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Misperceived eating norms: Assessing pluralistic ignorance in the food environment

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ABSTRACT

The current food environment communicates the social norm that it is normal to consume large amounts of unhealthy and unsustainable foods. However, it is unknown whether people endorse this norm because they agree with it, or whether they endorse it because they overestimate the degree to which other people agree with this norm – a phenomenon that is labeled as 'pluralistic ignorance'. We examined the possible presence of pluralistic ignorance by corroborating previous pluralistic ignorance literature in the food environment among a large representative sample of community residents ($N = 433$). In addition, we aimed to better assess pluralistic ignorance by comparing multiple dimensions, including how participants perceived themselves and other people in the *importance*, *frequency*, *normalcy*, and *intentions* of consuming healthy and sustainable food. We analyzed the perceptions with paired t-tests and our findings show that participants considered themselves to be healthier and more sustainable eaters than other people on all four dimensions. However, they did not think that other people were eating unhealthy or unsustainable. Participants themselves held low intentions to eat more healthily or sustainably and believed others had similar low intentions. Together, these findings reveal that there is a discrepancy between the perception of oneself and others regarding healthy and sustainable eating norms, which may suggest pluralistic ignorance. However, it is unclear whether this discrepancy would actually influence behavior, as suggested by the pluralistic ignorance literature, since people consider themselves healthier and more sustainable consumers who may not adjust their standards to perceptions of other people. We speculate they may use this discrepancy as justification in order to be complacent. In the discussion we consider these implications and next steps for future research.

1. Introduction

There is consensus that the current food environment in the Western world is encouraging unhealthy and unsustainable food choices (Lakerveld et al., 2018; Swinburn et al., 2011; Townshend & Lake, 2017). This 'toxic' food environment (Brownell, 2004), is characterized by the abundant availability of relatively cheap unhealthy and unsustainable food options. The features of this unhealthy and unsustainable food environment consist of any opportunity to acquire food, and includes economic, physical and policy influences on a micro (e.g., socio-economic position) or macro level (e.g. pricing of food; Townshend & Lake, 2017). The food environment is not limited to these kind of influences, as influences are also present in the social context that communicates the appropriateness of unhealthy and unsustainable food consumption (De Ridder et al., 2013). It is well known that the social context influences people's food choices, for example by providing information about what other people are eating. Research on social eating norms has demonstrated that people tend to model their food choices after other people around them (Herman et al., 2003; Higgs, 2015). As such, social norms are a crucial component when studying how the food environment affects food choices.

Only 30% of the people who hold healthy behavior intentions translate these intentions into actual behavior (Conner & Armitage, 1998; Godin & Kok, 1996). Several factors such as setting goals that are too ambitious, or lack of self-regulatory skills account for the intention-behavior gap (Mullan et al., 2014; Sheeran, 2002), but social norms warrant special attention as a predictor of the intention-behavior gap. Social norms are unwritten rules consciously or unconsciously upheld by a social group and are indicative for how people of that corresponding group (should) act (Bicchieri, 2005). Within social norms there is a clear distinction between two different types: descriptive norms and injunctive norms (Cialdini et al., 1990). Descriptive norms (informational social influence) are about what other people actually do. In contrast, injunctive norms (appropriate behaviour) describe how

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people think they ought to behave according to other group members. When eating is concerned, people's behavior is guided by these two type of social norms and what people perceive in others; what others do and what they convey is appropriate (Herman et al., 2003; Higgs, 2015).

However, the perception of social norms may not always reflect 'true' social norms (i.e., actual intentions or behavior from others). Currently, it is unknown whether people not acting in line with their intentions misperceive the social eating norm and thereby overestimate other people's engagement in unhealthy and unsustainable food choices, or whether they correctly perceive other people's engagement in unhealthy and unsustainable food practices which may predict their own behavior accordingly. From here on, we refer to healthy and sustainable eating with 'desirable' eating. The term entails food choices that are recommended in order to improve one's health and have a minimal burden on the planet (Willett et al., 2019).

Generally speaking, people's perception of others' behavior and beliefs are not always correct; people may misperceive the intentions of others. This could be due to other's overt behavior which does not necessarily align with those people's personal beliefs, resulting in a misperceived social norm (Berkowitz, 2004; Borsari & Carey, 2003; Perkins, Haines, & Rice, 2005; Perkins et al., 2010; Toch & Klofas, 1984). Perceptions of social norms among social groups are known as collective norms and affect individual's perceptions and in turn our behavior (Lapinski & Rimal, 2005). Due to a widespread misperceived collective norm, people may incorrectly perceive the behavior and attitudes of others as different from their own behaviors and attitudes when in reality they are similar. This phenomenon is known as pluralistic ignorance (Miller & McFarland, 1991; Prentice & Miller, 1993; Toch & Klofas, 1984) and "occurs when a majority of individuals falsely assume that most of their peers behave or think differently from them when in fact their attitudes and/or behavior are similar" (Berkowitz, 2004, p. 7).

Pluralistic ignorance can result in both the overestimation of undesired problematic behavior (e.g., overestimating others' comfort and support regarding bullying; Sandstrom et al., 2013) and the underestimation of desired behavior (e.g., underestimating support for climate change; Geiger & Swim, 2016; Leviston et al., 2013). A prototypical example of overestimating problem behavior and its devastating consequences concerns misperceived alcohol consumption norms among college students, showing that the majority of students believed that their peers were in favor of consuming large amounts of alcohol, while in turn their peers consumed large amounts because they thought that this was the social norm, even though this was not their initial preference (Prentice & Miller, 1993). Due to these misperceived beliefs of others, the majority of college students in the study conformed to drinking large amounts of alcohol against their own wish. This classic pluralistic ignorance example demonstrates why undesirable social norms can persist in groups of people even though the majority does not endorse this social norm (Berkowitz, 2004). Certain behaviors are upheld in a cycle of misperception and conformity even when individuals never intended to act this way.

Similar to the problematic behavior of alcohol consumption, the preference for undesirable food may also be overestimated due to the misperception of undesirable eating norms (De Ridder et al., 2013; Suglia et al., 2016; Swinburn et al., 2011). For example, people may increase their fast food consumption since they overestimate the preference for fast food of others (Van Rongen et al., 2020). Despite the potential relevance of pluralistic ignorance as an explanation of why so many people fail to act in accordance with their desirable eating intentions, a recent review by Sargent and Newman (2021) revealed that there has been no previous research on this topic. Their review of 77 articles on pluralistic ignorance included only one study related to the food domain with a focus on vegetarian identity (Kitts, 2003). Given the potential significance of pluralistic ignorance as an explanation of how the food environment communicates that undesired eating is appropriate, this study aims to establish whether misperceived food practices are present in the domain of desirable eating.

Previous research on pluralistic ignorance has typically measured the phenomenon through a single item or a small number of dimensions related to the topic. For instance, a classic study by Prentice and Miller (1993) on alcohol consumption employed questionnaires to assess personal and perceived others' levels of comfort with drinking (e.g., "*How comfortable do you feel with the alcohol drinking habits of students here?*" and "*How comfortable would you say the average student feels with the alcohol drinking habits of students here?*"; cf., Hines, Saris & Throckmorton-Belzer, 2002). Other studies employed questionnaires to measure different dimensions of pluralistic ignorance by asking about the personal and perceived *appropriateness* of specific behavior, such as controlling behaviors and physical violence in romantic relationships (Hertzog & Rowley, 2014) or personal and perceived attitudes towards paternity leave (Miyajima & Yamaguchi, 2017). Pluralistic ignorance has not yet been investigated in the domain of eating behavior, but it is probable that multiple dimensions of pluralistic ignorance will play a role, as there may be a comprehensive range of perceptions that may exist about others' eating behavior. These dimensions include how important people consider their own desirable food choices (El Ansari et al., 2015), and how frequently they consume desirable food (El Ansari et al., 2015) as compared to their perceptions of other people. The *normalcy* of desirable eating (Robinson et al., 2014), and *intentions* to eat more desirably (Allan et al., 2008) can be part of pluralistic ignorance as well, again in comparison to their perceptions of other people. By taking multiple dimensions related to food choices into account we aim to better ascertain pluralistic ignorance in the context of food consumption.

Pluralistic ignorance has mostly been studied in homogenous groups within a specific setting such as (college) students (e.g., Hines, Saris & Throckmorton-Belzer, 2002; Prentice & Miller, 1993; Shelton & Richeson, 2005; Smith-Simone et al., 2008; Suls & Green, 2003) or employees within an organization (Halbesleben et al., 2007). This means that most studies have been conducted in situations where groups of people had to compare themselves with their close peers or other salient in-group members. However, eating behavior also takes place in shared food environments with less defined groups. That is why we intend to map pluralistic ignorance in neighborhoods where more heterogenous groups of people live, who may not be in close contact with each other, but do share a common food environment.

1.1. Current study

The aim of the current study is to investigate the presence of pluralistic ignorance in the domain of eating behavior in Dutch neighborhood settings. We intend to corroborate previous pluralistic ignorance studies in a new context and investigate it through multiple dimensions to capture a comprehensive range of perceptions that may exist about others' eating behavior. Specifically, we will assess the perceived *importance* of food choices (El Ansari et al., 2015), *frequency* of food choices (El Ansari et al., 2015), *normalcy* of food choices (Robinson et al., 2014) and eating *intentions* (Allan et al., 2008) when examining how people perceive their own behavior, and how they think other people in their food environment consider these same dimensions. We propose that finding discrepancies between people's perceptions of themselves and their perceptions of others would indicate pluralistic ignorance within this context. This finding could contribute to a better understanding of the social dimensions of the 'toxic' food environment and its influence on food choices.

2. Methods

2.1. Ethics statement and funding

The study was approved by the Ethics Review Board of the Faculty of Social and Behavioral Sciences and filed under number 21–0129. The

data collection was funded by the Regio Deal Foodvalley which is a collaboration between the Dutch government and the Foodvalley region to stimulate more healthy and sustainable food choices among Dutch citizens.

2.2. Participants and procedure

For the present study, data were collected by a research panel (Flycatcher.eu). Panel members had given their permission prior to research participation. Data collection for the study was conducted online in the spring of 2021. Personal information was gathered on gender, age and educational level, which was encoded in order to anonymize the data. The sample consisted of people aged 18 years and older who specifically lived in a neighborhood within the Foodvalley region[1] or the city of Utrecht, and were randomly selected from the panel's database. They were invited by e-mail informing them about the purpose of the study. In total 452 people[2] participated, of whom 19 were excluded from the sample due to unsatisfactory completion time. We estimated an average completion time of 5–10 min; the participants who completed the questionnaire faster than 3.6 min or slower than 40 min were excluded, since they were considered too fast or too slow. Before starting with the questionnaire, participants filled out the informed consent form. After providing informed consent, participants completed the questionnaire which included, in order: socio-demographic questions, perceived neighborhood social norms, self-perception, connectedness with others and the dimensions of pluralistic ignorance.

2.3. Measures

2.3.1. Socio-demographic information

Socio-demographic information on gender, age and education level was available from the panel's database. Education level was categorized on the Dutch education system, which has three levels, namely high, middle and low educational level. Several other measures were taken that are not relevant for the current study; these are listed with the relevant measures for this study in the supplementary materials.

2.3.2. Pluralistic ignorance dimensions

'*Importance* of desirable food' was assessed with two questions on the importance of healthy food and sustainable food. Two similar questions were administered on what 'others' find important. We did not inquire on the importance of unhealthy food choices, since we considered it to be too sensitive for socially acceptable answers. These questions were answered on a seven-point Likert-scale (very unimportant – very important).

2.3.3. 'Frequency of consuming desirable food'

Was assessed by five food choice items on how frequently participants eat healthy, unhealthy and sustainable foods. Healthy foods were assessed with two items: one on fruits and vegetables and one on whole grain products. Likewise, unhealthy foods were assessed with two items: one on fast food and one on cookies and candy. Sustainability was assessed by one item on meat products. The participants also answered five similar items on how often 'others' would eat these foods. These questions were answered on a five-point Likert scale (never – very often).

2.3.4. 'Normalcy of consuming desirable food'

Was assessed with five items which addressed the considered normality of consuming healthy, unhealthy and sustainable foods (similar to the frequency items) among participants and five items what they think 'others' consider normal. These items and the items on intentions were answered on a seven-point Likert scale (fully disagree – fully agree).

2.3.5. 'Intentions'

On wanting to eat more healthy, less unhealthy and less unsustainable food were assessed by five items which addressed participants' own intentions, and five items which addressed what they thought 'others'' intentions were. An overview of all pluralistic ignorance items is presented in Table 1.

2.4. Other measures

2.4.1. Perceived neighborhood social norms

To assess how people think others eat in their neighborhood and gauge the norm in neighborhoods regarding desirable eating, we instructed them to think of the people in their neighborhood while answering social norm questions. For this, an adapted version of the 'perceived neighborhood social norms' scale (Van Rongen et al., 2020) was taken. The scale in the current study consisted of six items on neighborhood social eating norms (e.g., '*In my neighborhood people often eat unhealthy*') with four answered on a seven-point Likert scale (fully disagree – fully agree) and two on a percentage slider.

2.4.2. Self-perception

Participants were asked with four statements how they perceive themselves regarding their healthy or sustainable food choices (e.g. '*I*

Table 1
Overview of pluralistic ignorance items.

***Importance* - self**	***Importance* - other**
I find healthy food to be …	*Others find healthy food to be …*
I find sustainable food to be …	*Others find sustainable food to be …*
***Frequency* – self**	***Frequency* – other**
I eat fruits and vegetables …	*Others eat fruits and vegetables …*
I eat whole grain products …	*Others eat whole grain products …*
I eat fast food …	*Others eat fast food …*
I eat cookies and candy …	*Others eat cookies and candy …*
I eat meat products …	*Others eat meat products …*
***Normalcy* – self**	***Normalcy* – other**
I consider it normal to eat fruits and vegetables.	*Others consider it normal to eat fruits and vegetables.*
I consider it normal to eat whole grain products.	*Others consider it normal to eat whole grain products.*
I consider it normal to eat fast food.	*Others consider it normal to eat fast food.*
I consider it normal to eat cookies and candy.	*Others consider it normal to eat cookies and candy.*
I consider it normal to eat meat products.	*Others consider it normal to eat meat products.*
***Intentions* – self**	***Intentions* – other**
I intend to eat more fruits and vegetables.	*I think others intend to eat more fruits and vegetables.*
I intend to eat more whole grain products.	*I think others intend to eat more whole grain products.*
I intend to eat less fast food.	*I think others intend to eat less fast food.*
I intend to eat less cookies and candy.	*I think others intend to eat less cookies and candy.*
I intend to eat less meat products.	*I think others intend to eat less meat products.*

[1] The Foodvalley region is a collaboration of several municipalities, educational institutions and local entrepreneurs within the Netherlands and is the area for recruitment (i.e. based on postal code).

[2] Initially three comparison conditions were differentiated, namely, family and friends, the average Dutch person and others in their respective neighborhood. However, no substantial differences between the conditions were found in the results, so the results reported are collapsed over conditions. Full details on the three separate conditions can be found in the Supplementary Materials.

consider myself to be a healthy eater'; Lake et al., 2007) on a seven-point Likert (fully disagree – fully agree). Self-perception is considered to be important as a control measure to assess participant's own perception of healthiness, unhealthiness and sustainability regarding food choices.

2.4.3. Connectedness

In addition, they were requested to indicate their feelings of connectedness with others in their neighborhood to determine pressure from others with two statements (e.g., *I feel strongly connected to others in my neighborhood*) on a seven-point Likert (fully disagree – fully agree).

2.5. Data analyses

For the sample descriptives we used descriptive statistics to present the perceived neighborhood social norms, self-perception regarding their healthy or sustainable food choices and their degree of connectedness with others in their neighborhood.

Before examining the pluralistic ignorance dimensions, we first determined to what extent these dimension differed from each other, both in how participants viewed themselves as well as how they perceived others by a series of repeated measure ANOVA's. Bonferroni correction was used in order to make adjustment due to the multiple comparisons. For healthy and sustainable scores four comparisons ($p = .012$) were made and for unhealthy scores three comparisons ($p = .017$).

After assessing the discrepancies within participants' own food behavior and how they perceived others' food behavior, we investigated the discrepancies between these scores. This was done to assess the presence of pluralistic ignorance regarding desirable food choices. We investigated the differences between perceptions of participants' own food behavior and their perceptions of others' food behavior. To corroborate previous pluralistic ignorance research this was examined through paired t-tests, arguing that a significant difference between people's own behavior and their perception of others would indicate the presence of pluralistic ignorance.

3. Results

3.1. Sample descriptives

The mean age of participants ($N = 433$) was 46.5 years ($SD = 16.55$); 38.6% of the participants were male. The majority of the sample (46.9%) had a high educational level, 39.5% had a middle educational level and 13.6% had a low educational level. Table 2 summarizes participants' perceptions of their neighborhood eating environment and their own assessment to what extent they considered themselves to be a healthy and/or sustainable eater. These responses were normally distributed (skewness <2.0). Participants generally thought that the majority of people in their neighborhood ate healthily. In line with this, they did not think other people in their neighborhood often eat unhealthily or found it normal to eat unhealthy. Numbers relating to perceptions of sustainable eating in the neighborhood were lower, and participants indicated that most people in their neighborhood did not eat sustainably or found it normal to do so. Table 2 further shows that participants felt fairly connected to others in their neighborhood and did not consider it important what others might think of them. They were also pretty certain about which food choices were healthy and/or sustainable.

Table 2
Means and standard deviations of items on neighborhood perceptions and general opinions on desirable eating (all assessed at a 7-point scale). N = 433.

	Mean	SD	Skewness
In my neighborhood people often eat unhealthy.	3.53	1.14	.07
How big do you estimate the percentage of people in your neighborhood who eat healthy?	63%	16.79%	−.59
In my neighborhood people often don't eat sustainably.	4.28	1.16	−.06
How big do you estimate the percentage of people in your neighborhood who eat sustainably?	42.18%	18.45%	.20
In my neighborhood it is normal to eat unhealthy.	3.18	1.29	.11
In my neighborhood it is normal to not eat sustainably.	3.86	1.27	−.34
I consider it to be important what others think of me.	3.12	1.50	.31
I feel strongly connected to others in my neighborhood.	3.85	1.51	−.01
I consider myself to be a healthy eater.	5.24	1.01	−.95
I am uncertain what healthy eating choices are.	2.81	1.19	.84
I consider myself to be a sustainable eater.	4.05	1.72	.04
I am uncertain what sustainable eating choices are.	2.98	1.30	.47

3.1.1. Discrepancies within self

To assess whether there were differences in the four dimensions of how participants perceived themselves, relating to either healthy, unhealthy or sustainable eating, we ran a series of repeated measure ANOVA's.[3] This analysis yielded a significant difference within the healthy items, $F(1.78, 769.57) = 391.56$, $p < .001$, $\eta 2 = 0.48$, unhealthy items, $F(1.62, 699.04) = 18.37$, $p < .001$, $\eta 2 = 0.04$, and sustainable items, $F(1.69, 730.57) = 42.34$, $p < .001$, $\eta 2 = 0.09$. These results are summarized in Table 3.

Post hoc tests show that participants perceived *normalcy*, *frequency*, *importance* and *intentions* to differ significantly from each other regardless if it concerned healthy, unhealthy or sustainable eating. In particular, for the healthy items *intentions* to eat more healthy were far lower than the ratings of *importance*, $F(1, 432) = 1.61$, $p < .001$; *frequency*, $F(1, 432) = 1.62$, $p < .001$; and *normalcy*, $F(1, 432) = 1.92$, $p < .001$. For the unhealthy items *intentions* to eat less unhealthy were higher than the rating of *frequency*, $F(1, 432) = -0.40$, $p < .001$; and lower than the rating of *normalcy*, $F(1, 432) = 0.24$, $p = .012$. For the sustainable items *intentions* to eat less unsustainable were lower than the ratings of *importance*, $F(1, 432) = 1.03$, $p < .001$; *frequency*, $F(1, 432) = 0.87$, $p < .001$; and *normalcy*, $F(1, 432) = 0.96$, $p < .001$. These findings suggest that intentions to increase desirable eating or decrease undesirable eating lagged behind on their general favorable views of desirable eating behaviors. Meaning that despite high scores on *importance*, *frequency*, and *normalcy*, *intentions* did not increase accordingly.

3.1.2. Discrepancies within other

A similar series of repeated measure ANOVAs was performed in order to examine whether there were any discrepancies in how participants view other people's *importance* of food, *frequency* of food consumption, perceived *normalcy* of food consumption and *intention* to increase healthy or decrease unhealthy and unsustainable food consumption. This analysis also revealed a significant difference within the healthy other-score items, $F(2.45, 1057.56) = 76.12$, $p < .001$, $\eta 2 = 0.15$, unhealthy other-score items, $F(1.65, 710.46) = 28.55$, $p < .001$, $\eta 2 = 0.06$, and sustainable other-score items, $F(2.25, 973.44) = 173{,}67$, $p < .001$, $\eta 2 = 0.29$ (Table 3). Post hoc tests were conducted for further examination of the within differences.

Post hoc tests show that participants perceived others' *normalcy*, *frequency*, *importance* and *intentions* to differ significantly from each other regardless if it concerned healthy, unhealthy or sustainable eating. In particular, for the healthy items *intentions* to eat more healthy were lower than the ratings of *importance*, $F(1, 432) = 0.47$, $p < .001$; *frequency*, $F(1, 432) = 0.55$, $p < .001$; and *normalcy*, $F(1, 432) = 0.77$, $p < .001$. For the unhealthy items *intentions* to eat less unhealthy were lower

[3] For the repeated measures ANOVA sphericity was not assumed, thus the Greenhouse-Geisser and Huynh-Feldt correction were used.

Table 3
Means, standard deviations and repeated measures ANOVA for healthy, unhealthy and sustainable self- and other-score.

	Importance		*Frequency*		*Normalcy*		*Intentions*		
Variables	M	SD	M	SD	M	SD	M	SD	Sig
Healthy self-score	5.86 $_{A\ B}$	.72	5.88 $_{C\ D}$	.95	6.17 $_{A\ C\ E}$	.83	4.26 $_{B\ D\ E}$	1.32	***
Unhealthy self-score	x	x	3.64 $_{F\ G}$	.87	3.81 $_{F\ H}$	1.35	4.04 $_{G\ H}$	1.36	***
Sustainable self-score	4.82 $_{I}$	1.48	4.67 $_{J}$	1.49	4.77 $_{K}$	1.54	3.80 $_{I\ J\ K}$	1.60	***
Healthy other-score	4.88 $_{L\ M}$	1.00	4.96 $_{N\ O}$	.83	5.18 $_{L\ M\ P}$	.97	4.41 $_{M\ O\ P}$	.97	***
Unhealthy other-score	x	x	4.54 $_{Q}$	.79	4.64 $_{R}$	1.06	4.20 $_{Q\ R}$	1.02	***
Sustainable other-score	4.14 $_{S}$	1.11	5.14 $_{T}$	.85	5.20 $_{S\ U}$	.98	3.98 $_{T\ U}$	1.05	***

$N = 433$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.
Note: Means subscripted with the same letter in the same row differ significantly with Bonferroni correction. Healthy and sustainable scores differ at $\alpha = 0.012$ and unhealthy scores at $\alpha = 0.017$.

than the rating of *frequency*, $F(1, 432) = 0.34$, $p < .001$; and *normalcy*, $F(1, 432) = 0.44$, $p < .001$. For the sustainable items *intentions* to eat less unsustainable were lower than the rating of *frequency*, $F(1, 432) = 1.16$, $p < .001$; *normalcy*, $F(1, 432) = 1.22$, $p < .001$. These findings suggest that participants perceived others' intentions to increase desirable eating or decrease undesirable eating also lagged behind on their general favorable views of desirable eating behaviors. Again, meaning that despite high scores on *importance*, *frequency*, and *normalcy*, *intentions* did not increase accordingly. The implications of these findings will be addressed in the discussion.

3.2. Pluralistic ignorance indicators

Our main analyses pertain to the possible presence of pluralistic ignorance. We examined how participants compared their own perceptions of *importance*, *frequency*, *normalcy* and *intentions* regarding desirable eating with perception of how other people considered these dimensions. We examined this by means of a series of paired t-tests relating to healthy, unhealthy and sustainable eating. All results are summarized in Table 4. Regarding healthy eating, our findings show that participants indicate that they considered healthy food choices to be more important than they think others do, $t(432) = 18.43$, $p < .001$, $d = 0.98$, eat healthier than others, $t(432) = 16.84$, $p < .001$, $d = 1.11$, considered consuming healthy food to be more normal than others do, $t(432) = 19.62$, $p < .001$, $d = 1.02$, and had lower intentions to change their healthy food choices than others, $t(432) = -2.39$, $p = .017$, $d = 0.16$.

Regarding unhealthy eating, our findings revealed a similar pattern, showing that participants indicated that they eat less unhealthy food than they think others do, $t(432) = -17.49$, $p < .001$, $d = 1.15$, considered consuming unhealthy food to be less normal than others do, $t(432) = -13.39$, $p < .001$, $d = 0.78$, and had lower intentions to change their unhealthy food choices than others, $t(432) = -2.41$, $p = .016$, $d = 0.16$.

Our findings further show that participants indicate that they considered sustainable food choices to be more important than others, $t(432) = 10.10$, $p < .001$, $d = 0.61$, eat more sustainable than others, $t(432) = -6.13$, $p < .001$, $d = 0.57$, considered consuming sustainable food to be more normal than others do, $t(432) = -5.32$, $p < .001$, $d = 0.44$, and had lower intentions to change their sustainable food choices than others, $t(432) = -2.36$, $p = .019$, $d = 0.17$.

4. Discussion

The aim of the current study was to assess the presence of pluralistic ignorance regarding desirable food consumption in neighborhood environments. Four dimensions (*importance*, eating *frequency*, *normalcy* and *intentions*) were used to capture a comprehensive range of people's perceptions of their own and others' desirable eating behavior. Our findings show some evidence of pluralistic ignorance regarding desirable food choices. In particular, the observed discrepancy between how participants viewed their food choices on the four dimensions compared to how they perceived others' suggests pluralistic ignorance. Across the board, participants perceived others to eat less healthy (more unhealthy) and less sustainable than themselves. This finding is in line what the pluralistic ignorance literature generally suggests, i.e. that people tend to believe that an undesirable standard is present in their (immediate) environment.

However, this general observation needs to be qualified in view of other findings. Even though the participants perceived discrepancy between themselves and others on all four dimensions, the findings also show that participants generally thought both other people and themselves think desirable eating is important, frequently done, and normal. In contrast, although participants reported to have lower intentions to increase desirable eating than they perceived others' intentions, in both cases intentions for more desirable eating were relatively low. Together, these findings suggest that even though self-other discrepancies on the four dimensions of pluralistic ignorance were present, a misperceived

Table 4
Ratings of own and other scores on importance, eating frequency, normalcy and intentions to eat more healthy and sustainable food or less unhealthy food.

	Healthy (self vs other)			Unhealthy (self vs other)			Sustainable (self vs other)		
	Self	Others		Self	Others		Self	Others	
Importance (7-point)	5.86 (.72 sd)	4.88 (1.00 sd)	***	NM	NM		4.83 (1.48 sd)	4.14 (1.11 sd)	***
Frequency (5-point)	4.25 (.63 sd)	3.64 (.55 sd)	***	2.76 (.58 sd)	3.36 (.52 sd)	***	3.44 (.99 sd)	3.76 (.56 sd)	***
Normalcy (7-point)	6.17 (.83 sd)	5.18 (.97 sd)	***	3.81 (1.35 sd)	4.64 (1.06 sd)	***	4.77 (1.54 sd)	5.20 (.98 sd)	***
Intentions (7-point)	4.26 (1.32 sd)	4.41 (.97 sd)	*	4.04 (1.36 sd)	4.20 (1.02 sd)	*	3.80 (1.60 sd)	3.98 (1.05 sd)	*

$N = 433$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$, *NM = Not Measured.*
Note: the reported asterisks indicate significant differences between the self- and other-scores.

undesirable social eating norm may not be present because perceptions of other people's norms were actually generally favorable and overall fairly in line with one's own standards. Even though there was no misperceived undesirable social eating norm, the social eating norm was still misperceived which may influence eating behavior. Previous studies among secondary and high school students have shown the effect of misperceived social eating norms which can steer eating behavior in a desirable or undesirable direction (Calvert et al., 2021; Perkins et al., 2018). In addition, people also considered their neighborhood food environment as supportive and their own food choices desirable. This finding contrasts with the notion of the 'toxic' food environment (Brownell, 2004; Swinburn et al., 2011), potentially revealing that people have more favorable evaluations of their food environment than it actually is.

According to the pluralistic ignorance literature, perceiving others as endorsing an undesirable norm can facilitate attitudinal change and/or behavioral expression resulting in individuals and groups acting in ways which they do not agree with. However, pluralistic ignorance can also be an inhibitor of attitudinal and/or behavioral expression and promote passivity to the extent that people do not see any reason to change a behavior that is apparently endorsed by their environment (Sargent & Newman, 2021). To the extent that pluralistic ignorance might be present in our study, our findings seem to suggest the latter effect. Specifically, participants perceived themselves to be more desirable eaters than others and perceived a lack in intentions to increase desirable eating behavior among others. This kind of reasoning could be interpreted as a form of self-enhancement (Sedikides & Gregg, 2008) used to justify people's own low intentions to increase desirable food choices, resulting in complacency. In addition, previous research has suggested that people tend to actively search for reasons to violate their long-term goals, when they experience a strong desire to deviate from their goals (De Witt Huberts et al., 2014; Effron et al., 2013). The readily available temptations within the unhealthy food environment (Lakerveld et al., 2018; Swinburn et al., 2011; Townshend & Lake, 2017), and people justifying making less desirable food choices than others due to the presence of a social eating norm, that is perceived to be less desirable than themselves, may make it challenging for those who have desirable eating intentions. Investigating the interplay between these themes is a worthwhile direction for future research.

This study is the first to examine pluralistic ignorance within the context of food choices. Previous studies on pluralistic ignorance and consumption have investigated the phenomenon in relation to alcohol (Prentice & Miller, 1993; Schroeder & Prentice, 1998), drug use (Hines, Saris, Throckmorton-Belzer, 2002; Smith-Simone et al., 2008) and a number of other themes. Examining pluralistic ignorance in the context of food is new and challenging. For instance, whereas clear social standards are present for drug and alcohol consumption, social standards for consuming the appropriate amount and type of food are less explicit (De Ridder et al., 2013). In this light, our study has some limitations.

In comparison with the existing pluralistic ignorance literature generally focusing on relatively homogenous groups in a confined setting, we focused on large neighborhood communities – where group definition may be less clear, and consequently (implicit) norms are not directly communicated as much as may be the case in homogenous contexts. However, we found that feelings of neighborhood connectedness were moderate to high, which may be sufficient for establishing a sense of group belonging that is required for pluralistic ignorance. Perhaps with a higher degree of perceived connectedness, evidence for pluralistic ignorance may be stronger than in the current study. However, the target group we examined may also be considered as a strength of the current study, since the community setting presented an ecologically valid approach, which has thus far received little attention in pluralistic ignorance studies. The novel measures used in the current study to assess pluralistic ignorance may be seen as a limitation. However, in view of the novel community setting and the thus far unstudied behavior of food consumption, we aimed to include multiple dimensions to increase the chance of detecting elements of pluralistic ignorance. Still, it is uncertain whether the dimensions that were used covered their respective elements entirely. That is why it is recommended to supplement the current measures in the future. This can be achieved by, for example, offering the participants additional information on the definition of desirable food, employing additional items per dimension, incorporating behavioral outcome measures, observing perceived counter normative behavior and its effects on the social norm, or even add qualitative measurements. Finally, people could have perceived their food environment to be more desirable than it objectively was, which is why it is important to compare the perceived food environment with the actual food environment and examine potential discrepancies. This is an important avenue for future research.

Implications of our findings may be that the existing perceived food norms and 'toxic' food environment could stimulate a status quo of complacency in (suboptimal) food choices. Participants in our study perceived themselves behaving more desirable regarding food choices than others and might think others in their neighborhood have low intentions to increase desirable food choices (as they themselves do). Although it is uncertain to what extent participants would be inclined to adjust their behavior to these perceptions, the low ratings of intention to change one's behavior of self and others, may suggest that participants used their observations as self-enhancement (Sedikides & Gregg, 2008) and an excuse not to change their own behavior. This potentially implies that pluralistic ignorance inhibits intentions to change eating behavior (Sargent & Newman, 2021), facilitating unwarranted satisfaction with eating behavior in the current food environment. If this notion proves true in future research, this would highlight the need for psychological interventions aimed at disrupting complacency, together with targeted policy change to transform the food environment and consequently eating behavior. For instance, the undesired behavioral consequences of pluralistic ignorance (e.g. overconsumption of alcohol) have been addressed in previous research (Schroeder & Prentice, 1998). In this study they organized peer-oriented and individual-oriented discussions with focus groups. The peer-oriented approach was more successful as these participants reported a substantial decrease in alcohol consumption. This principle could be used as well in the food environment by similarly engaging key stakeholders during focus group meetings.

5. Conclusion

This study is one of the first to explore the possible presence of pluralistic ignorance regarding healthy and sustainable food choices with an emphasis on neighborhood environments. Our study found initial evidence for pluralistic ignorance within a naturalistic setting. The findings on self-other discrepancies relating to healthy and sustainable food choices revealed indicators of pluralistic ignorance within neighborhood food environments. This suggests promising new avenues for future research and the development of interventions on a neighborhood level regarding discrepancies within behavior and attitudes related to food choices.

Ethical statement

The study was approved by the Ethics Review Board of the Faculty of Social and Behavioral Sciences and filed under number 21–0129.

Author contributions

All authors contributed to the study design. RM oversaw the data-collection and carried out the data analysis. All authors were involved in writing the paper and collectively approved submitting the manuscript.

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Ethical statement

This study was approved by the Ethics Review Board of the Faculty of Social and Behavioral Sciences and filed under number 21–0129. The data collection was performed in accordance with the declaration of Helsinki. After explaining the study details participants could voluntarily opt in or out of the study. The participation was anonymous and not invasive and signed informed consent was gathered.

Declaration of competing interest

The authors hereby declare that there is no affiliation or involvement with any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in the study "Misperceived eating norms: Assessing pluralistic ignorance in the food environment".

Data availability

The research data and materials are publicly available on OSF via the following link: https://osf.io/h5b43/?view_only=7000e5bbd91c4827893103b00154ddd9

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2022.106284.

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