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The Interaction of Social Influence and Message Framing on Children's Food Choice

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Structured Abstract

Purpose

Obesity leads to increased mortality and morbidity among children, as well as when they turn adults. Melding marketing theories in social influence and message framing, this study examines how compliance versus conformance social influence, each framed either prescriptively or proscriptively, may guide children's choice of healthy versus unhealthy food.

Design

We conducted two experiments in a Pakistani junior school. Experiment 1 exposed children to either a prescriptive or a proscriptive compliance-influence. Experiment 2 involved a 2 (prescriptive vs proscriptive compliance-influence) x 2 (supportive versus conflicting conformance-influence) between-subjects design. Participants in both studies answered an online survey after being exposed to the social-influence messages.

Findings

Experiment 1 showed proscriptive was stronger than prescriptive compliance-influence in nudging children to pick fruits (healthy) over candies (unhealthy). However, frequency of fruits dropped as susceptibility to compliance strengthened. Experiment 2 found that a proscriptive compliance-influence reinforced by a supportive conformance-influence led to most children picking fruits. However, a conflicting conformance-influence was able to sway some children away from fruits to candies. This signalled the importance of harmful peer influence, particularly with children who were more likely to conform.

Originality

This study adopts a marketing lens, and draws on social influence and message framing theory to shed light on children's food choice behaviour within a classroom environment.

The context was an underexplored developing country, Pakistan, where childhood obesity is a public health concern.

Research Implications

Childhood is a critical stage for inculcating good eating habits. Besides formal education about food and health, social influence within classrooms can be effective in shaping children's food choice. While compliance and conformance influence can co-exist, one influence can reinforce or negate the other depending on message framing.

Practical Implications

In developing countries like Pakistan, institutional support to tackle childhood obesity may be weak. Teachers can take on official, yet informal, responsibility to encourage healthy eating. Governments can incentivise schools to organise informal activities to develop children's understanding of healthy consumption. Schools should prevent children from bringing unhealthy food to school so that harmful peer behaviours are not observable, and even impose high tax on unhealthy products or subsidise healthy products sold in schools.

Keywords: childhood obesity, compliance influence, conformance influence, prescriptive message, proscriptive message.

The Interaction of Social Influence and Message Framing on Children's Food Choice

Introduction

Childhood obesity is a critical health epidemic that leads to increased mortality and morbidity, not only among children (Brown *et al.*, 2019; Jalali *et al.*, 2016), but also when they grow up (Parsons *et al.*, 1999; Simmonds *et al.*, 2016), thus leading to long-term societal and economic impact. A recent report by the World Health Organisation (2016) revealed that childhood obesity is reaching alarming proportion globally, in both developed as well as in developing countries. Besides a greater propensity to perform poorly in schools (Taras and Potts - Datema, 2005), obese children are more likely to remain obese as adults, thereby predicating the onset of chronic illnesses such as diabetes and cardiovascular diseases (Simmonds *et al.*, 2016; WHO, 2016).

Research into combating childhood obesity has primarily focused on management and interventions such as through public health education (Chari *et al.*, 2014), parental guidance (Gerards *et al.*, 2011), and dietary control (Duncanson *et al.*, 2020). Other studies have approached the issue from a clinical perspective including investigating the epidemiological (Livingstone, 2000), psychological (Schroeder *et al.*, 2021) and even genetic (Albuquerque *et al.*, 2017) links to childhood obesity. Few studies have considered how social influence may play a critical role in childhood obesity interventions. Yet, studies across broad domains (Hammond, 2010; Hogleve *et al.*, 2021; Jalali *et al.*, 2016; Ragelienė and Grønhøj, 2020), including those in marketing (John, 1999; Nairn and Spotswood, 2015; Tarabashkina *et al.*, 2017), have found that children are particularly susceptible to social influence (also see a recent meta-analysis by Melnyk *et al.* (2021)). While some marketing studies into childhood obesity has investigated mechanisms such as social media (Chou *et*

al., 2014), advertising (Tarabashkina *et al.*, 2017), or peers as role models (Cruwys *et al.*, 2015), yet little is known about the role of social influence within an actual school environment, where as we explained below, different sources of social influence may co-exist. When their literature review of 69 studies (1974-2014) on the influence of social norms on eating preference and behaviour found that majority of studies were experiments conducted in labs, Cruwys *et al.* (2015) stressed the importance of conducting research in actual settings in order to better address the societal challenges of obesity and its health consequences.

Meanwhile, researchers theorise that there are two types of social influence: compliance and conformance (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Ozuem *et al.*, 2021). Compliance involves people obeying explicit requests, and is particularly pertinent when the influence comes from sources that are perceived as authority, such as school teachers. By contrast, conformance influence concerns people adhering to norms or what they perceive as unspoken rules, in order to fit in, to be liked or to gain approval. Within schools, conformance influence is likely to come from classmates.

In collectivistic cultures like Pakistan, the context of this study, school children hold teachers in high regard (Khan, 2011). Hence, it is probable that teachers can play an effective role in nudging children towards healthy eating behaviour through compliance influence. Yet, modelling of teacher's behaviour has rarely been examined experimentally, and the results among the few existing studies are inconsistent (Hendy and Raudenbush, 2000). Concurrently, children at schooling age are particularly vulnerable to want to conform to their peers (Nairn and Spotswood, 2015; Prinstein and Dodge, 2008; Ragelienė and Grønhoj, 2020). While schools can provide formal education on food and healthy eating (e.g., Jung *et al.*, 2019; Nga *et al.*, 2019), it remains unclear how teachers and peers may

concurrently exert social influence on children's food choice behaviour. Since compliance and conformance message may possess the same or opposite valence (i.e., teachers and peers may concur or disagree over a subject matter), a particularly interesting question would be how they may reinforce or negate each other's influence on children's food choice behaviour. Furthermore, individuals may vary in their dispositional proneness to comply with authority or eagerness to conform with peers (Bearden *et al.*, 1989; Park and Lessig, 1977). Often overlooked in social influence research including those within marketing domain (e.g., Nairn and Spotswood, 2015; Tarabashkina *et al.*, 2017), accounting for the potential interaction between influence-type and these personal dispositions is an important contribution of this study.

Research further suggests that how a message is framed can alter consumer behaviour (Lee *et al.*, 2018; Mckechnie *et al.*, 2012). Similarly, social influence may be framed prescriptively (i.e., a positively stated norm that a behaviour should be performed) or proscriptively (i.e., a negatively stated norm that a behaviour should *not* be performed) (Bergquist and Nilsson, 2019; Rhodes *et al.*, 2020; Staunton *et al.*, 2014; Törnblom and Biddle, 1976). Blake and Davis (1964) suggests that a prescriptive message implies a reward for observance, whereas a proscriptive message implies punishment. Thus, another research objective concerns how compliance and conformance influence may also depend on their framing. Considering this interaction is particularly important because teachers and classmates coexist concurrently in a classroom environment to exert different social influence on student, and the influence message from each party may be framed differently (i.e., prescriptively or proscriptively). In other words, accounting for just the influence source (e.g., Cialdini and Goldstein, 2004; Zhang and Gong, 2021) or message framing (e.g.,

Bergquist and Nilsson, 2019; Rhodes *et al.*, 2020) independently would have yielded inconclusive findings, especially for the important issue of tackling childhood obesity.

By combining theories in social influence (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Ozuem *et al.*, 2021) and message framing (Lee *et al.*, 2018; Mckechnie *et al.*, 2012) through a marketing lens, this study aims to address the two research objectives through two experiments. The first experiment investigated the effects of compliance influence with a prescriptive versus proscriptive message, while accounting for individuals' susceptibility to comply with authority. The second experiment then considered what happened when a prescriptive or proscriptive compliance-influence was paired with the conformance influence that either reinforced or attenuated the compliance influence. We similarly controlled for individuals' proneness to comply or conform.

Collectively, the findings hold important practical implications by shedding light on how teachers, beyond formal instructions, can play an active yet implicit role to help tackle childhood obesity. Understanding the effects of peer influence would also help schools enact policy rules to mitigate any potentially harmful influence. Thus, carrying out this study within an actual classroom environment enhances the external validity of this study. In countries like Pakistan, where the constitution obligates the state to provide free and compulsory education to children (e.g., Mofept, 2021), schools are an important and suitable avenue to help tackle childhood obesity epidemic. As obesity is reaching alarming proportion in developing countries, this study's context of Pakistan also answers calls by World Health Organisation (2016) to urge studies in such countries.

Literature Review

Obesity among Children

It is a well-established phenomenon that unhealthy food contributes to obesity which in turn leads to various chronic problems including diabetes, cardiovascular diseases, gastrointestinal diseases and even disability overtime (Daniels, 2006; Fuemmeler *et al.*, 2009; Sommer and Twig, 2018; Usfar *et al.*, 2010). Childhood obesity also has long-term effects as obese children are likely to suffer from health-related problems even in their adulthood (Parsons *et al.*, 1999; WHO, 2016). For example, Rundle *et al.* (2020) found that childhood obesity is positively related to body mass index (BMI) in adulthood. Hence, obesity should be controlled during childhood, not only to minimise its health consequences during childhood, but also to prevent future health issues in adulthood, which could have long-term societal and economic consequences. Besides, obese children are also more likely to perform poorly in schools compared to non-obese classmates (Taras and Potts - Datema, 2005).

While research has largely examined childhood obesity in developed nations (Bleich *et al.*, 2008; Simmonds *et al.*, 2016; Singh and Singh, 2020), it is equally, if not more, critical to address the epidemic in developing nations, as a report by the World Health Organisation (2016) suggests that obesity is also reaching alarming proportion in developing countries. Specifically within this study's contextual setting (Pakistan), a recent study by UNICEF (2018) in conjunction with Pakistan's Ministry of Health Services found that about 17% of Pakistani children aged between 10 and 17 years were overweight, in similar proportion between gender, as well as between urban and rural population. The report stressed that these numbers were alarming given the 200 million population of the country, and declared obesity "a public health issue of concern" (UNICEF, 2018, p. 24).

Meanwhile, from a marketing perspective, childhood obesity research has focused on streams including food marketing (Elliott, 2018), advertising (Tarabashkina *et al.*, 2017),

and branding (Bogomolova *et al.*, 2021). In addition, some studies conducted in developing markets' settings have chosen to focus on the role of social marketing (Witkowski, 2007). For example, Minos (2020) shows that an effective way to tackle childhood obesity in South Africa is to educate caregivers and empower them with a more active role in food selection. Similarly, social marketing could play a role in encouraging Nigerian parents to select healthy options for their children (Mcleay and Oglethorpe, 2013). However, while decades of marketing research has established the efficacy of social influence in shaping consumer behaviour (Bearden and Etzel, 1982; Festinger, 1957; Netemeyer *et al.*, 1992; Veblen, 1925; Witt and Bruce, 1970; Zhang and Gong, 2021), social influence has hardly been considered as a mechanism to address childhood obesity, particularly among school children. Indeed, a systematic review by Nga *et al.* (2019) suggests that while formal health and nutrition education do play a crucial role in combatting obesity among school children, the issue is a complex problem that requires participation from a wider community.

Compliance versus Conformance Influence

Over a long period, studies into the effects of social influence on human behaviour, including with children (Lippitt *et al.*, 1952; Prinstein and Dodge, 2008; Ragelienė and Grønhøj, 2020), are well established (Cialdini and Goldstein, 2004; Hyman, 1960; Netemeyer *et al.*, 1992; Zhang and Gong, 2021). Indeed, a recent meta-analysis that spanned 22 countries and over 40 years reported that social influence has remained strong and stable in guiding approved behaviour (e.g., healthy eating, donations), as well as disapproved behaviour (e.g., smoking, gambling) (Melnyk *et al.*, 2021). In order to better understand the social influence phenomenon, researchers have dichotomised social influence into two distinct, but possibly overlapping, categories that exhaust a superordinate category.

Although such classifications may sometimes be difficult to disentangle (David and Turner, 2001), they nonetheless help dissect the underpinnings of social influence so that theoretical propositions based on empirical observations can be made.

For example, social influence may be informational versus normative (Burnkrant and Cousineau, 1975; Deutsch and Gerard, 1955). Informational influence arises from the willingness to accept information as evidence of reality, whereas normative influence rests on bending to others' expectations. Similarly, social influence may be cast as injunctive or descriptive (Lee *et al.*, 2010; Ravis and Sheeran, 2003). Injunctive influence is a perceived pressure to conform to group behaviour, whereas descriptive influence rests on people observing and subsequently adopting others' behaviours. In a study that illustrates the differences between injunctive and descriptive influences, Swedish children aged 11 to 15 years old reported their choice of breakfast foods: high-fibre bread and four types of milk (Berg *et al.*, 2000). The findings revealed that the children were more likely to mimic their parents' behaviour (descriptive influence) than what their parents told them (injunctive influence).

A particular dichotomous classification that is central to this study's proposition is compliance versus conformance influence (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Ozuem *et al.*, 2021). Compliance involves people responding to or obeying requests, which may be implicit or explicit, especially when the influence stems from sources that are perceived as authority. By contrast, conformance influence concerns people adhering to norms, often unspoken, in order to fit in or to gain approval from others. Compliance is typically goal-directed, where the target recognises that a response in a desired way is being sought. By contrast, conformance may not be goal-directed in that the source of influence may not have a goal or have an unrelated goal compared to the target.

Compliance influence is particularly effective when the influence source is perceived to command authority (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Gass, 2015). For example, in Milgram's (1974) classic study, participants were more compliant to shock administration when the experimenter was dressed in a white lab coat and carried a clipboard, compared to one that did not; the rationale being that the participants perceived the former experimenter as possessing legitimate authority. Some studies have found that parents, as authority figures, are influential in shaping children's eating behaviour either by indirect influence such as through conversations with children about healthy eating (Tarabashkina *et al.*, 2017), by setting examples for children to mimic (Berg *et al.*, 2000), or by explicitly selecting the food choice for their children Hogleve *et al.* (2021).

Teachers are another important authority as children spend substantial time in schools. Hendy and Raudenbush (2000) demonstrated that compared to teachers who remained silent, enthusiastic promotions by teachers led to increased new food adoption by school children. Furthermore, authority is situational in that the perceived authority in one setting may be irrelevant or lacking in another setting (Gass, 2015). In this study's context, a teacher within a classroom setting would be perceived as an authority figure, and hence a compliance influence enacted by the teacher would likely be effective in guiding children's food choice behaviour.

As opposed to compliance, conformity is viewed as an act of adapting or changing one's behaviour to match others in order to win social approval (Cialdini and Goldstein, 2004; Deutsch and Gerard, 1955; Lee *et al.*, 2010; Thürmer *et al.*, 2020). An early study by Asch (1968) was already able to demonstrate compellingly that individuals could yield to group pressures—in judging line measurements—even when the group judgments were contrary to facts.

Conformance influence is particularly effective when people perceived themselves as similar to the source of influence, and when they want to maintain good relationship with the source (Cialdini and Trost, 1998; Tarabashkina *et al.*, 2017). Hogg and Turner (1987) argue that conformance is underpinned by people self-categorising themselves to a group, adopting the group identity, and consequently conforming to group behaviour willingly. For example, a systematic review by Ragelienė and Grønhøj (2020) found that children are negatively influenced by peers, to whom they were close and attached, in consuming unhealthy food. Hammond (2010) discussed the phenomenon of social contagion—where obesity spread through social networks of peers—and found that obese children are more likely to befriend others who are similarly overweight. This influence may even occur without conscious awareness that people are mimicking the behaviour of peers (Cruwys *et al.*, 2015). Moscovici and Lage (1976) further show conformance influence may be effective even when the source of influence is numerically inferior compared to the target of influence. Hence, it is plausible that class students may choose to behave consistently with a single student—who serves as a source of influence—with whom they associate.

The above review shows that while studies often focused independently on the influence of compliance (e.g., Kemp *et al.*, 2021; Milgram, 1974) or conformance (e.g., Lee *et al.*, 2010; Thürmer *et al.*, 2020) on human behaviour, more clarity is needed regarding how the two influences could coexist, such that one influence may reinforce or attenuate the other. One such environment is the classroom, where school children may be exposed to compliance influence from teachers, in concurrence with conformance influence from their peers. Moreover, children, as individuals, may also differ in their personal dispositions regarding their proneness to comply with authority or eagerness to conform with peers

(Bearden *et al.*, 1989; Park and Lessig, 1977). In other words, how the two influences may bear on an individual would further depend on these personal dispositions.

Prescriptive versus Proscriptive Normative Messages

The efficacy of social influence may also depend on the framing of the influence message (Bergquist and Nilsson, 2019; Rhodes *et al.*, 2020; Staunton *et al.*, 2014). Specifically, literature distinguishes a prescriptive or positively stated norm (e.g., should, ought) from a proscriptive or negatively stated norm (e.g., should not, ought out) (Bergquist and Nilsson, 2019; Törnblom and Biddle, 1976). Blake and Davis (1964) suggests that a prescriptive normative message implies a reward for observance, whereas a proscriptive normative message suggests punishment.

People need not be exclusively exposed to either normative message type and both message types can co-exist (Jasso and Opp, 1997; Munroe and Munroe, 1975). Indeed, a study on children's formation of game rules found that children formed strongest normative judgments when they were exposed to both prescriptive and proscriptive norms compared to either norm alone (Riggs and Young, 2016). Although both normative messages can co-exist, their results are not consistent. For example, Jasso and Opp (1997) found that proscriptive messages are stronger than prescriptive messages that state reasons to engage in political protests. Proscriptive messages are also stronger than prescriptive ones in encouraging pro-environment behaviour (Bergquist and Nilsson, 2019). However, another study found that children from a collectivistic culture were more obedient (with tasks such as picking up toys) to prescriptive norms than those from an individualistic culture, and they responded equally to proscriptive norms (Munroe and Munroe, 1975).

Support for the differential effects of prescriptive and proscriptive normative messages can also be gleaned for research in other domains. For example, word-of-mouth research suggests that negative word-of-mouth is stronger than positive ones is explaining customer loyalty and advocacy (Samson, 2006), but results are not consistent (Sweeney *et al.*, 2008). Lee *et al.* (2018) demonstrated that the positively framed advertising messages are more effective than negatively framed messages, but the effectiveness depends on whether consumers are promotion-focused or prevention-focused, as well as whether the advertised product is hedonic or utilitarian. Finally, drawing on regulatory focus theory (Higgins, 1998), Naletelich and Spears (2020) show that promotion versus prevention focused message may lead to different consumer outcomes.

Earlier, in articulating the first research objective of this study, we argue that children may be exposed to compliance and conformance influence concurrently, and that the effects of these influences may depend on the children's dispositional vulnerability to comply or conform. In extension, the second objective is to determine how these differential effects may further depend on the framing (prescriptive or proscriptive) of the compliance-influence and conformance-influence message. To address these two research objectives, we carried out two experiments in actual classroom environment in order to enhance the external validity of this study. The study's practicality is also enriched by conducting the experiments in a developing country (Pakistan), where the childhood obesity is reportedly epidemic (WHO, 2016).

Overall Sample Collection and Pretest

Prior to describing the two main experiments, we outlined the overall sample collection method and a pretest. Following ethics approval and permissions from the

participating school, teachers and parents/guardians, the pretest and main experiments took place in a junior school in the populous Pakistani city of Lahore. Due to the prevailing Covid-19 pandemic, all lessons in the school were conducted online using videoconferencing (Zoom) software where all participants appeared in a live gallery, with the profile enlarged for the active speaker. Across seven online sessions, Grade 6-7 children aged between 11-12 years participated in the study. The pretest involved one group of students (n=38), Experiment 1 involved two groups (total n= 94), and four groups of students (n=189) participated in Experiment 2. The pretest and two main experiments all used different students.

The pretest served two purposes: 1) to validate the two scales used in the main experiments; and 2) to serve as a baseline or control group for Experiment 1. In the pretest (n=38; male=55%), just before the online lesson ended, the teacher shared a survey link and asked the children to complete the survey without giving any further details or instructions. An opening question prompted "*If you were to pick something to eat now, which of these two items would you choose*", and the children picked from a binary pictorial choice of fruit or candy. The children then responded to a four-item scale that measured their susceptibility to compliance influence (COMPLY), and a five-item scale measuring their susceptibility to conformance influence (CONFORM), adapted from various sources (Bearden *et al.*, 1989; Park and Lessig, 1977; Zhang and Gong, 2021) (see Table 5 in Experiment 2 for the items). Finally, they stated their gender (male or female).

Both COMPLY and CONFORM possessed adequate reliability with both Cronbach's $\alpha > .9$ (Peter, 1979), and were discriminantly valid as their variance extracted estimates (AVE $>.732$) were greater than the square of the correlation between the factors (Pearson's $r = -.165$, $p=.322$) (Fornell and Larcker, 1981). Overall, 18 children picked candies and 20

children picked fruits, yielding a non-significant difference between them (one-sample binomial test with probability to pick either fruit or candy at .50, $p=.871$). Also, a cross-tabulation test ($\chi^2(1)=1.799$, $p=.18$) found no difference between gender on choice of food. Since the pretest children picked the items without being exposed to any social influence messages, these baseline numbers from the pretest served as the control group for Experiment 1.

Experiment 1 – The Differential Effects of Prescriptive versus Proscriptive Compliance

Influence

The objective of this experiment was to determine the effects of teachers' compliance influence on children's food choice and how the influence might be moderated by prescriptive versus proscriptive framing of the influence message.

Method

Two groups (prescriptive message vs proscriptive message) of children participated in this study. In the prescriptive-message group ($n=46$, male=53%), the teacher made an arbitrary comment in the midst of the online lesson: "*Children, do you know that eating healthy food like fruits is good for your health. I recommend that you eat fruits regularly.*" Just before the lesson ended, the teacher shared a survey link and asked the children to complete an online survey without giving further instructions. Because studies suggest that social influence is more pertinent when people are aware that their responses are public (Cialdini and Trost, 1998), the teacher ostensibly told the group that the survey results might be shared openly, although the survey remained anonymous and was not shared. The procedure in the proscriptive-message group ($n=48$, male=61%) was identical, except that

the teacher said, “*Children, do you know that unhealthy food like candies is not good for your health. I recommend that you do not eat candies.*”

Both groups answered an online survey with five questions. The first question prompted “*If you were to pick something to eat now, which of these two items would you choose*”, with a binary pictorial choice of fruit or candy. The children then responded to same four-item COMPLY scale in the pretest, randomly ordered to minimise common method bias (Podsakoff *et al.*, 2012) (see Table 1 for the descriptive statistics). As previously mentioned, the results from the pretest served as the control group, since the pretest group was not exposed to any social influence messages.

Insert Table 1 here

Results

The factor scores for COMPLY (mean=5.461; sd=1.67) were a simple average of the four scale items, with adequate reliability (Cronbach’s $\alpha = .933$) (Peter, 1979). An analysis of variance (ANOVA) test showed no difference in COMPLY scores across the three groups (control, prescriptive, proscriptive) ($F(2)=1.453$, $p=.236$). Levene’s test of homogeneity of variance ($F(2)=1.867$, $p=.157$) indicated that the variance of COMPLY did not differ significantly across the groups. There was also no difference between gender on food choice (cross-tabulation test $\chi^2(1)=.066$, $p=.797$). A cross-tabulation test ($\chi^2(2)=5.998$, $p=.049$) further revealed that children in proscriptive-message group picked healthy food (fruit) significantly more often than those in the prescriptive-message group, as well as those in the control group (see Table 2).

Insert Table 2 here

Next we ran a logistic regression using Process Model 1 in SPSS with item-picked (fruit or candy) as the dependent variable, message type (prescriptive=1, proscriptive=2) as the independent variable, and mean-centred COMPLY as the moderator. The model fit was satisfactory (Hosmer-Lemeshow $\chi^2(7)=5.257$, $p=.629$; Nagelkerke's $R^2=.367$; overall correct=77%). As Table 3 shows, the message type, as well as the interaction of message type and COMPLY, were both significant. However, the main effects of COMPLY were not. Figure 1 graphically illustrates the moderating effects of COMPLY on the two message types.

Insert Table 3 here

Insert Figure 1 here

Discussion

Child obesity is becoming a global phenomenon, particularly in developing countries whose limited resources and institutional support give rise to significant challenges to address this issue (UNICEF, 2019). We conducted two experiments in Pakistan to understand this phenomenon. Overall, the findings suggest that when exposed to a compliance influence, children obeyed teachers in preferring fruits over candies. Furthermore, a proscriptive message was more salient than a prescriptive message in nudging food choice. This result is consistent with research that suggests the potency of negatively framed messages compared to positively framed ones (Charlett *et al.*, 1995; Sweeney *et al.*, 2012). Although the difference in fruits being picked was not significant

between the control and prescriptive group, it is nonetheless noteworthy that exposure to either compliance message still led to more picked fruits than not exposed to any compliance message. Combined, these results are consistent with past research that supports the efficacious role of compliance influence from authority figures (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Gass, 2015).

Interestingly, as Figure 1 illustrates, the influences of both prescriptive and proscriptive compliance-messages were moderated by children's proneness to complying with authority. Specifically, they picked more fruits as proneness to comply increased. Although this phenomenon was similar for both prescriptive and proscriptive messages, the effect of compliance was less pronounced for the proscriptive message than for the prescriptive message, as indicated by the gradient of the slopes for the two message-types. In other words, proscriptive messages were less effective than prescriptive messages as children became more compliant. A plausible explanation is psychological reactance (Brehm and Brehm, 1981), where people react negatively to being restrictively told *not* to do something. In this instance, the more compliant children might feel that they were being restricted by the proscriptive message, and hence reacted oppositely by picking candies.

Experiment 2 – The Effects of Compliance versus Conformance Influence

Study 1 concerned only compliance influence from teachers. However, in reality, children in a classroom environment do not just face the teacher. They would also be mingling with their classmates, and the classmates may or may not concur with the teachers on a subject matter. Hence, it is plausible that the compliance influence may be further strengthened, or even negated, by conformance influence from peers. That is, the compliance and conformance message may possess the same or opposite valence.

Furthermore, each type of social influence may be framed differently (Bergquist and Nilsson, 2019; Jasso and Opp, 1997; Steenhaut and Kenhove, 2006). Thus, Experiment 2 considered this situation by investigating this potential interaction effect.

Method

Experiment 2 was a 2 (compliance influence with prescriptive message vs proscriptive message) x 2 (conformance influence with supportive versus conflicting message) between-subjects design (see Table 4 for the four experiment conditions). Prior to the start of the experiments, the class teacher identified and appointed a student to be the confederate. In the context of Pakistani junior schools, a class representative is typically identified by the teacher as a student who performs relatively well academically and is generally well liked by classmates. Across all four classes, class representatives were appointed as the confederates, all of whom were 11-year old boys. Without being told the purpose of the experiment, the confederates were briefed beforehand on what and when they had to speak out, and instructed not to share or discuss with their classmates.

Insert Table 4 here

Similar to Experiment 1, Experiment 2 started around the middle of the lesson with the teachers in Group 1 and 2 making a prescriptive comment (*Children, do you know that eating healthy food like fruits is good for your health. I recommend that you eat fruits regularly*), and the teachers in Group 3 and 4 making a proscriptive comment (*Children, do you know that unhealthy food like candies is not good for your health. I recommend that you do not eat candies*). Immediately after the teachers had spoken, the confederates in the two

supportive-conformance groups (Group 1 and 3) said *“Children our age should eat more fruits as they are healthy. I also prefer fruit.”* That is, the conformance and compliance influence in these two groups were aligned. For the conflicting-conformance group (Group 2 and 4), the confederate said *“There is nothing wrong with eating candies. Children our age should be allowed to eat candies. I prefer candies.”* That is, the conformance and compliance influence in these two groups were opposite. Finally, all groups answered an online survey with ten questions. The first question prompted *“If you were to pick something to eat now, which of these two items would you choose”*, with a binary pictorial choice of fruit or candy. Then they answered the CONFORM and COMPLY scales that were similar to the pretest, with the questions randomly ordered to minimise common method bias (Podsakoff *et al.*, 2012). Table 5 contains the factor items and their descriptive statistics.

Insert Table 5 here

Results

The factor scores for COMPLY (mean=5.435; sd=1.62; Cronbach’s $\alpha = .933$) and CONFORM (mean=4.367; sd=1.718; Cronbach’s $\alpha = .915$) were a simple average of the scale items. The variance extracted estimates for both factors (AVE > .697) were greater than .5, and greater than the square of the correlations between the factors (Pearson’s $r = .311$, $p < .001$), thus supporting discriminant validity between the two factors (Fornell and Larcker, 1981). An analysis of variance (ANOVA) test showed no significant differences in COMPLY ($F(3)=-1.441$, $p=.232$) and CONFORM ($F(3)=-1.387$, $p=.249$) across the four groups. Tests of homogeneity of variances revealed that the variances for COMPLY ($F(3)=2.001$, $p=.115$) and CONFORM ($F(3)=2.495$, $p=.062$) were also not significantly different across the groups.

Table 4 shows the children's' picked choice across the four groups. Comparing (Group 1+2) versus (Group 3+4), children exposed to proscriptive compliance-influence selected fruits more often than those exposed to prescriptive compliance-influence (cross-tabulation $\chi^2(1)=5.224$, $p=.022$). This result was consistent with the finding of Experiment 1, which found that a proscriptive influence was stronger than a prescriptive influence. Comparing (Group 1+3) versus (Group 2+4), there was a marginally significant difference (at $p=.10$ level) in picked fruits between supportive conformance-influence and conflicting conformance-influence (cross-tabulation $\chi^2(1)=2.82$, $p=.093$).

Across the four groups (cross-tabulation test $\chi^2(3)=8.088$, $p=.044$), the highest number of children who preferred fruits (81%) over candies occurred when they were exposed to a proscriptive compliance-influence that was reinforced with a supportive conformance-influence. Importantly, a comparison of Group 3 and 4 revealed a significant difference ($\chi^2(1)=3.931$, $p=.047$), such that children first exposed to proscriptive compliance-influence were more likely to pick candies when exposed to conflicting conformance-influence than when exposed to a supportive conformance-influence. Between Group 1 and 2, where children were first exposed to prescriptive compliance-influence, there was no significant difference regardless of whether the conformance influence was supportive or conflicting ($\chi^2(1)=.568$, $p=.326$).

Next, Table 6 shows the results of a logistic regression using Process Model 1 in SPSS. The model fit was satisfactory (Hosmer-Lemeshow $\chi^2(8)=5.086$, $p=.748$; Nagelkerke's $R^2=.39$; overall correct=80%). It is noteworthy that while CONFORM significantly predicted item picked ($\beta=-.498$, $p<.001$), COMPLY did not ($\beta=.237$, $p=.11$). The interaction of CONFORM and conformance message-type ($\beta=.148$, $p=.035$), as well as the interaction of COMPLY and

compliance message-type ($\beta=.188$, $p=.005$), were both significant. Figure 2 illustrates these interaction effects in separate graphs.

Insert Table 6 here

Insert Figure 2 here

It is also noteworthy that for all four groups, children picked more fruits than the control group where the children were not exposed to any compliance or conformance message (cross-tabulation test $\chi^2(4)=9.988$, $p=.041$).

Discussion

Consistent with Experiment 1, Experiment 2 found that proscriptive compliance-influence was stronger than prescriptive compliance-influence in nudging healthy food choice. This result further supports the potency of negatively framed messages compared to positively framed ones in marketing studies (Charlett *et al.*, 1995; Sweeney *et al.*, 2012). Although marginally significant, the results also supported marketing research into the efficacy of conformance-influence through peers (Deutsch and Gerard, 1955; Lee *et al.*, 2010; Thürmer *et al.*, 2020). Indeed, the most potential combination, leading to most fruits picked, was when a proscriptive compliance-influence was reinforced by a supportive conformance-influence.

While past research has shown that structured and deliberate activities such as formal education (e.g., Jung *et al.*, 2019; Nga *et al.*, 2019), or even commercial advertising (Tarabashkina *et al.*, 2017), can influence children's food choice, our research alluded to the importance and effectiveness of informal and implicit approaches in tackling childhood

obesity. Our findings of the implicit influence enacted by teachers and peers are consistent with research, which suggests that the targets are often not aware of being subjected to the influence (Cialdini and Goldstein, 2004; Cruwys *et al.*, 2015; Freedman and Fraser, 1966; Gass, 2015). Others similarly posit that social influence takes place via peripheral processing, where the influence serves as heuristic cues to guide decisions or behaviour (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998). As children are susceptible to compliance influence from teachers in a classroom context, teachers should purposely, and yet implicitly, talk about healthy eating or even exhibit healthy eating behaviours in the presence of students. Such informal actions can help complement formal school curriculum on food and health.

However, similar to Hendy and Raudenbush (2000), Experiment 2 shows that peers could negate teachers' influence when the peers made statements that conflicted with the teachers' message. As the declining gradients of Group 2 and 4 in Figure 2 imply, peers in these groups were able to exert more negative influence—to switch from fruits to candies—as children's susceptibility to follow their peers increased. Compliance influence means accepting a message even if there is no agreement (Ozuem *et al.*, 2021). Hence, it is plausible that more children picked candies once they learnt that their peers were also not in favour of fruits. This is similar to our Experiment 1's postulation of psychological reactance (Brehm and Brehm, 1981), where people react negatively to being restrictively told *not* to do something, might explain why children switched to candies. Experiment 2's findings similarly suggest that psychological reactance may be at play once children learnt that their peers were not in favour of the teacher's message to pick healthy food. This result is worrying in that while the schools can play a proactive and constructive role in

encouraging healthy eating habits, they cannot control peers' behaviours especially those whose approval are sought by other children.

Conclusion and Future Research

Childhood is an important stage for learning about and forming good habits when it comes to food choice and consumption (Birch and Fisher, 1998; Tarabashkina *et al.*, 2017). Thus, developing further understanding on the determinants of healthy eating behaviour in children is important, especially when childhood obesity may lead to increased mortality and morbidity (Brown *et al.*, 2019; Jalali *et al.*, 2016), as well as health issues as adults (Parsons *et al.*, 1999; Simmonds *et al.*, 2016). In this research, we investigated a particular driver of children's behaviour, social influence, which is known to affect children's behaviour (Lippitt *et al.*, 1952; Prinstein and Dodge, 2008; Ragelienė and Grønhoj, 2020).

A literature review of 69 studies (1974-2014) on the influence of social norms on eating preference and behaviour found that majority of studies were experiments conducted in labs, and the authors stressed the importance of conducting studies in real-world settings in order to better address the societal challenges of obesity and its health consequences (Cruwys *et al.*, 2015). This study sheds light on how different types of social influence, and the message framing of the influence, may sway children's choice of healthy versus unhealthy food in an actual classroom context. Within the context of collectivistic cultures like Pakistan, school children hold high respect for teachers (Khan, 2011). As the Pakistani constitution obligates the state to provide free and compulsory education to children (Mofept, 2021), schools are a convenient and suitable avenue to help tackle childhood obesity epidemic.

Besides the theoretical contributions of investigating childhood obesity through a marketing lens by drawing on theories of social influence and message framing, this paper points out useful and practical and policy contributions especially for developing countries like Pakistan, where institutional support to tackle childhood obesity may be weak. Our findings open up important considerations for schools and governments to enhance education facilities and support to promote healthy food consumption amongst children. For example, teachers can take on official, yet informal, responsibility of promoting healthy eating. To prevent exposing children to harmful peer behaviour, schools should ban or deter children from bringing unhealthy food to school to ensure that harmful peer behaviours are not observable. Within schools, differential pricing policies can impose higher tax on unhealthy products or subsidise the prices of healthy products (Garbarino *et al.*, 2018).

Social influence on children can similarly extend beyond food consumption. Based on the anecdotal discussions with the class teachers, it was suggested that schools could arrange excursion activities to places of interest related to healthy eating, such as fruit orchards, in order to enhance children's understanding of healthy consumption or the consequences of unhealthy consumption. Governments could incentivise schools to promote such programs and events as a part of their curriculum. Similarly, teachers can influence children to exercise more. Policy makers and educational institutions can facilitate this by providing proper playground and exercise facilities. Formal curriculum can also include awareness of healthy eating, exercising, and their association with obesity.

While our research provides important contributions, it also contains some limitations which future studies can address. Beyond the context of Pakistan, future research should compare the theoretical phenomenon across different cultures or countries. For example, countries steeped in Confucian culture are known to hold teachers

in high esteem, thereby possibly accentuating compliance influence (Park and Kim, 2008). As this study shows that peers could negate teachers' influence, it would be interesting to understand the extent of this negation in traditional Confucian countries (e.g., China or Japan) versus non-Confucian countries (e.g., US or UK). Given the experiment design, it was not feasible to assign individual students within the same class to different experimental conditions. Instead, all children within the same class were exposed to the same condition, thereby giving rise to potential random-effect bias across classes. In this study, all four confederates were male, and it remains unclear whether gender would make a difference to the results. While the online survey asked for food choice, it would be useful to replicate this study with actual food consumption as dependent variable, such as by observing what children actually eat during recess or break, after exposure to an influence message.

Some researchers have suggested that the influence process is inherently dynamic and cross-sectional models that consider only a single time-point are inadequate in revealing the influence process (Mason *et al.*, 2007). Hence, future research should replicate this study by taking a longitudinal approach to determine how long the effect of a single exposure would last, as well as the effects of multiple exposures of each of the two types of social influence. As social influences can come from multiple sources (Mason *et al.*, 2007), it would be useful to understand how parents, or the home and neighbourhood environment in general, can reinforce what happens in classrooms. Given the popularity of social media, the same research idea applies to the role of social influencers. In other words, future research can consider how would a combination of explicit (formal) and implicit (informal) activities may influence children's food choice better than either approach alone.

Similarly, Zhang and Gong (2021) suggest that the social contagion of adopting a new product increases as more network neighbours adopt a behaviour. This study uses just one

student in each class as confederate, and it would be interesting to determine whether increasing the number of confederates would increase the contagion, especially when Zhang and Gong (2021) found an inverse-U relationship where the influence did not work as well at either extreme. Finally, we speculated that psychological reactance (Brehm and Brehm, 1981) might have led to more children picking candies against the teachers' message about healthy eating. Future research should specifically measure the presence or extent of reactance in order to test this postulation.

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Table 1. Descriptive Statistics of Factor in Experiment 1

Item Description of Susceptibility to Compliance Influence (COMPLY)	Mean	SD	Factor loading
It is important that I listen to my teacher	5.36	1.774	.853
My teacher would approve the choice of food that I picked	5.00	2.001	.779
I always obey my teacher	5.74	1.725	.839
It is important that I do what my teacher says	5.74	1.844	.872

Table 2. Breakdown of Items Picked by the Two Classes (Experiment 1)

Group	Item Picked		Group size
	Unhealthy (Candy)	Healthy (Fruit)	
0 - No message (control)	18 (47.4%)	20 (52.6%)	38 (male=55%)
1 - Prescriptive message	20 (43.5%)	26 (56.5%)	46 (male=53%)
2 - Proscriptive message	13 (27.1%)	35 (72.9%)	48 (male=61%)

Table 3. Results of Logistic Regression (Experiment 1)

	Coefficient <i>B</i>	S.E	Sig. <i>p</i>
Message Type	3.891	1.553	.012
COMPLY	-.503	.351	.152
Message Type * COMPLY	.841	.273	.002

Table 4. Breakdown of Items Picked across the Four Experiment Conditions (Experiment 2)

Experiment Group	item Picked		Class size
	Unhealthy - Candy	Healthy - Fruit	
1 - Prescriptive compliance/ Supportive conformance	18 (36.7%)	31 (63.3%)	49 (male=61%)
2 - Prescriptive compliance/ Conflicting conformance	21 (46.7%)	24 (53.3%)	45 (male=58%)
3 - Proscriptive compliance/ Supportive conformance	9 (19.1%)	38 (80.9%)	47 (male=56%)
4 - Proscriptive compliance/ Conflicting conformance	18 (36%)	30 (64%)	48 (male=60%)

Table 5. Descriptive Statistics of Factors (Experiment 2)

	Item Description	Mean	SD	Factor loading
Susceptibility to compliance influence (COMPLY)	It is important that I listen to my teacher	5.33	1.776	.851
	My teacher would approve the choice of food that I picked	4.97	2.0	.776
	I always obey my teacher	5.72	1.731	.838
	It is important that I do what my teacher says	5.71	1.851	.872
Susceptibility to conformance influence (CONFORM)	I like to choose the same item as my friends	4.42	1.92	.868
	I observe what others are choosing when I choose my item	4.44	1.923	.842
	I choose the same item as my friends so that I can be like them	4.28	2.138	.879
	I choose the same item as my friends so that I can make good impressions on them	4.22	2.029	.885
	I choose the item that my friends would approve of	4.45	1.872	.847

Table 6. Results of Logistics Regression (Experiment 2)

	coeff B	S.E.	Sig. p
CONFORM	-.498	.138	<.001
COMPLY	.237	.148	.11
Interaction of CONFORM x Conformance message	.18	.07	.035
Interaction of COMPLY x Compliance message	.188	0.67	.005

Dependent variable is item picked (0=candy; 1=fruit)

Conformance message: 1=conflicting; 2=supportive

Compliance message: 1=prescriptive; 2=proscriptive

Figure 1. Moderating Effects of Susceptibility to Compliance Influence (Experiment 1)

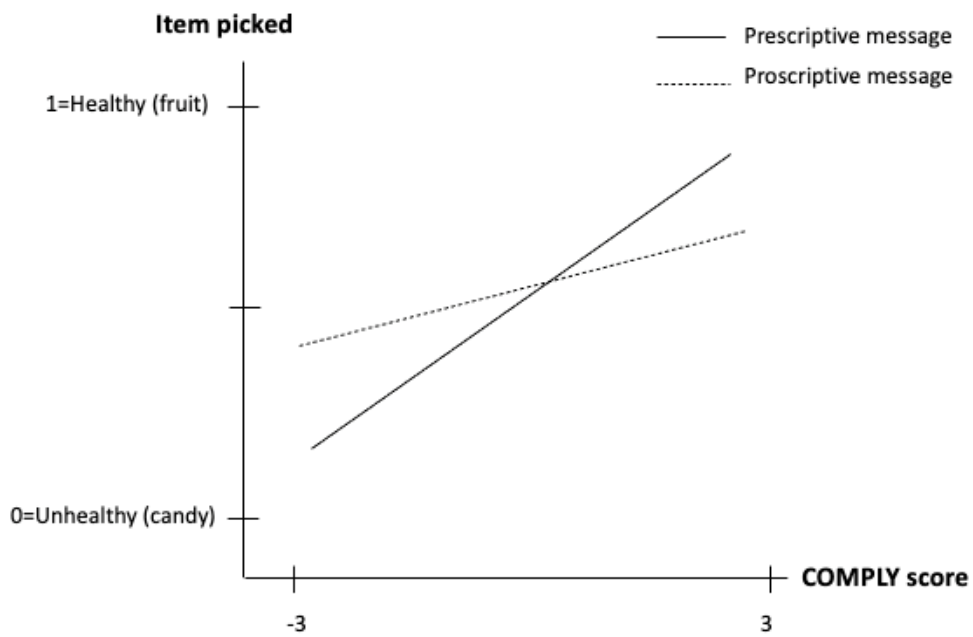


Figure 2. Moderating Effects of Susceptibility to Compliance and Conformance Influence (Experiment 2)

