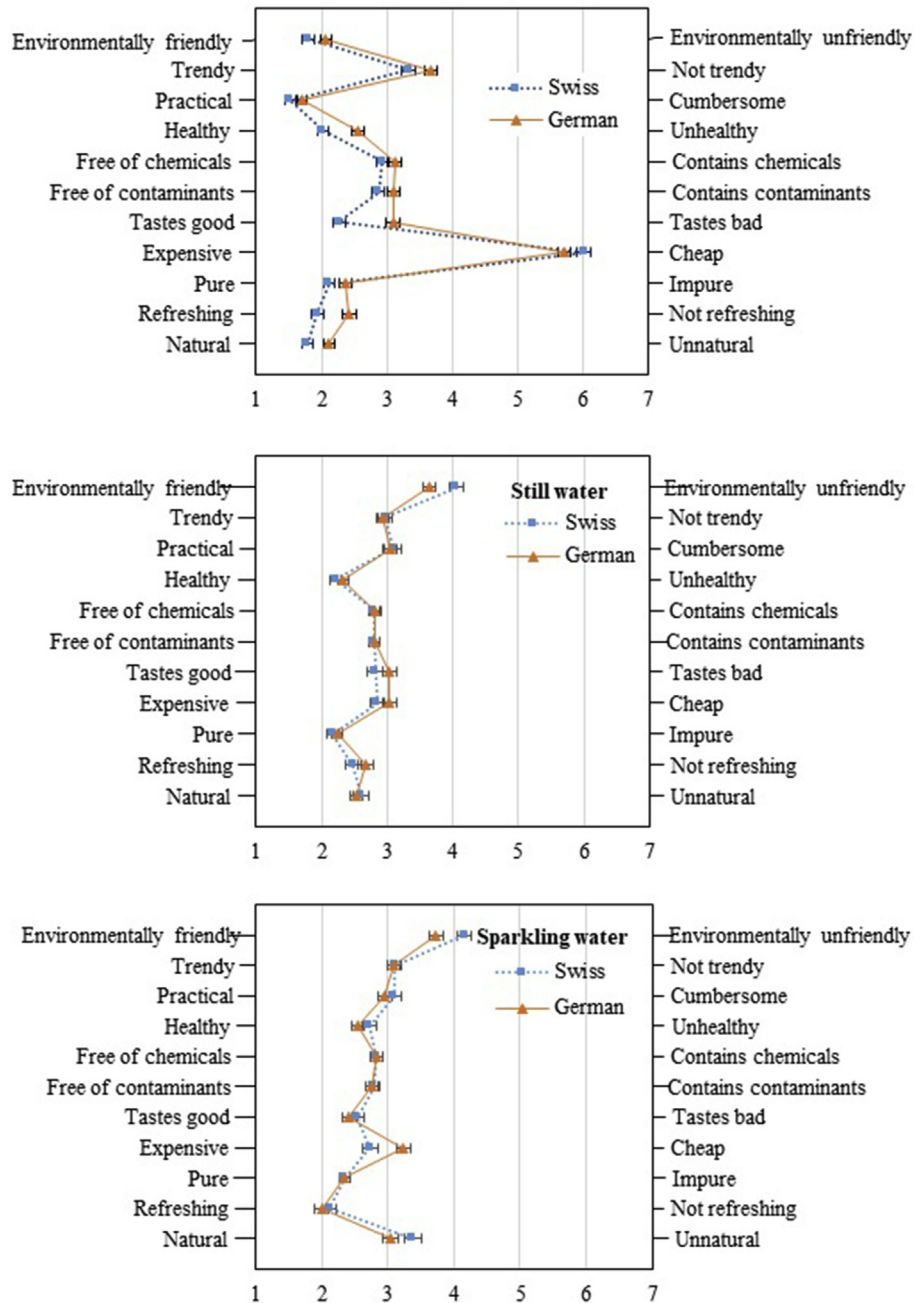


Fig. 1. Ratings of tap, still and sparkling water by Swiss and German respondents ( $n = 426$  and  $423$ , respectively) on 11 water attributes. Error bars represent confidence intervals.

**Table 3**  
Inter-country differences in the affect elicited by tap, still and sparkling water. Different letters indicate significant gender differences in consumption between the countries ( $p < 0.05$ ).

	Swiss ( $n = 424$ )	German ( $n = 423$ )
	Mean (SD)	Mean (SD)
Tap water	5.76 (1.41) <sup>a</sup>	4.86 (1.68) <sup>b</sup>
Still water	5.18 (1.69) <sup>a</sup>	4.89 (1.83) <sup>b</sup>
Sparkling water	5.31 (1.71) <sup>a</sup>	5.48 (1.59) <sup>a</sup>

and the image associated with still and sparkling water on consumption. Affect was included as the tenth factor following the finding above on its relationship with consumption as described in

above. Since results of tap water consumption also provide an indication of how the factors influence bottled water consumption, we present only one set of results, those of tap water (Table 5).

The regression model with all ten predictors explained 40.5% of Swiss, and 37.6% of German tap water consumption. Affect was the most important predictor of tap water consumption amongst the Swiss ( $\beta = 0.36$ ) and the second most important for German consumption ( $\beta = 0.30$ ). The relationship in both cases was positive, implying that an increase in positive tap water affect corresponded with an increase in its consumption. With each unit increase in the positive affect associated with tap water, Swiss consumption increased by 8.7% while that of the Germans increased by 5.6%. In contrast, the social norms associated with bottled water had a negative effect on tap water consumption. With each unit decrease

**Table 4**Comparisons (*t*-tests) of opinions of tap water by Swiss and German consumers. Different letters indicate significant differences between countries.

Factor	Swiss	German	<i>t</i> -test (df)*
	Mean (SD)	Mean (SD)	
1. Convenience	14.90 (5.40) <sup>a</sup>	16.38 (5.19) <sup>b</sup>	−4.07
2. Norms	17.01 (6.64) <sup>a</sup>	18.81 (6.14) <sup>b</sup>	−4.10
3. Environmental impact of bottled water	15.54 (4.99) <sup>a</sup>	14.13 (4.74) <sup>b</sup>	4.23
4. Chemicals and contamination concern	15.54 (4.99) <sup>a</sup>	14.13 (4.74) <sup>b</sup>	−4.22
5. Personal image	11.71 (5.17) <sup>a</sup>	10.49 (5.27) <sup>b</sup>	3.41
6. Still water image	10.42 (3.76) <sup>a</sup>	9.76 (3.84) <sup>b</sup>	2.54
7. Sparkling water image	8.96 (3.16) <sup>a</sup>	8.57 (3.21) <sup>a</sup>	1.74
8. Health beliefs	14.02 (4.58) <sup>a</sup>	13.78 (4.54) <sup>a</sup>	−0.83
9. Taste	20.83 (2.85) <sup>a</sup>	20.99 (2.82) <sup>a</sup>	0.75

\*df ranged between 847 and 829 due to missing values in some cases.

**Table 5**

Multiple linear regression model of tap water consumption predictors. 95% bias corrected and accelerated confidence intervals (CI) are in parentheses. Confidence intervals and standard errors are based on 1000 bootstrap samples.

	Swiss					German				
	<i>b</i> [CI]	SE <i>b</i>	$\beta$	<i>t</i>	<i>p</i>	<i>b</i>	SE <i>b</i>	$\beta$	<i>t</i>	<i>p</i>
Constant	40.50 [6.62, 77.66]	17.96		2.30	0.027	52.09 [18.34, 84.97]	16.32		3.29	0.002
Affect	8.67 [6.09, 11.14]	1.28	0.36	7.15	0.001	5.60 [3.94, 7.25]	0.83	0.30	6.21	0.001
Norms	−1.14 [−1.70, −0.58]	0.29	−0.22	−3.92	0.001	−1.12 [−1.77, −0.50]	0.32	−0.21	−3.75	0.002
Convenience	−1.28 [−1.86, −0.65]	0.31	−0.20	−4.27	0.001	−2.23 [−2.76, −1.70]	0.27	−0.37	−7.63	0.001
Sparkling water image	−1.27 [−2.48, 0.09]	0.64	−0.11	−2.05	0.052	−1.25 [−2.45, −0.08]	0.60	−0.13	−1.97	0.037
Bottled water environmental effects	0.64 [−0.03, 1.29]	0.33	0.10	2.01	0.054	0.42 [−0.18, 1.01]	0.31	0.06	1.38	0.166
Contamination concern	0.22 [−0.38, 0.81]	0.29	0.04	0.75	0.457	−0.37 [−0.81, 0.08]	0.22	−0.08	−1.58	0.089
Image	−0.42 [−1.16, 0.34]	0.39	−0.06	−1.10	0.277	−0.43 [−1.22, 0.33]	0.37	−0.70	−1.15	0.230
Health beliefs	0.05 [−0.68, 0.83]	0.40	0.01	0.13	0.903	0.11 [−0.70, 1.00]	0.44	0.02	0.27	0.785
Taste	−0.29 [−1.46, 0.80]	0.58	−0.03	−0.54	0.573	0.69 [−0.39, 1.72]	0.54	0.06	1.28	0.196
Still water image	0.47 [−0.65, 1.59]	0.59	0.05	0.90	0.427	0.62 [−0.37, 1.59]	0.51	0.07	1.17	0.228

in the sensitivity towards norms associated with bottled water, tap water consumption in both countries increased by ~1.1%. The convenience associated with bottled water transport also had an inverse relationship with tap water consumption. As the perceived convenience of transporting bottled water decreased, Swiss tap water consumption increased by ~1.3% while that of the Germans decreased even more, by 2.2%. This implies that despite their already higher consumption, Germans would consume even more bottled water if its transportation was more convenient.

Finally, and perhaps very interesting, was the finding that a more positive image of sparkling water was related to lower tap water consumption. Seemingly, for the German respondents in this study, the image associated with sparkling water, and particularly its trendiness, hindered their consumption of tap water, with every unit increase in the positive image of sparkling water resulting in a 1.3% reduction in tap water consumption. Data from sparkling water regression analyses also corroborate this influence of image on consumption. For German respondents, in particular, the image associated with sparkling water was significantly related to its consumption ( $p = 0.037$ ). Taken together, these data imply that association of sparkling water with a greater positive image was related to a higher consumption of it and less tap water consumption.

#### 4. Discussion

This study set out to investigate the drivers of bottled water consumption by consumers with ready access to safe tap water. Unlike previous studies, our model incorporated both psychological and non-psychological factors. The results show that with such an integrated approach, psychological factors such as affect, norms and the image associated with bottled water, specifically sparkling water, emerge top of the list. Of the tested non-psychological factors, only the (in)convenience of transporting bottled water was a significant predictor.

Norms had a significant influence on drinking water choice in both countries. One such norm dictated that sparkling water was more acceptable than tap water during special occasions or for guests. Norms are particularly important in such situations because individuals are more focused on acting in norm-congruent ways, making it more likely for norms to direct behaviour (Cialdini, Reno, & Kallgren, 1990 ; Herman & Polivy, 2005; Inauen, Hossain, Johnston, & Mosler, 2013; Vartanian, 2015). Although the origin of such consumption norms is not apparent to us, Herman and Polivy (2005) suggested that they may be drawn from peoples' individual experiences e.g. what kind of water pairs best with particular foods or from past practice i.e. what they have always done. It may also be that people consider spending money to

entertain guests i.e. buying bottled water, a sign that the guests are valued. By the same token, guests for whom one does not wish to incur the expense or inconvenience of procuring bottled water, are less valued. One way to test this hypothesis would be to measure perceptions of what it means to offer guests bottled sparkling water versus home-made sparkling water.

Results on the influence of convenience on consumption corroborate previous research i.e. that the inconvenience of transporting bottled water is a deterrent that leads some consumers to settle for tap water instead (Ferrier, 2001). Our qualitative interviews showed that convenience also influences on-the-go consumption so that even people who drank tap water at home consumed bottled water outside the home because it can be found at almost any store and in various quantities. This is, of course, a short-term view because it does not take into account the environmental impacts of such a choice. Nevertheless, there is some evidence that people can be influenced to make the shift to re-useable bottles and tap water consumption and that norm activation is a useful strategy for this (Santos & van der Linden, 2016; van der Linden, 2015).

This work showed clearly that peoples' choice of water is very closely related to the affect evoked by the specific water. Two sets of results confirm this. The first is from the semantic differential analysis which show that German respondents, who consumed less tap water, rated it significantly less positively than the Swiss. The other is from the affect ratings which also showed that tap water elicited less positive affect for the Germans than it did for the Swiss. Affective reactions often reflect learned responses to stimuli and a stimulus which evokes a positive affective reaction the first time, will evoke a similar reaction during subsequent exposures, and vice versa. This means that previously formed positive affect e.g. in childhood or from pairing sparkling water with particular foods, may be responsible for the positive affect associated with it, and for its consumption in subsequent occasions. Similarly, negative affect may be the result of early learning e.g. from opinions expressed in the home about tap water. Affect may also be the result of advertisements and the positive affect associated with bottled water is evidence of this (Pierce & Gonzalez, 2016; York, Barnett, Wutich, & Crona, 2011). Historically, and even today, bottled water advertisements employ imagery related to youth, fashion, sport, health, purity and other positive and desirable attributes. Arguably, such positively-valenced imagery generates a positive affect for the product. However, it may inadvertently generate negative affect for what is seen as the alternative i.e. if bottled water is pure then the alternative, tap water, is less pure. The result is that people drink more bottled and, therefore, less tap water. The role of advertisement in affect generation and preferential choice is therefore crucial.

The issue of taste has a long tradition in the potable water sector. Although it was not a significant predictor of consumption, evaluations by semantic differentials showed that German respondents, who it will be remembered consumed less tap water, rated its taste less positively than the Swiss. There is therefore a case for taste as a factor in water choice, and previous studies have shown this to be so (Doria, 2006; Hu, Morton, & Mahler, 2011; Platikanov et al., 2013). In addition, the finding that consumers' choice of bottled water was not influenced by concerns over the quality of tap water is reassuring and implies that consumers trust the relevant authorities (Parag & Roberts, 2009). It was also interesting to note that in contrast to the study by Ward et al. (2009), health beliefs were not a significant predictor of bottled water consumption in the population surveyed here.

## 5. Conclusions

This study has provided empirical evidence for the hitherto-undescribed role of psychological factors in water choice and

consumption. We have shown that such factors as affect, norms and the image associated with a given type of water can be significant predictors of choice, and may even be more significant predictors than contextual factors.

Such an integrated approach is key not just for understanding consumer choice, but also for influencing people towards more environmentally-friendly consumption. A number of approaches exploiting the insights presented here come to mind. One involves exploiting the influence of affect. Since people are more likely to consume tap water if they have a positive feeling about it, positive portrayals such as those utilised in the bottled water industry could generate more positive affect and, result in higher tap water consumption. Positive affect may also be generated by using role models to promote tap water or by campaigns highlighting its positive aspects e.g. environmental friendliness, and the fact that it is subjected to more stringent quality standards than bottled water.

There may also be room for changing behaviour by changing norms. This requires first identifying the origin of norms. Norms grounded simply on habit e.g. drinking bottled water on the go, may be reversed by signalling a desired behaviour. For example, signalling that the desired 'typical' behaviour of Princeton students should be 'sustainable' led to more students choosing to consume tap water and supporting a ban on bottled water on campus (Santos & van der Linden, 2016). This approach is particularly effective in institutions and organisations where such initiatives as providing re-useable bottles may provide a signal for acceptable consumption and induce social conformity. As such, institutional norm-signalling may be a vehicle for changing established social norms.

Finally, although environmental concern was not a statistically significant predictor of consumption, this study shows that, for some people, a relationship exists between consumption choice and environmental concerns. Swiss people, who consumed less bottled water, showed greater concern about the environmental impacts of bottled water. This means that existing approaches to curbing bottled water consumption are not entirely misguided and so new strategies need not ignore this aspect entirely. Nevertheless, Saylor et al. (2011) found that some people believed recycling eliminated the negative environmental impacts of bottled water. So perhaps, environment-based messages are not as effective because of misinformation among consumers. Identifying and correcting such misinformation may increase the effectiveness of campaigns. Providing information on the environmental effects on bottled water on labels may be another way of correcting such misinformation (Parag & Roberts, 2009).

More importantly, however, is how information around the environmental effects of bottled water is communicated. Cialdini (2003) points out that mobilising action against an issue by portraying it as regrettably frequent is ineffective. This is because it makes the undesirable behaviour appear to be the norm and since people are more likely to act in norm-congruent ways, the intended result is not achieved. Effective communication strategies should rather make use of messages that imply everybody is performing the desirable action. For example, instead of highlighting the high consumption of bottled water, effective messages would suggest 'most people now drink tap water because they realise the negative impacts of bottled water on the environment'. More specifically, information should be designed for specific target populations e.g. by age or gender (Bator & Cialdini, 2000) and messages should be specific in how behaviour change can be effected, leaving out any distracting information (Pratkanis & Greenwald, 1993). There is, therefore, a case for maintaining some focus on activating environmental consciousness, but we posit that strategies incorporating psychological factors such as those identified in this study, would have greater impact and should, therefore, be considered.

Like other studies, ours too has limitations one of which

concerns the role of affect in water choice. While this study investigated the role of affect as a predictor of tap water consumption, affect may also serve a mediatory function. Future studies should therefore look into this possibility and the direction of the relationships.

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### Appendix

Appendix 1: Scales generated after factor analysis with varimax rotation, and their corresponding items. The loadings for each item are given in parentheses. Items indicated (R) were recoded.

Factor	Definition	Items (Loadings)
1. Convenience ( $\alpha = 0.74$ )	Convenience of bottled water transportation and effects on consumption.	1.1. I consume tap water because the transport of mineral water is cumbersome. (R) (0.67) 1.2. The transport of mineral water from the store to my home limits how much I consume of it. (R) (0.83) 1.3. The transportation of mineral water from the store to my home is cumbersome for me. (R) (0.66) 1.4. My consumption of mineral water is limited by its cost. (R) (0.42)
2. Norms ( $\alpha = 0.84$ )	What constitutes acceptable consumption.	2.1. At special occasions, mineral water is a more appropriate accompaniment to a meal than tap water. (0.71) 2.2. It is more appropriate to offer mineral water than tap water to guests at dinner. (0.80) 2.3. Offering guests mineral water shows appreciation or high regard for them. (0.70) 2.4. Mineral water pairs better with certain foods. (0.61)
3. Environmental impact of bottled water ( $\alpha = 0.84$ )	Opinions on the impacts of bottled water on the environment.	3.1. In comparison to tap water, the production of mineral water has more negative environmental effects. (0.83) 3.2. The consumption of mineral water contributes more to environmental degradation than does tap water. (0.88) 3.3. In comparison to tap water, mineral water is not an environmentally friendly product. (0.64) 3.4. In comparison to tap water, the transportation of mineral water has a stronger negative environmental effect. (0.63)
4. Chemicals and contamination concern ( $\alpha = 0.77$ )	Safety and quality of tap water and concerns about its contamination e.g. by chemicals.	4.1. I worry about harmful chemicals in drinking water in Switzerland (Germany). (R) (0.86) 4.2. I worry about the contamination of drinking water from the pipes in my house or office. (R) (0.49) 4.3. I worry about possible contamination of tap water by terrorist activities. (R) (0.45) 4.4. Contamination of tap water is not easy to detect and contain. (R) (0.39) 4.5. I worry about the quality of drinking water in Switzerland (Germany). (R) (0.75) 4.6. Tap water contains harmful chemicals. (R) (0.55)
5. Personal image ( $\alpha = 0.85$ )	The image of a person consuming bottled water.	5.1. The consumption of still water is indicative of a higher social status. (0.82) 5.2. The consumption of sparkling water is indicative of a higher social status. (0.81) 5.3. The image associated with still mineral water corresponds to the image I have of myself. (0.69) 5.4. The image associated with sparkling mineral water corresponds to the image I have of myself. (0.63)
6. Still water image ( $\alpha = 0.73$ )	The image associated with still water.	6.1. The consumption of still water is trendy. (0.58) 6.2. The consumption of still water goes hand-in-hand with sporting activity. (0.54) 6.3. Still mineral water is symbolic of youthfulness. (0.53)
7. Sparkling water image ( $\alpha = 0.76$ )	The image associated with sparkling water.	7.1. The consumption of sparkling water is trendy. (0.54) 7.2. The consumption of sparkling water goes hand-in-hand with sporting activity. (0.54) 7.3. Sparkling mineral water is symbolic of youthfulness. (0.52)
8. Health beliefs ( $\alpha = 0.77$ )	Health-related beliefs about bottled water.	8.1. Mineral water provides unique health benefits. (0.51) 8.2. Mineral water has more minerals than tap water. (0.68) 8.3. Mineral water is purer than tap water. (0.67) 8.4. Mineral water does not contain harmful chemicals. (0.56)
9. Taste ( $\alpha = 0.66$ )	Differences in the taste of still, sparkling and tap water.	9.1. Still mineral water tastes better than Swiss (German) tap water. (0.67) 9.2. Still mineral water tastes different from Swiss (German) tap water. (0.37) 9.3. Swiss (German) Tap water has a bad odour. (R) (0.47) 9.4. Swiss (German) tap water has excessive hardness (calcium/magnesium carbonate) for my taste. (R) (0.47) 9.5. Bottled water has excessive softness (not enough calcium/magnesium carbonate) for my taste. (R) (0.34)

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