

Chapter 2

Influential Factors on PEBs

Abstract In conducting PEBs, some factors can work as barriers while others act as accelerators. This chapter summarizes these barriers and accelerators and also explains the influence of psychological factors on PEBs. In the first section (2.1), various reasons to conduct and not to conduct PEBs are listed, and the relationships between the reasons and influential factors are shown. In the second section (2.2), the psychological factors, such as norm, attitude, affect, and cognitive dissonance, are explained. The influence of other factors, such as cost and benefit and knowledge, is explained in the following sections (2.3 and 2.4). In addition to the influence of sociodemographics, such as gender, age, education, and income, on the PEBs and environmental attitudes (Sect. 2.5), the influence of personality is also shown in Sect. 2.6. In the final section (2.7), the influence of situational factors, such as contextual and institutional factors, is explained.

The relationships between these factors can be illustrated by various models, which are described in more detail in Chap. 3.

Keywords Accelerator • Barrier • Norm • Attitude • Knowledge • Sociodemographics • Personality • Situational factors

2.1 Barriers and Accelerators to PEBs

Various studies have reported reasons to conduct or to not conduct PEBs. Table 2.1 summarizes these reasons in relation to possible influential factors. Some reasons are common for all PEBs, while others are specific to certain PEBs. Lee et al. (2013) have categorized PEBs based on these reasons using multiple correspondence analysis (Fig. 2.1). For example, as seen in Fig. 2.1, the behavior of purchasing organic foods (B47 in Lee et al. 2013; no.192 in Table 1.10) is conducted mainly because organic foods are recognized as being good for health ([v] in Table 2.1). The reason for it not being conducted is because of the additional cost compared to ordinary foods ([j]). In their study, Lee et al. concluded that one of the main reasons to conduct PEBs was financial “saving” ([j]).

Steg and Vlek (2009) summarized influential factors on PEBs. As shown in Table 2.2, they divided the factors into **intrapersonal** and **contextual**. They focused not only on the psychological factors but also on surrounding conditions,

Table 2.1 Possible reasons to conduct/not to conduct the target PEB

	Factor	Reasons to conduct <i>Because...</i>	Reasons not to conduct
a	Norm	It is a rule	It is not a rule
b		It is expected by other people	It is not expected by other people
c		It is being done by other people	Nobody is doing it
d		It is moral	It is amoral
e	Attitude	It is environment friendly	It is not environment friendly
f		It is necessary behavior	It is not necessary behavior
g		It is good behavior	It is not good behavior
h	Affect	It is cool	Is not cool
i		I like it	I do not like it
j	Cost and Benefit	It saves money	It costs [too much] money
k		It is beneficial	It is not beneficial
l		Time is saved	It is time consuming
m		It is not bothersome	It is bothersome
n	Knowledge	I know the meaning of the behavior	I do not know the meaning of the behavior
o		I know the procedure	I do not know the procedure
p		I know the effectiveness	I do not know the effectiveness
q	Ability	It is easy to do	It is difficult to do
r	Habit	It is a habit	Can be forgotten
s	Opportunity	There are many chances to conduct	There are no chances to conduct
t	Surrounding condition	There are many products to choose from	There is no choice of products
u		There are sufficient facilities	There are insufficient facilities
v	Sub-effect	Is good for health	Is not good for health
w		It is comfortable	Is not comfortable

such as preparedness of facilities or equipment. In Table 2.1, these factors are categorized from [s] to [u].

In the following sections, definitions and characteristics of each factor in Table 2.1 are explained in detail.

2.2 Psychological Factors

The most popular influential psychological factors on PEBs are explained in this section. Other specific psychological factors (e.g., risk awareness, perceived behavioral control, and others) are addressed in Chap. 3 along with behavioral model explanations.

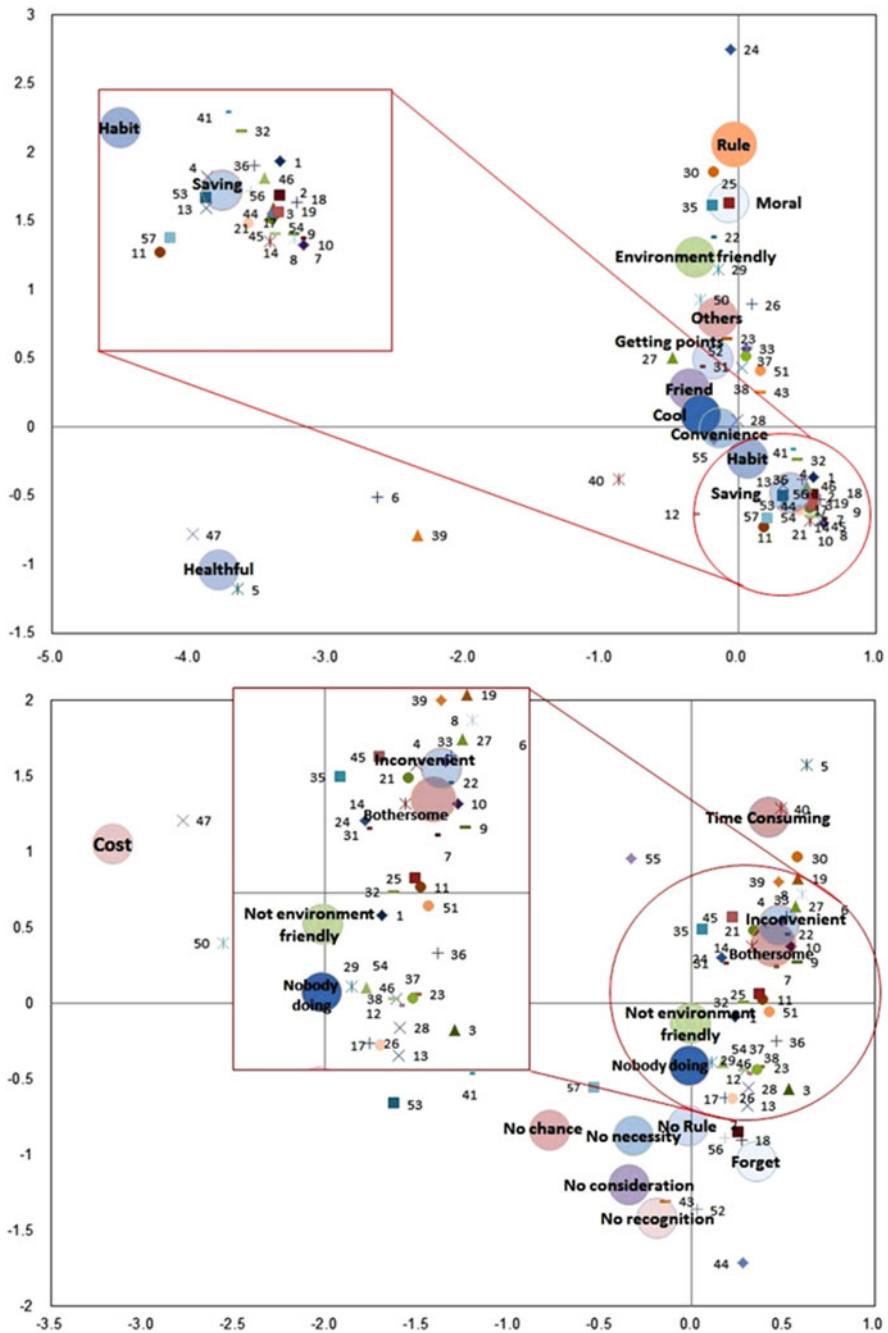
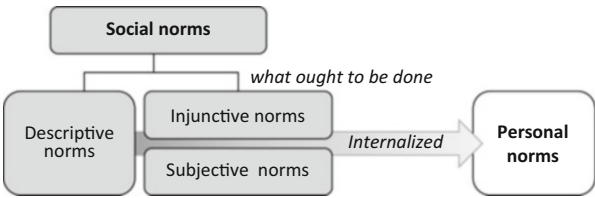


Fig. 2.1 Categorization of PEBs by reason in Seoul: *top*, reasons to conduct; *bottom*, reasons not to conduct (Lee et al. 2013; reused from *Journal of Low Carbon Economy*, which allows free use of materials). For each PEB number, please see Table 1.10

Table 2.2 Influential factors on PEBs

Steg and Vlek (2009)		Categorization in Table 2.1
Intrapersonal factors	Cost and benefit evaluation	j–m
	Norm	a–d
	Affect	h–i
	Attitude	e–g
	Habit	r
Contextual factors	Physical infrastructure	u
	Technical facilities	u
	Availability of products	t
	Product characteristics	

Fig. 2.2 Categorization of norms (Based on Cialdini et al. 1990; Thøgersen 2006)



2.2.1 Norm

“Norm” is considered to be one of the important factors in deciding people’s behaviors. The basic dictionary definition of norm is:

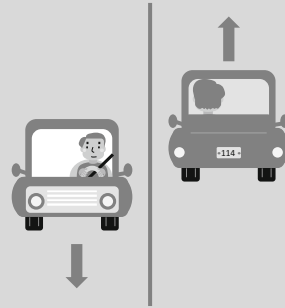
- An accepted standard or a way of being or doing things
(Cambridge Academic Content Dictionary)
- A generally accepted standard of behaviour within a society, community, or group
(Oxford Dictionary of Psychology 3rd ed.)

The basic categorization of norms into **social** and **personal** is shown in Fig. 2.2. Although the definition of social norms is not uniform, it can be thought of in general terms as the **behavioral standards shared in a group or society**.

According to Cialdini et al. (1990), social norms are categorized into “what ought to be done” (**injunctive**) and “what is done” (**descriptive**). Gibbs (1965) describes them as “collective evaluations [which] relate to how one ought to behave” and “collective expectations [which] refer to predictions as to what persons will do.” According to Cialdini (2007), “[i]njunctive social norms refer. . . to one’s perception of **what others believe to be appropriate conduct**.” In other words, injunctive norms refer to “rules or beliefs as to what constitutes **morally approved and disapproved** conduct” (Cialdini et al. 1990). On the other hand, the **descriptive norms** refer to **what others do**. As mentioned in Cialdini et al. (1990), “what is approved is often what is typically done, [therefore] it is easy to confuse these two meanings of norms.” Essentially, the big difference between these two is that **sanctions** often accompany injunctive norms (see Column 2.1).

Column 2.1: Injunctive Norm vs. Descriptive Norm

The abstract definition of a norm is sometimes quite difficult to understand. An **injunctive norm** is the standard that is **approved** by most people. It is also accompanied by **sanctions**. For example, in some countries, driving on the right-hand side is the approved standard, and anyone breaking this rule faces sanction. In the case, when you conduct this behavior to keep the rule, it can be based on the injunctive norm.



Alternatively, if you find many people to bring their own shopping bags to use in supermarkets and conduct this behavior to follow the other people's behaviors, it can be based on the **descriptive norm**.

The **subjective norm** is subjective perception of social norms and is defined as perception of expectation from others. As mentioned by Park and Smith (2007), “[t] here is some question about the distinctiveness of the subjective norms from the TPB [Theory of Planned Behavior (for details, see 3.1.3)] and the descriptive and injunctive norms from the SNA [social norm approach].” However, many studies have **ascribed the subjective norms from the TPB to the injunctive norms from the SNA**. Therefore, Ajzen (2006) recommended that in addition to items for subjective norms, items for descriptive norms should be included in questionnaires to aid understanding of the influences of the different two social norms on a behavior.

When a social norm is internalized, a **personal norm** is formed. Personal norms can be **internalized moral rules**, regarded as the perception of correctness or incorrectness of the target behavior. As shown in the next chapter, in several behavioral models, personal norms are considered to be one of the influential factors that determine PEBs. Schwartz (1977) especially proposed the norm-activation model (see Sect. 3.1.1.1 and Fig. 3.1), where personal norm activation is considered as an essential preceding step for altruistic behaviors.

2.2.2 Attitude

“Attitude” is another important factor to explain a wide range of behaviors, including PEBs. There has been a long history of attitude studies dating back to

the early twentieth century. Louis Leon Thurstone (1887–1995) proposed a scale to measure attitude in the late 1920s (Thurstone 1928, 1929). He described attitude as “the sum total of a man’s inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats, and convictions about any specified topic.” In the 1930s, Gordon Willard Allport (1897–1967), who is famous for studies on personality and prejudice, also conducted several studies on attitude.

Vernon and Allport (1931) tested six types of attitude first proposed by Eduard Spranger (1882–1963), these being: “(1) the theoretical, or interest in the discovery of truth; (2) the economic, or interest in the useful; (3) the aesthetic, or interest in form and harmony; (4) the social, or interest in, and love of, people; (5) the political, or interest in power; and (6) the religious, or desire for comprehension of, and unity with, the cosmos as a whole” (cited from Duffy 1940).

The **ABC (tripartite) model** for attitude was proposed by Harry Charalambos Triandis (b1926), which showed three components: **(A) affect**, **(B) behavior**, and **(C) cognition** (Triandis 1971). Rajecki (1982) explained that “the affective component is essentially the evaluative element in an attitude, on the basis of which the attitude holder judges the object to be good or bad,” “behavior represents an intentional element in attitudes,” and “cognitions are basically beliefs about the attitudinal object.” This ABC model has been widely adopted.

Fishbein and Ajzen (1975) defined “attitude” as “a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object” (Fishbein and Ajzen 1975). They pointed three important features of attitude involved in the above sentence: **consistency**, **predisposition**, and **learned**.

Environmental attitude (EA) has been defined by Hines et al. (1987) as “the individual’s feelings, pro or con, favorable or unfavorable, with regard to particular aspects of the environment or objects related to the environment.” EA can be divided into two levels: **general environmental attitude** and **attitude toward the PEB**. The former is usually considered as **environmental concern**, which represents the actor’s concern with regard to environmental problems. The latter is the actor’s specific attitude toward the target behavior. It represents whether an actor recognized the behavior positively or negatively. The attitude toward the behavior can be a more influential factor than general EA on the target behavior.

As shown by the meta-analyses of Hines et al. (1987) and Bamberg and Möser (2007), EA can be one of the significant determinants for PEBs (the details are shown in Sect. 3). However, there are also criticisms about the **gaps between attitude and behavior**. Blake (1999) shows three barriers lying between EA and PEB, **individuality**, **responsibility**, and **practicality**, as shown in Fig. 2.3. In addition to internal barriers, such as individuality, the influence of situational factors, such as practicality, is one of the reasons explaining the gap (see also Sect. 3.1.3).

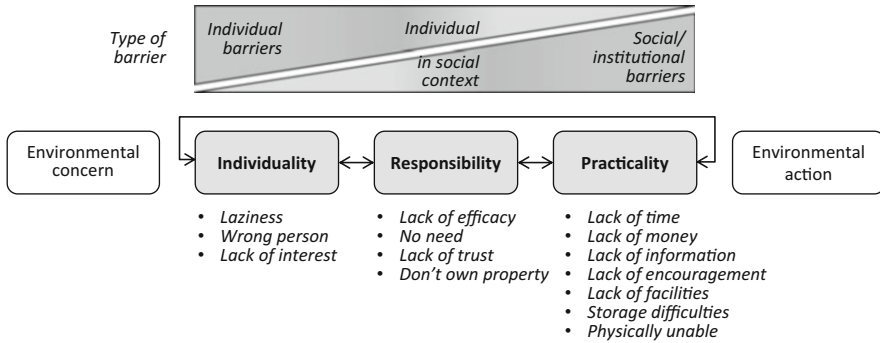


Fig. 2.3 Barriers between environmental concern and action (Blake 1999; reused by permission from *Local Environment* © Taylor & Francis)

2.2.3 Affect

“Affect” has been incorporated into “attitude” in many studies. As Fishbein and Ajzen (1975) stated, “affect is the most essential part of the attitude” and Rajecki (1982) selected affect as one of the three essential components of attitude as well as the ABC attitude model (see 2.2.2). However, Cohen (1990) proposed disentangling affect from attitude. The dictionary definition of affect is as follows:

Emotion or subjectively experienced feeling, such as happiness, sadness, fear, or anger.
(Oxford Dictionary of Psychology 3rd ed.)

Cohen et al. (2008) explained that affect is an **internal feeling state**. The influences of affect on behaviors have been investigated mainly in the field of consumer behavior research.

In terms of PEB, the influence of affect has been particularly discussed with regard to car possession and use. Steg (2005) observed that “[a]ffective motives refer to emotions evoked by driving a car, i.e., driving may potentially affect people’s mood and they may anticipate these feelings when making travel choices.” He measured affect using two aspects shown by Russell and Lanius (1984): “pleasure” and “arousal” (Fig. 2.4). He showed that car use is mainly derived from symbolic and affective motives instead of instrumental motives.

The influence of affect can be stronger in cases where other inner benefits, besides environmental benefits, such as comfort, cuteness, coolness, and so on, are associated with the target PEB. As seen in Fig. 2.1, for example, reasons to use a dishwasher (B55 in Lee et al. 2013) are coolness and comfort; therefore, affective influence may be large for this behavior.

Fig. 2.4 Structural representation of the affective appraisal of environments (Russell and Lanius 1984; reused by permission from *Journal of Environmental Psychology* © Elsevier)

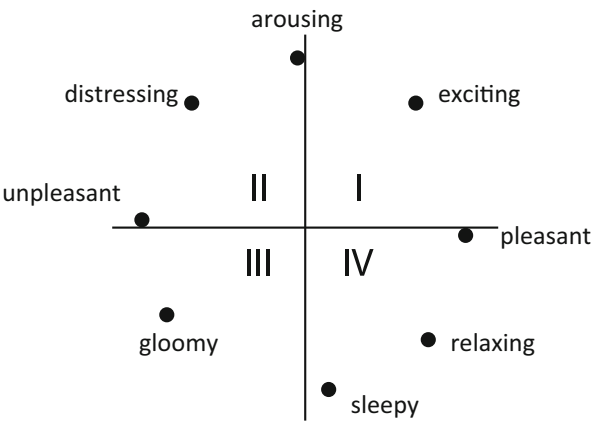


Table 2.3 Effect of monetary cost on PEBs

Act as	Condition	Example
Barrier	Monetary cost is needed for the target PEB	Environmentally conscious products are often more expensive than others
Accelerator	Monetary cost can be saved by the target PEB	Tap water saving results in reduced cost

2.2.4 Cognitive Dissonance

Leon Festinger (1919–1989) proposed the theory of **cognitive dissonance**, which explains the consistency of people’s attitudes and behaviors (Festinger 1957). The existence of dissonance makes people uncomfortable; therefore, they tend to **avoid inconsistency** in their attitudes, beliefs, and behaviors.

Thøgersen (2004) discussed that some PEBs share motivational roots and there is a spillover effect from one PEB to another. He tried to explain the correlations of PEBs by cognitive dissonance; people want to keep a consistency in their behaviors, thus practice or intention of one PEB can enhance the practice or intention of another similar PEB.

2.3 Cost and Benefit

2.3.1 Monetary Cost

Monetary cost is one of the critical factors determining PEBs. As shown in Sect. 2.1, Lee et al. (2013) revealed that one of the main reasons to conduct and not to conduct PEBs is monetary cost. As shown in Table 2.3, the monetary cost can act as an accelerator as well as a barrier. If people can save money through PEBs, monetary cost can act as accelerator. One example of cost saving acting as an

accelerator is the significant effect of introducing a charge system for disposable shopping bags on waste reduction, as shown by Kurisu and Bortoleto (2011). On the other hand, people often avoid PEBs that require significant monetary cost.

2.3.2 Time and Effort

In addition to monetary cost, other costs, such as time and effort, can be also influential factors. As seen in Fig. 2.1, many PEBs are placed around the reasons not to conduct them such as “bothersome” and “inconvenient” (Lee et al. 2013). For example, “avoiding discharging used cooking oils” (B21 in Lee et al. 2013; no. 83 in Table 1.10) is placed in the area covered by “bothersome” and “inconvenient” in Fig. 2.1, because discharging used cooking oils into sewers is much easier than collecting and storing them or using an oil absorbent.

2.4 Knowledge

Kaiser and Fuhrer (2003) mentioned that “knowledge” is a **necessary condition but not a satisfactory condition** to conduct PEBs. If we don’t have enough knowledge about the target behavior, we cannot conduct the behavior. However, even if we have enough knowledge about the behavior, we do not always conduct the behavior.

Kaiser and Fuhrer (2003) categorized environmental knowledge into four types: (1) **declarative**, (2) **procedural** (i.e., action- related), (3) **effectiveness**, and (4) **social**.

Declarative knowledge can be defined as:

Awareness and understanding of factual information about the world. . .

(Oxford Dictionary of Psychology 3rd ed.)

It represents what is the environmental phenomenon or behavior; for instance, what is the ozone depletion phenomenon.

When people act out a behavior, they need to know how to do it. This is the so-called procedural knowledge. Declarative and procedural knowledge are sometimes bound as a single knowledge form (Kaiser and Fuhrer 2003). The influence of procedural knowledge on PEBs has been well investigated for recycling. If people don’t know where the segregation boxes are placed or how to segregate, they cannot appropriately conduct the recycling behaviors. This is the reason why the provision of procedural information can foster people’s recycling behaviors after a recycling policy is introduced.

Knowledge about effectiveness is knowledge about outcomes of the target behavior. People want to know how much benefit they can get: how much energy is saved or by how much greenhouse gases are reduced by their behaviors. Knowing about the effectiveness of their behaviors can enhance people’s behaviors. This

knowledge can be related to psychological variables, such as “awareness of consequences (AC)” in Schwartz’s norm-activation model (see Sect. 3.1.1) and “beliefs about consequences of the behavior” in the theory of reasoned action (TRA) model by Fishbein and Ajzen (see Sect. 3.1.2).

2.5 Sociodemographics

Sociodemographics can have direct effects on PEBs and also have indirect effects on PEBs through the influences on psychological factors, such as on environmental attitude (EA).

There have been various studies conducted about relationships between PEBs and sociodemographics; however, we cannot find consistent tendencies because the **influence of sociodemographics varies according to time, social situation, and target PEB**. Besides, it has also been pointed out by many studies that the explained variance for PEBs by sociodemographics is quite small. One outstanding study by Van Liere and Dunlap (1980) concluded that “younger, well-educated, and politically liberal persons tend to be more concerned about environmental quality than older, less educated, and politically conservative counterparts” based on their review of 21 studies from 1968 to 1978 (Table 2.4). However, the results of this review reflect the tendencies of the time (1970s) in developed countries.

Gatersleben et al. (2002) analyzed the influence of sociodemographics and attitudinal variables on PEBs. Their results showed that larger households and older, lower-income people and people with a higher level of education performed more PEBs.

Although the **sociodemographic influence on PEBs may be small and not have been consistently reported in previous studies**, this section explains some influential sociodemographics on EA and PEBs and illustrates some previous outcomes.

2.5.1 Gender

2.5.1.1 Gender Influence on EA

Consistent evidence for the influence of gender on EA has not been found in previous studies (Van Liere and Dunlap 1980). Some researchers reported that males have higher concern than females (Arcury and Christianson 1990), while opposite results have been also shown by other studies (Blaikie 1992; Stern et al. 1993; Schahn and Holzer 1990; Ebreo et al. 1999).

Blaikie (1992) cited one aspect reported by Blocker and Eckberg as follows:

Blocker and Eckberg (1989) found that women were no more concerned than men about general environmental issues, but were significantly more concerned about local specific issues. In addition, Schahn and Holzer (1990) noted women were more environmentally concerned in those topical areas that refer to household behavior, whereas men knew more about environmental problems.

Table 2.4 Relationships between EA and sociodemographics shown by 1970s studies (Reviewed by Van Liere and Dunlap 1980; modified; reused by permission from *Public Opinion Quarterly* © Oxford University Press)

		(1)							
Ref.		Age	Educ.	Inc.	Occ.	Res. (2)	Gender (3)	Party (4)	Ideol. (5)
(a)	Recycling index	n	p	—	—	—	n	—	—
	Env. future orientation	n	p	—	—	—	n	—	—
(b)	Awareness of env. prob.	n	p	—	—	p	—	p	p
	Support for env. reforms	n	p	—	—	p	—	p	p
(c)	Ameliorative dimension	—	p	—	—	—	—	p	p
	Redirective dimension	—	p	—	—	—	—	n	p/n
(d)	Env. concern (1973)	n	p	p	p	n	p	p	—
	Env. concern (1974)	n	p	p	p	p	n	p	p
	Env. concern (1975)	n	p	p	p	p	p	p	p
	Env. concern (1976)	n	p	p	p	p	p	p	p
(e)	Env. concern index	NR	NR	NR	NR	—	—	p	—
(f)	Awareness of env. prob.	n	p	—	—	—	—	—	—
(g)	Env. ideol. — production	n	p	n	p	—	—	—	—
	Env. ideol. — consumption	n	p	n	p	—	—	—	—
(h)	Env. concern	n	p	p	—	p	—	NR	p
(i)	Import. of pure env.	n	p	—	—	—	—	+	+
	Attainment of pure env.	n	p	—	—	—	—	+	+
	Conservation scale	n	p	—	—	—	—	+	+
	Pollution scale	n	p	—	—	—	—	+	+
	Power plant scale	n	p	—	—	—	—	+	+
	Overpopulation scale	n	p	—	—	—	—	+	+
	Pop. control scale	n	p	—	—	—	—	+	+
(j)	Population scale	n	p	p	n	p	n	n	p
	Pollution scale	n	p	n	p	p	p	p	p
	Resource cons. scale	n	p	n	p	p	p	p	p
	NEP scale	n	p	n	n	p	p	p	p
	Env. funding scale	n	p	n	p	p	p	p	p
	Env. regulation scale	n	p	n	n	p	p	p	p
	Personal behavior scale	p	p	n	p	p	p	p	p
	Public behavior scale	p	p	p	p	n	p	n	p

(continued)

Table 2.4 (continued)

		(1)							
Ref.		Age	Educ.	Inc.	Occ.	Res. (2)	Gender (3)	Party (4)	Ideol. (5)
(k)	Env. behavior index	n	p	—	p	—	—	—	p
(l)	Env. as a prob. (1968)	—	p	p	—	n	—	—	—
	Env. as a prob. (1969)	—	p	p	—	n	—	—	—
	Env. as a prob. (1970)	—	p	p	—	p	—	p	—
(m)	Env. concern scale	NR	p	n	—	—	—	—	p/p
(n)	Pollution value index	n	p	p	p	p	—	+	p
(o)	Air poll. in state	n	p	—	—	p	—	—	—
	Air poll. in community	n	p	—	—	p	—	—	—
	Water poll. in state	—	p	—	—	p	—	—	—
	Water poll. in community	—	p	—	—	p	—	—	—
(p)	Air poll. in state	n	p	—	—	p	—	—	—
	Air poll. in community	n	p	—	—	p	—	—	—
	Water poll. in state	n	p	—	—	n	—	—	—
	Water poll. in community	n	p	—	—	p	—	—	—
(q)	Env. most impt. prob. (1970)	n	—	—	—	p	p	n	—
	Env. most impt. prob. (1972)	n	—	—	—	—	p	n	p
(r)	Env. concern	n	p	p	—	p	n	—	—
(s)	Env. concern	—	p	—	p	—	p	—	—
(t)	Support env. protection	n	p	p	p	—	—	—	—
(u)	Env. concern	n	p	p	—	p	n	—	—

(a) Arbuthnot and Lingg (1977), (b) Buttel and Flinn (1976), (c) Buttel and Johnson (1977), (d) Grossman and Potter (1977b), (e) Koenig (1975), (f) Martinson and Wilkening (1975), (g) Malkis and Grasmick (1977), (h) Springer and Constantini (1974), (i) Tognacci et al. (1972), (j) Van Liere and Dunlap (1978), (k) Weigel (1977), (l) Buttel and Flinn (1974), (m) Constantini and Hanf (1972), (n) Dillman and Christenson (1972), (o) Harris (1970a), (p) Harris (1970b), (q) Hornback (1974), (r) McEvoy (1972), (s) Murch (1974), (t) Murdock and Schriner (1977), (u) National Wildlife Federation (1972)

(1) n, negative correlation; p, positive correlation; —, not analyzed; +, significant differences were found

(2) p means urban residents are more concerned than rural residents

(3) p means females are more concerned than males

(4) p means democrats are more concerned than conservatives

(5) p means liberals are more concerned than conservatives (anti-laissez faire liberalism/welfare state liberalism)

2.5.1.2 Gender Influence on PEBs

The meta-analysis of four PEB studies by Hines et al. (1987) showed insignificant correlations between gender and PEBs (see Table 3.1), and some studies have also shown no gender influence on PEBs. However, other studies have shown significant relationships between gender and PEBs.

Lee et al. (2013) reported that, out of 57 PEBs, the practice rate of females was statistically higher than that of males in 33 PEBs in Seoul and 37 PEBs in Tokyo. They explained this as being because most of the PEBs related to household affairs, which females are usually more engaged in. Aoyagi-Usui et al. (2003) showed that Japanese women were more likely to be positive than men in energy-saving and green-consumer behaviors. Scott and Willtis (1994) also showed that females were more likely to be green consumers. Saphores et al. (2006) demonstrated that women were much more willing to recycle e-waste. Barr (2003) showed that females were more likely to conduct waste prevention behaviors than males, whereas there was no gender influence on recycling behaviors in Exeter, England.

Opposite results are also seen in other studies; Bortoleto et al. (2012) showed a higher practice rate in males in three out of ten of waste prevention behaviors in Sao Paulo. The study by Aoyagi-Usui et al. (2003) showed different results from Japan for the Netherlands, where women were less likely to be positive than men in political and energy-saving behaviors.

2.5.2 Age

2.5.2.1 Age Influence on EA

Three influences on age have been pointed out: “aging,” “cohort,” and “period” (Blaikie 1992). “Aging” means that people come to think of the society with age, while “cohort” means that people are influenced by what year they were born. The combination of these two aspects can be considered as “period.”

Blaikie (1992) investigated the age influence on people’s ecological world views. He showed that a middle-aged cohort had the highest ecological world view and explained this because the target age cohort had spent their youth in the late 1960s and early 1970s in Australia and was most susceptible to developing high environmental awareness. His study explained the age influence as “cohort” influence. On the other hand, many studies showed significant correlation between age and EA, meaning “aging/antiaging” influence on EA. Positive correlation was shown by Ebreo et al. (1999) in Champaign–Urbana, USA, where older people demonstrated more concern about nature-related attributes than younger people. Although there are some studies showing positive correlations between age and EA, many studies showed that younger people have more environmental concerns (Van Liere and Dunlap 1980; Arcury and Christianson 1990); this fact represents some antiaging effect; it means that higher awareness in youth can be lost by aging.

Based on these different aspects of age influence, we should carefully interpret our results about the relationships between age and EA.

2.5.2.2 Age Influence on PEBs

Hines et al. (1987) concluded based on 10 previous papers that younger people were slightly more likely to engage PEBs than older people (see Table 3.1). However, many papers show opposite tendencies. Barr (2003) reported that older people were more likely to conduct waste prevention and recycling behaviors. Vining and Ebreo (1990) showed the same tendency for recycling. Kurisu and Bortoleto (2011) showed older people's higher practice rate in 13 out of 18 of waste prevention behaviors in three Japanese megacities. Lee et al. (2013) also showed that older people tended to practice PEBs more than younger people in Seoul and Tokyo. Whitmarsh (2009) demonstrated that older people were more likely to buy energy-saving light bulbs and turn off unused lights in Hampshire, England.

There were some exceptions in these studies. Lee et al. (2013) and Whitmarsh (2009) showed that younger people were more likely to use public transportation (no. 67 in Table 1.10) than older people because of their better mobility and the necessity of commuting. Kurisu and Bortoleto (2011) showed that respondents in their 60s showed significantly lower practice rates than respondents of other ages for "own cup use" (no. 116 in Table 1.10). The reason could be that "the trend of using my cup or tumbler at offices and coffee shops (e.g., Starbucks) has spread especially among younger ages in Japan." They also showed that people in their 30s and 40s showed a higher practice rate of "recycling shop use" (no. 125 in Table 1.10) than others, because they had young children and would often use recycling shops and free markets to donate clothes and toys or buy temporary necessary equipment.

As seen in this section, there are some contradictions in age influences on EA and PEBs. Younger people may have a higher environmental consciousness and passion, as shown by some studies; however, this cannot connect with actual behaviors. There is a gap between attitude and actual behavior (see Sect. 2.2.2). One possible reason for this is the influence of situational factors, but other uncertainties can also exist. For predicting PEBs, attitude toward the target behavior is a more reliable determinant than general environmental attitude (EA).

2.5.3 Education and Income

Educational and income levels are sometimes integrated into one social-level factor; these are therefore explained together in this section. However, it should be carefully investigated before interpretation of your results as to whether correlations between income and age or income and education exist for your target

samples. If there is a strong correlation, you should interpret carefully which factor is likely to be the main determinant for the target behavior (see Column 4.4).

2.5.3.1 Education and Income Influences on EA

Van Liere and Dunlap (1980) showed the consistent influence of educational level on EA; a higher educational level showed a higher EA, as seen in Table 2.4. O'Connor et al. (1999) also showed a positive correlation between educational level and intention of PEBs. On the other hand, the opposite tendency was seen by Ebreo et al. (1999), who showed that people with higher education had a lower level of nature-related attributes.

Unlike education, the influence of income on EA has not been consistent in previous studies (Van Liere and Dunlap 1980).

2.5.3.2 Education and Income Influences on PEBs

Hines et al. (1987) reported average positive correlations between income and PEBs as well as education level and PEBs (see Table 3.1). This suggests that people with a higher income and a higher level of education are slightly more likely to engage in PEBs. Scott and Willtis (1994) also showed that higher education and higher income were associated with higher PEBs.

Bortoleto et al. (2012) showed that individuals with a graduate level of education were more inclined to engage in home composting than other educational levels. They also showed that those with higher incomes were more likely to engage in waste prevention behavior by reusing things and taking their own bags to supermarkets. Oskamp et al. (1991) showed that recyclers have higher family incomes than non-recyclers. Their results also showed slightly higher education level in recyclers, but it was not statistically significant. Similarly, Whitmarsh (2009) showed insignificant correlation between education and energy conservation behaviors.

2.6 Personality

2.6.1 Influence on EA

Borden and Francis (1978) discussed the influence of personality on EA. They characterized the environmentally concerned person as someone who has **high personal control, high future perspective, and high responsibility and low authoritarianism and protestant ethics, low generalism** (rather than being a thing specialist), and **low androgyny** (rather than having a traditional sex

orientation). As seen in Van Liere and Dunlap (1980), liberalism was considered as one of the influential personality traits on EA at that time.

2.6.2 *Influence on PEBs*

Some studies have reported the influence of personality on PEBs. Arbuthnot (1977) evaluated the influential factors on the use of recycling centers. He revealed that recyclers showed lower scores on the “general **conservatism**” and “lack of **personal control**” factors. It indicated that the recyclers were more **liberal** and relied on their abilities to have control over events. Scott and Willtis (1994) also showed that liberalists were more likely to conduct PEBs. However, the influence of personality would be an indirect effect through EA in these cases. Besides, the influential personality on PEBs can change with the times; when pro-environmental activities were not common, being popular only for liberal people, liberality was one of the important personalities to determine the PEBs. However, when environmental issues become quite common for most people, liberality is not an influential factor.

“**Locus of control**” was first proposed by Julian Rotter (1916) as the personality measure about how much people think outcomes depend on their own actions (Rotter 1966). Locus of control is a bipolar concept, consisting of “**external control**” and “**internal control**.” The belief that events can be controlled by external forces, such as fate or gods, is a belief in external control. If people think events can be driven by their own behaviors, that is a belief in internal control. This aspect has been considered as one of the influential factors on PEBs. Hines et al. (1987), for instance, showed that locus of control is one of the personality factors that determine the intention of PEBs (see Sect. 3.2.5.1).

Other general personality aspects, such as cultural theory, are explained in Chap. 4, where questionnaire items are shown.

2.7 **Situational Factors**

As shown in Table 2.2, in addition to intrapersonal factors, contextual factors, such as preparedness of facilities or equipment and product availability, can be also influential factors on PEBs.

Oskamp et al. (1991) showed that recyclers were invariably **homeowners**. Ebreo et al. (1999) also showed a significant influence of housing type on their EA and recycling behaviors. For recycling, for instance, storage space for segregated materials is needed; therefore, house type and size can be important influential factors. Again for space reasons, composting behavior has been shown to be influenced by house type (Tucker and Speirs 2001). Kurisu and Bortoleto (2011) demonstrated that people living in **detached houses** showed significantly higher

practice rates for composting behavior than those living in other housing types. Similarly, installation of eco-facilities, such as solar panels and wood stoves, can be also influenced by house type.

Lee et al. (2013) explained that the higher practice rate of recycling secondhand clothes in Seoul (B26 in Lee et al. 2013; no. 126 in Table 1.10) than in Tokyo was because **collection boxes** were placed beside daily curbside waste collection boxes in Seoul, making the practice very easy, whereas people in Tokyo needed to take old clothes to department stores or recycling shops. Saphores et al. (2006) showed similar results for e-waste; they showed that in California the closer a drop-off e-waste center, the higher the probability of willingness to recycle. Thus, installation of recycling boxes has been considered as one of the influential factors on recycling behavior.

Institutional factors can explain regional differences between PEB practices. In regions where public transportation is not well provided, people cannot select a public transportation option. Kurisu and Bortoleto (2011) compared the waste prevention behaviors in three megacity regions in Japan. They showed extremely high practice rate of using own shopping bags (no. 117 in Table 1.10) in Aichi prefecture where the charging of plastic shopping bags occurred in most cities and towns. The same effect of introducing a **charging system** for disposable shopping bags has been reported in several studies (Ueta and Koizumi 2001; Convery et al. 2007; Lee et al. 2013). Instead of a charging system, some regions have reward systems, such as **subsidies** and **deposits**, which can also enhance PEBs. For example, if shops charge deposit money for beer or milk bottles, people tend to return the bottles to claim back their deposit and the reuse rate is enhanced (no. 117 in Table 1.10). When subsidies for eco-facilities, such as solar panels and composting machines, exist in a region, it can enhance the installation of those facilities there.

In the case of product selection, **availability** is an important influential factor. For instance, no matter how much you might want to use refillable products, you are unlikely to use them if the closest supermarket doesn't offer refillable items so would have to travel further afield.

Kollmass and Agyeman (2002) also pointed out **social and cultural** influences. They hypothesized that "cultures in small, highly populated countries such as Switzerland and The Netherlands tend to be more resource conscientious than societies in large, resource-rich countries, such as the USA." Ando et al. (2010) compared PEBs between Japan and Germany and pointed out that Japanese subjective norm influences were stronger than German ones. Many other studies also showed that Japanese people care so much about what others think in their culture; the subjective norm effect of this on behaviors is much larger than in other cultures (Abrams et al. 1998; Ando et al. 2007; Lee et al. 2013). On the other hand, Pieters (1989) showed an insignificant influence of social norms on recycling in the Netherlands, the reason being explained by the cultural background and value system. Zheng (2010) reported different environmental consciousness and PEB patterns in East Asian cities. They also examined the influence of different value systems on environmental consciousness in East Asian countries (Zheng

et al. 2006). Hence, when we conduct a cross-national study, we need to consider not only institutional factors but also cultural and value differences.

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