



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

Journal:	<i>European Journal of Marketing</i>
Manuscript ID	EJM-07-2021-0505.R2
Manuscript Type:	Original Article
Keywords:	child obesity, compliance influence, conformance influence, prescriptive message, proscriptive message

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Manuscripts

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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

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3 some children away from fruits to candies. This signalled the importance of harmful peer
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5 influence, particularly with children who were more likely to conform.
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10 **Originality**

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12 This study adopts a marketing lens, and draws on social influence and message framing
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14 theory to shed light on children's food choice behaviour within a classroom environment.
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17 The context was an underexplored developing country, Pakistan, where childhood obesity is
18
19 a public health concern.
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25 **Research Implications**

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

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

Research paper



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*

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2
3 *al.*, 2014), advertising (Tarabashkina *et al.*, 2017), or peers as role models (Cruwys *et al.*,
4
5 2015), yet little is known about the role of social influence within an actual school
6
7 environment, where as we explained below, different sources of social influence may co-
8
9 exist. When their literature review of 69 studies (1974-2014) on the influence of social
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11 norms on eating preference and behaviour found that majority of studies were experiments
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13 conducted in labs, Cruwys *et al.* (2015) stressed the importance of conducting research in
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15 actual settings in order to better address the societal challenges of obesity and its health
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17 consequences.
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23 Meanwhile, researchers theorise that there are two types of social influence:
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25 compliance and conformance (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Ozuem
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27 *et al.*, 2021). Compliance involves people obeying explicit requests, and is particularly
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29 pertinent when the influence comes from sources that are perceived as authority, such as
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31 school teachers. By contrast, conformance influence concerns people adhering to norms or
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33 what they perceive as unspoken rules, in order to fit in, to be liked or to gain approval.
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35 Within schools, conformance influence is likely to come from classmates.
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40 In collectivistic cultures like Pakistan, the context of this study, school children hold
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42 teachers in high regard (Khan, 2011). Hence, it is probable that teachers can play an
43
44 effective role in nudging children towards healthy eating behaviour through compliance
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46 influence. Yet, modelling of teacher's behaviour has rarely been examined experimentally,
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48 and the results among the few existing studies are inconsistent (Hendy and Raudenbush,
49
50 2000). Concurrently, children at schooling age are particularly vulnerable to want to
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52 conform to their peers (Nairn and Spotswood, 2015; Prinstein and Dodge, 2008; Ragelienė
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54 and Grønhoj, 2020). While schools can provide formal education on food and healthy eating
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56 (e.g., Jung *et al.*, 2019; Nga *et al.*, 2019), it remains unclear how teachers and peers may
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3 concurrently exert social influence on children's food choice behaviour. Since compliance
4 and conformance message may possess the same or opposite valence (i.e., teachers and
5 peers may concur or disagree over a subject matter), a particularly interesting question
6 would be how they may reinforce or negate each other's influence on children's food choice
7 behaviour. Furthermore, individuals may vary in their dispositional proneness to comply
8 with authority or eagerness to conform with peers (Bearden *et al.*, 1989; Park and Lessig,
9 1977). Often overlooked in social influence research including those within marketing
10 domain (e.g., Nairn and Spotswood, 2015; Tarabashkina *et al.*, 2017), accounting for the
11 potential interaction between influence-type and these personal dispositions is an
12 important contribution of this study.
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28 Research further suggests that how a message is framed can alter consumer
29 behaviour (Lee *et al.*, 2018; Mckechnie *et al.*, 2012). Similarly, social influence may be
30 framed prescriptively (i.e., a positively stated norm that a behaviour should be performed)
31 or proscriptively (i.e., a negatively stated norm that a behaviour should *not* be performed)
32 (Bergquist and Nilsson, 2019; Rhodes *et al.*, 2020; Staunton *et al.*, 2014; Törnblom and
33 Biddle, 1976). Blake and Davis (1964) suggests that a prescriptive message implies a reward
34 for observance, whereas a proscriptive message implies punishment. Thus, another
35 research objective concerns how compliance and conformance influence may also depend
36 on their framing. Considering this interaction is particularly important because teachers and
37 classmates coexist concurrently in a classroom environment to exert different social
38 influence on student, and the influence message from each party may be framed differently
39 (i.e., prescriptively or proscriptively). In other words, accounting for just the influence
40 source (e.g., Cialdini and Goldstein, 2004; Zhang and Gong, 2021) or message framing (e.g.,
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3 Bergquist and Nilsson, 2019; Rhodes *et al.*, 2020) independently would have yielded
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5 inconclusive findings, especially for the important issue of tackling childhood obesity.
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8 By combining theories in social influence (Cialdini and Goldstein, 2004; Cialdini and
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10 Trost, 1998; Ozuem *et al.*, 2021) and message framing (Lee *et al.*, 2018; Mckechnie *et al.*,
11
12 2012) through a marketing lens, this study aims to address the two research objectives
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14 through two experiments. The first experiment investigated the effects of compliance
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16 influence with a prescriptive versus proscriptive message, while accounting for individuals'
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18 susceptibility to comply with authority. The second experiment then considered what
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20 happened when a prescriptive or proscriptive compliance-influence was paired with the
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22 conformance influence that either reinforced or attenuated the compliance influence. We
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24 similarly controlled for individuals' proneness to comply or conform.
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30 Collectively, the findings hold important practical implications by shedding light on
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32 how teachers, beyond formal instructions, can play an active yet implicit role to help tackle
33
34 childhood obesity. Understanding the effects of peer influence would also help schools
35
36 enact policy rules to mitigate any potentially harmful influence. Thus, carrying out this study
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38 within an actual classroom environment enhances the external validity of this study. In
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40 countries like Pakistan, where the constitution obligates the state to provide free and
41
42 compulsory education to children (e.g., Mofept, 2021), schools are an important and
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44 suitable avenue to help tackle childhood obesity epidemic. As obesity is reaching alarming
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46 proportion in developing countries, this study's context of Pakistan also answers calls by
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48 World Health Organisation (2016) to urge studies in such countries.
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57 **Literature Review**

58 ***Obesity among Children***

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3 It is a well-established phenomenon that unhealthy food contributes to obesity
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5 which in turn leads to various chronic problems including diabetes, cardiovascular diseases,
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7 gastrointestinal diseases and even disability overtime (Daniels, 2006; Fuemmeler *et al.*,
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9 2009; Sommer and Twig, 2018; Usfar *et al.*, 2010). Childhood obesity also has long-term
10
11 effects as obese children are likely to suffer from health-related problems even in their
12
13 adulthood (Parsons *et al.*, 1999; WHO, 2016). For example, Rundle *et al.* (2020) found that
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15 childhood obesity is positively related to body mass index (BMI) in adulthood. Hence,
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17 obesity should be controlled during childhood, not only to minimise its health consequences
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19 during childhood, but also to prevent future health issues in adulthood, which could have
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21 long-term societal and economic consequences. Besides, obese children are also more likely
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23 to perform poorly in schools compared to non-obese classmates (Taras and Potts-Datema,
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25 2005).

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32 While research has largely examined childhood obesity in developed nations (Bleich
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34 *et al.*, 2008; Simmonds *et al.*, 2016; Singh and Singh, 2020), it is equally, if not more, critical
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36 to address the epidemic in developing nations, as a report by the World Health Organisation
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38 (2016) suggests that obesity is also reaching alarming proportion in developing countries.
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40 Specifically within this study's contextual setting (Pakistan), a recent study by UNICEF (2018)
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42 in conjunction with Pakistan's Ministry of Health Services found that about 17% of Pakistani
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44 children aged between 10 and 17 years were overweight, in similar proportion between
45
46 gender, as well as between urban and rural population. The report stressed that these
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48 numbers were alarming given the 200 million population of the country, and declared
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50 obesity "a public health issue of concern" (UNICEF, 2018, p. 24).
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57 Meanwhile, from a marketing perspective, childhood obesity research has focused
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59 on streams including food marketing (Elliott, 2018), advertising (Tarabashkina *et al.*, 2017),
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3 and branding (Bogomolova *et al.*, 2021). In addition, some studies conducted in developing
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5 markets' settings have chosen to focus on the role of social marketing (Witkowski, 2007).
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8 For example, Minos (2020) shows that an effective way to tackle childhood obesity in South
9
10 Africa is to educate caregivers and empower them with a more active role in food selection.
11
12 Similarly, social marketing could play a role in encouraging Nigerian parents to select
13
14 healthy options for their children (Mcleay and Oglethorpe, 2013). However, while decades
15
16 of marketing research has established the efficacy of social influence in shaping consumer
17
18 behaviour (Bearden and Etzel, 1982; Festinger, 1957; Netemeyer *et al.*, 1992; Veblen, 1925;
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20 Witt and Bruce, 1970; Zhang and Gong, 2021), social influence has hardly been considered
21
22 as a mechanism to address childhood obesity, particularly among school children. Indeed, a
23
24 systematic review by Nga *et al.* (2019) suggests that while formal health and nutrition
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26 education do play a crucial role in combatting obesity among school children, the issue is a
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28 complex problem that requires participation from a wider community.
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38 ***Compliance versus Conformance Influence***

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40 Over a long period, studies into the effects of social influence on human behaviour,
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42 including with children (Lippitt *et al.*, 1952; Prinstein and Dodge, 2008; Ragelienė and
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44 Grønhøj, 2020), are well established (Cialdini and Goldstein, 2004; Hyman, 1960; Netemeyer
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46 *et al.*, 1992; Zhang and Gong, 2021). Indeed, a recent meta-analysis that spanned 22
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48 countries and over 40 years reported that social influence has remained strong and stable in
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50 guiding approved behaviour (e.g., healthy eating, donations), as well as disapproved
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52 behaviour (e.g., smoking, gambling) (Melnik *et al.*, 2021). In order to better understand the
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54 social influence phenomenon, researchers have dichotomised social influence into two
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56 distinct, but possibly overlapping, categories that exhaust a superordinate category.
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3 Although such classifications may sometimes be difficult to disentangle (David and Turner,
4 2001), they nonetheless help dissect the underpinnings of social influence so that
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6 theoretical propositions based on empirical observations can be made.
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10 For example, social influence may be informational versus normative (Burnkrant and
11 Cousineau, 1975; Deutsch and Gerard, 1955). Informational influence arises from the
12 willingness to accept information as evidence of reality, whereas normative influence rests
13 on bending to others' expectations. Similarly, social influence may be cast as injunctive or
14 descriptive (Lee *et al.*, 2010; Ravis and Sheeran, 2003). Injunctive influence is a perceived
15 pressure to conform to group behaviour, whereas descriptive influence rests on people
16 observing and subsequently adopting others' behaviours. In a study that illustrates the
17 differences between injunctive and descriptive influences, Swedish children aged 11 to 15
18 years old reported their choice of breakfast foods: high-fibre bread and four types of milk
19 (Berg *et al.*, 2000). The findings revealed that the children were more likely to mimic their
20 parents' behaviour (descriptive influence) than what their parents told them (injunctive
21 influence).
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40 A particular dichotomous classification that is central to this study's proposition is
41 compliance versus conformance influence (Cialdini and Goldstein, 2004; Cialdini and Trost,
42 1998; Ozuem *et al.*, 2021). Compliance involves people responding to or obeying requests,
43 which may be implicit or explicit, especially when the influence stems from sources that are
44 perceived as authority. By contrast, conformance influence concerns people adhering to
45 norms, often unspoken, in order to fit in or to gain approval from others. Compliance is
46 typically goal-directed, where the target recognises that a response in a desired way is being
47 sought. By contrast, conformance may not be goal-directed in that the source of influence
48 may not have a goal or have an unrelated goal compared to the target.
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3 Compliance influence is particularly effective when the influence source is perceived
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5 to command authority (Cialdini and Goldstein, 2004; Cialdini and Trost, 1998; Gass, 2015).
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7 For example, in Milgram's (1974) classic study, participants were more compliant to shock
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9 administration when the experimenter was dressed in a white lab coat and carried a
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11 clipboard, compared to one that did not; the rationale being that the participants perceived
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13 the former experimenter as possessing legitimate authority. Some studies have found that
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15 parents, as authority figures, are influential in shaping children's eating behaviour either by
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17 indirect influence such as through conversations with children about healthy eating
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19 (Tarabashkina *et al.*, 2017), by setting examples for children to mimic (Berg *et al.*, 2000), or
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21 by explicitly selecting the food choice for their children Hogleve *et al.* (2021).
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28 Teachers are another important authority as children spend substantial time in
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30 schools. Hendy and Raudenbush (2000) demonstrated that compared to teachers who
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32 remained silent, enthusiastic promotions by teachers led to increased new food adoption by
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34 school children. Furthermore, authority is situational in that the perceived authority in one
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36 setting may be irrelevant or lacking in another setting (Gass, 2015). In this study's context, a
37
38 teacher within a classroom setting would be perceived as an authority figure, and hence a
39
40 compliance influence enacted by the teacher would likely be effective in guiding children's
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42 food choice behaviour.
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47 As opposed to compliance, conformity is viewed as an act of adapting or changing
48
49 one's behaviour to match others in order to win social approval (Cialdini and Goldstein,
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51 2004; Deutsch and Gerard, 1955; Lee *et al.*, 2010; Thürmer *et al.*, 2020). An early study by
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53 Asch (1968) was already able to demonstrate compellingly that individuals could yield to
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55 group pressures—in judging line measurements—even when the group judgments were
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57 contrary to facts.
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3 Conformance influence is particularly effective when people perceived themselves
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5 as similar to the source of influence, and when they want to maintain good relationship with
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7 the source (Cialdini and Trost, 1998; Tarabashkina *et al.*, 2017). Hogg and Turner (1987)
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9 argue that conformance is underpinned by people self-categorising themselves to a group,
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11 adopting the group identify, and consequently conforming to group behaviour willingly. For
12
13 example, a systematic review by Ragelienė and Grønhøj (2020) found that children are
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15 negatively influenced by peers, to whom they were close and attached, in consuming
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17 unhealthy food. Hammond (2010) discussed the phenomenon of social contagion—where
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19 obesity spread through social networks of peers—and found that obese children are more
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21 likely to befriend others who are similarly overweight. This influence may even occur
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23 without conscious awareness that people are mimicking the behaviour of peers (Cruwys *et*
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25 *al.*, 2015). Moscovici and Lage (1976) further show conformance influence may be effective
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27 even when the source of influence is numerically inferior compared to the target of
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29 influence. Hence, it is plausible that class students may choose to behave consistently with a
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31 single student—who serves as a source of influence—with whom they associate.
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40 The above review shows that while studies often focused independently on the
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42 influence of compliance (e.g., Kemp *et al.*, 2021; Milgram, 1974) or conformance (e.g., Lee
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44 *et al.*, 2010; Thürmer *et al.*, 2020) on human behaviour, more clarity is needed regarding
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46 how the two influences could coexist, such that one influence may reinforce or attenuate
47
48 the other. One such environment is the classroom, where school children may be exposed
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50 to compliance influence from teachers, in concurrence with conformance influence from
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52 their peers. Moreover, children, as individuals, may also differ in their personal dispositions
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54 regarding their proneness to comply with authority or eagerness to conform with peers
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(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).

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3 Support for the differential effects of prescriptive and proscriptive normative
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5 messages can also be gleaned for research in other domains. For example, word-of-mouth
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7 research suggests that negative word-of-mouth is stronger than positive ones is explaining
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9 customer loyalty and advocacy (Samson, 2006), but results are not consistent (Sweeney *et*
10
11 *al.*, 2008). Lee *et al.* (2018) demonstrated that the positively framed advertising messages
12
13 are more effective than negatively framed messages, but the effectiveness depends on
14
15 whether consumers are promotion-focused or prevention-focused, as well as whether the
16
17 advertised product is hedonic or utilitarian. Finally, drawing on regulatory focus theory
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19 (Higgins, 1998), Naletelich and Spears (2020) show that promotion versus prevention
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21 focused message may lead to different consumer outcomes.
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28 Earlier, in articulating the first research objective of this study, we argue that
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30 children may be exposed to compliance and conformance influence concurrently, and that
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32 the effects of these influences may depend on the children's dispositional vulnerability to
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34 comply or conform. In extension, the second objective is to determine how these
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36 differential effects may further depend on the framing (prescriptive or proscriptive) of the
37
38 compliance-influence and conformance-influence message. To address these two research
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40 objectives, we carried out two experiments in actual classroom environment in order to
41
42 enhance the external validity of this study. The study's practicality is also enriched by
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44 conducting the experiments in a developing country (Pakistan), where the childhood obesity
45
46 is reportedly epidemic (WHO, 2016).
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54 **Overall Sample Collection and Pretest**

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57 Prior to describing the two main experiments, we outlined the overall sample
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59 collection method and a pretest. Following ethics approval and permissions from the
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3 participating school, teachers and parents/guardians, the pretest and main experiments
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5 took place in a junior school in the populous Pakistani city of Lahore. Due to the prevailing
6
7 Covid-19 pandemic, all lessons in the school were conducted online using videoconferencing
8
9 (Zoom) software where all participants appeared in a live gallery, with the profile enlarged
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11 for the active speaker. Across seven online sessions, Grade 6-7 children aged between 11-12
12
13 years participated in the study. The pretest involved one group of students (n=38),
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15 Experiment 1 involved two groups (total n= 94), and four groups of students (n=189)
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17 participated in Experiment 2. The pretest and two main experiments all used different
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19 students.
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25 The pretest served two purposes: 1) to validate the two scales used in the main
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27 experiments; and 2) to serve as a baseline or control group for Experiment 1. In the pretest
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29 (n=38; male=55%), just before the online lesson ended, the teacher shared a survey link and
30
31 asked the children to complete the survey without giving any further details or instructions.
32
33 An opening question prompted "*If you were to pick something to eat now, which of these*
34
35 *two items would you choose*", and the children picked from a binary pictorial choice of fruit
36
37 or candy. The children then responded to a four-item scale that measured their
38
39 susceptibility to compliance influence (COMPLY), and a five-item scale measuring their
40
41 susceptibility to conformance influence (CONFORM), adapted from various sources
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43 (Bearden *et al.*, 1989; Park and Lessig, 1977; Zhang and Gong, 2021) (see Table 5 in
44
45 Experiment 2 for the items). Finally, they stated their gender (male or female).
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52 Both COMPLY and CONFORM possessed adequate reliability with both Cronbach's
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54 $\alpha > .9$ (Peter, 1979), and were discriminantly valid as their variance extracted estimates
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56 (AVE $>.732$) were greater than the square of the correlation between the factors (Pearson's
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58 $r = -.165, p=.322$) (Fornell and Larcker, 1981). Overall, 18 children picked candies and 20
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3 children picked fruits, yielding a non-significant difference between them (one-sample
4
5 binomial test with probability to pick either fruit or candy at .50, $p=.871$). Also, a cross-
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7 tabulation test ($\chi^2(1)=1.799$, $p=.18$) found no difference between gender on choice of food.
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9 Since the pretest children picked the items without being exposed to any social influence
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11 messages, these baseline numbers from the pretest served as the control group for
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15 Experiment 1.

20 Experiment 1 – The Differential Effects of Prescriptive versus Proscriptive Compliance

22 Influence

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

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37 Two groups (prescriptive message vs proscriptive message) of children participated
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39 in this study. In the prescriptive-message group ($n=46$, male=53%), the teacher made an
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41 arbitrary comment in the midst of the online lesson: "*Children, do you know that eating*
42
43 *healthy food like fruits is good for your health. I recommend that you eat fruits regularly.*"
44
45 Just before the lesson ended, the teacher shared a survey link and asked the children to
46
47 complete an online survey without giving further instructions. Because studies suggest that
48
49 social influence is more pertinent when people are aware that their responses are public
50
51 (Cialdini and Trost, 1998), the teacher ostensibly told the group that the survey results
52
53 might be shared openly, although the survey remained anonymous and was not shared. The
54
55 procedure in the proscriptive-message group ($n=48$, male=61%) was identical, except that
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3 the teacher said, “*Children, do you know that unhealthy food like candies is not good for*
4 *your health. I recommend that you do not eat candies.*”
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8 Both groups answered an online survey with five questions. The first question
9 prompted “*If you were to pick something to eat now, which of these two items would you*
10 *choose*”, with a binary pictorial choice of fruit or candy. The children then responded to
11 same four-item COMPLY scale in the pretest, randomly ordered to minimise common
12 method bias (Podsakoff *et al.*, 2012) (see Table 1 for the descriptive statistics). As previously
13 mentioned, the results from the pretest served as the control group, since the pretest group
14 was not exposed to any social influence messages.
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Insert Table 1 here

Results

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

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3 between the control and prescriptive group, it is nonetheless noteworthy that exposure to
4 either compliance message still led to more picked fruits than not exposed to any
5 compliance message. Combined, these results are consistent with past research that
6 supports the efficacious role of compliance influence from authority figures (Cialdini and
7 Goldstein, 2004; Cialdini and Trost, 1998; Gass, 2015).
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15 Interestingly, as Figure 1 illustrates, the influences of both prescriptive and
16 proscriptive compliance-messages were moderated by children's proneness to complying
17 with authority. Specifically, they picked more fruits as proneness to comply increased.
18 Although this phenomenon was similar for both prescriptive and proscriptive messages, the
19 effect of compliance was less pronounced for the proscriptive message than for the
20 prescriptive message, as indicated by the gradient of the slopes for the two message-types.
21 In other words, proscriptive messages were less effective than prescriptive messages as
22 children became more compliant. A plausible explanation is psychological reactance (Brehm
23 and Brehm, 1981), where people react negatively to being restrictively told *not* to do
24 something. In this instance, the more compliant children might feel that they were being
25 restricted by the proscriptive message, and hence reacted oppositely by picking candies.
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45 **Experiment 2 – The Effects of Compliance versus Conformance Influence**

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47 Study 1 concerned only compliance influence from teachers. However, in reality,
48 children in a classroom environment do not just face the teacher. They would also be
49 mingling with their classmates, and the classmates may or may not concur with the teachers
50 on a subject matter. Hence, it is plausible that the compliance influence may be further
51 strengthened, or even negated, by conformance influence from peers. That is, the
52 compliance and conformance message may possess the same or opposite valence.
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3 Furthermore, each type of social influence may be framed differently (Bergquist and
4
5 Nilsson, 2019; Jasso and Opp, 1997; Steenhaut and Kenhove, 2006). Thus, Experiment 2
6
7 considered this situation by investigating this potential interaction effect.
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9

10 11 12 13 **Method**

14
15 Experiment 2 was a 2 (compliance influence with prescriptive message vs
16
17 proscriptive message) x 2 (conformance influence with supportive versus conflicting
18
19 message) between-subjects design (see Table 4 for the four experiment conditions). Prior to
20
21 the start of the experiments, the class teacher identified and appointed a student to be the
22
23 confederate. In the context of Pakistani junior schools, a class representative is typically
24
25 identified by the teacher as a student who performs relatively well academically and is
26
27 generally well liked by classmates. Across all four classes, class representatives were
28
29 appointed as the confederates, all of whom were 11-year old boys. Without being told the
30
31 purpose of the experiment, the confederates were briefed beforehand on what and when
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33 they had to speak out, and instructed not to share or discuss with their classmates.
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3 supportive-conformance groups (Group 1 and 3) said "*Children our age should eat more*
4 *fruits as they are healthy. I also prefer fruit.*" That is, the conformance and compliance
5
6 influence in these two groups were aligned. For the conflicting-conformance group (Group
7
8 2 and 4), the confederate said "*There is nothing wrong with eating candies. Children our age*
9
10 *should be allowed to eat candies. I prefer candies.*" That is, the conformance and compliance
11
12 influence in these two groups were opposite. Finally, all groups answered an online survey
13
14 with ten questions. The first question prompted "*If you were to pick something to eat now,*
15
16 *which of these two items would you choose*", with a binary pictorial choice of fruit or candy.
17
18 Then they answered the CONFORM and COMPLY scales that were similar to the pretest,
19
20 with the questions randomly ordered to minimise common method bias (Podsakoff *et al.*,
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22 2012). Table 5 contains the factor items and their descriptive statistics.
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33 Insert Table 5 here
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38 Results

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40 The factor scores for COMPLY (mean=5.435; sd=1.62; Cronbach's $\alpha = .933$) and
41
42 CONFORM (mean=4.367; sd=1.718; Cronbach's $\alpha = .915$) were a simple average of the scale
43
44 items. The variance extracted estimates for both factors (AVE > .697) were greater than .5,
45
46 and greater than the square of the correlations between the factors (Pearson's $r = .311$,
47
48 $p < .001$), thus supporting discriminant validity between the two factors (Fornell and Larcker,
49
50 1981). An analysis of variance (ANOVA) test showed no significant differences in COMPLY
51
52 (F(3)=-1.441, $p = .232$) and CONFORM (F(3)=-1.387, $p = .249$) across the four groups. Tests of
53
54 homogeneity of variances revealed that the variances for COMPLY (F3)=2.001, $p = .115$) and
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56 CONFORM (F(3)=2.495, $p = .062$) were also not significantly different across the groups.
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3 Table 4 shows the children's' picked choice across the four groups. Comparing
4 (Group 1+2) versus (Group 3+4), children exposed to proscriptive compliance-influence
5 selected fruits more often than those exposed to prescriptive compliance-influence (cross-
6 tabulation $\chi^2(1)=5.224$, $p=.022$). This result was consistent with the finding of Experiment 1,
7 which found that a proscriptive influence was stronger than a prescriptive influence.
8 Comparing (Group 1+3) versus (Group 2+4), there was a marginally significant difference (at
9 $p=.10$ level) in picked fruits between supportive conformance-influence and conflicting
10 conformance-influence (cross-tabulation $\chi^2(1)=2.82$, $p=.093$).
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23 Across the four groups (cross-tabulation test $\chi^2(3)=8.088$, $p=.044$), the highest
24 number of children who preferred fruits (81%) over candies occurred when they were
25 exposed to a proscriptive compliance-influence that was reinforced with a supportive
26 conformance-influence. Importantly, a comparison of Group 3 and 4 revealed a significant
27 difference ($\chi^2(1)=3.931$, $p=.047$), such that children first exposed to proscriptive compliance-
28 influence were more likely to pick candies when exposed to conflicting conformance-
29 influence than when exposed to a supportive conformance-influence. Between Group 1 and
30 2, where children were first exposed to prescriptive compliance-influence, there was no
31 significant difference regardless of whether the conformance influence was supportive or
32 conflicting ($\chi^2(1)=.568$, $p=.326$).
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47 Next, Table 6 shows the results of a logistic regression using Process Model 1 in SPSS.
48 The model fit was satisfactory (Hosmer-Lemeshow $\chi^2(8)=5.086$, $p=.748$; Nagelkerke's $R^2=.39$;
49 overall correct=80%). It is noteworthy that while CONFORM significantly predicted item
50 picked ($\beta=-.498$, $p<.001$), COMPLY did not ($\beta=.237$, $p=.11$). The interaction of CONFORM
51 and conformance message-type ($\beta=.148$, $p=.035$), as well as the interaction of COMPLY and
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3 compliance message-type ($\beta=.188$, $p=.005$), were both significant. Figure 2 illustrates these
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5 interaction effects in separate graphs.
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11 Insert Table 6 here
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14 Insert Figure 2 here
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18 It is also noteworthy that for all four groups, children picked more fruits than the control
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20 group where the children were not exposed to any compliance or conformance message
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22 (cross-tabulation test $\chi^2(4)=9.988$, $p=.041$).
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27 Discussion

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29 Consistent with Experiment 1, Experiment 2 found that proscriptive compliance-
30
31 influence was stronger than prescriptive compliance-influence in nudging healthy food
32
33 choice. This result further supports the potency of negatively framed messages compared to
34
35 positively framed ones in marketing studies (Charlett *et al.*, 1995; Sweeney *et al.*, 2012).
36
37 Although marginally significant, the results also supported marketing research into the
38
39 efficacy of conformance-influence through peers (Deutsch and Gerard, 1955; Lee *et al.*,
40
41 2010; Thürmer *et al.*, 2020). Indeed, the most potential combination, leading to most fruits
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43 picked, was when a proscriptive compliance-influence was reinforced by a supportive
44
45 conformance-influence.
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52 While past research has shown that structured and deliberate activities such as
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54 formal education (e.g., Jung *et al.*, 2019; Nga *et al.*, 2019), or even commercial advertising
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56 (Tarabashkina *et al.*, 2017), can influence children's food choice, our research alluded to the
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58 importance and effectiveness of informal and implicit approaches in tackling childhood
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3 obesity. Our findings of the implicit influence enacted by teachers and peers are consistent
4
5 with research, which suggests that the targets are often not aware of being subjected to the
6
7 influence (Cialdini and Goldstein, 2004; Cruwys *et al.*, 2015; Freedman and Fraser, 1966;
8
9 Gass, 2015). Others similarly posit that social influence takes place via peripheral processing,
10
11 where the influence serves as heuristic cues to guide decisions or behaviour (Cialdini and
12
13 Goldstein, 2004; Cialdini and Trost, 1998). As children are susceptible to compliance
14
15 influence from teachers in a classroom context, teachers should purposely, and yet
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17 implicitly, talk about healthy eating or even exhibit healthy eating behaviours in the
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19 presence of students. Such informal actions can help complement formal school curriculum
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21 on food and health.
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28 However, similar to Hendy and Raudenbush (2000), Experiment 2 shows that peers
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30 could negate teachers' influence when the peers made statements that conflicted with the
31
32 teachers' message. As the declining gradients of Group 2 and 4 in Figure 2 imply, peers in
33
34 these groups were able to exert more negative influence—to switch from fruits to candies—
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36 as children's susceptibility to follow their peers increased. Compliance influence means
37
38 accepting a message even if there is no agreement (Ozuem *et al.*, 2021). Hence, it is
39
40 plausible that more children picked candies once they learnt that their peers were also not
41
42 in favour of fruits. This is similar to our Experiment 1's postulation of psychological
43
44 reactance (Brehm and Brehm, 1981), where people react negatively to being restrictively
45
46 told *not* to do something, might explain why children switched to candies. Experiment 2's
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48 findings similarly suggest that psychological reactance may be at play once children learnt
49
50 that their peers were not in favour of the teacher's message to pick healthy food. This result
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52 is worrying in that while the schools can play a proactive and constructive role in
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3 encouraging healthy eating habits, they cannot control peers' behaviours especially those
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5 whose approval are sought by other children.
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10 **Conclusion and Future Research**

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13 Childhood is an important stage for learning about and forming good habits when it
14
15 comes to food choice and consumption (Birch and Fisher, 1998; Tarabashkina *et al.*, 2017).
16
17 Thus, developing further understanding on the determinants of healthy eating behaviour in
18
19 children is important, especially when childhood obesity may lead to increased mortality
20
21 and morbidity (Brown *et al.*, 2019; Jalali *et al.*, 2016), as well as health issues as adults
22
23 (Parsons *et al.*, 1999; Simmonds *et al.*, 2016). In this research, we investigated a particular
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25 driver of children's behaviour, social influence, which is known to affect children's
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27 behaviour (Lippitt *et al.*, 1952; Prinstein and Dodge, 2008; Ragelienė and Grønhoj, 2020).
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33 A literature review of 69 studies (1974-2014) on the influence of social norms on
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35 eating preference and behaviour found that majority of studies were experiments
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37 conducted in labs, and the authors stressed the importance of conducting studies in real-
38
39 world settings in order to better address the societal challenges of obesity and its health
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41 consequences (Cruwys *et al.*, 2015). This study sheds light on how different types of social
42
43 influence, and the message framing of the influence, may sway children's choice of healthy
44
45 versus unhealthy food in an actual classroom context. Within the context of collectivistic
46
47 cultures like Pakistan, school children hold high respect for teachers (Khan, 2011). As the
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49 Pakistani constitution obligates the state to provide free and compulsory education to
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51 children (Mofept, 2021), schools are a convenient and suitable avenue to help tackle
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53 childhood obesity epidemic.
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3 Besides the theoretical contributions of investigating childhood obesity through a
4 marketing lens by drawing on theories of social influence and message framing, this paper
5 points out useful and practical and policy contributions especially for developing countries
6 like Pakistan, where institutional support to tackle childhood obesity may be weak. Our
7 findings open up important considerations for schools and governments to enhance
8 education facilities and support to promote healthy food consumption amongst children.
9 For example, teachers can take on official, yet informal, responsibility of promoting healthy
10 eating. To prevent exposing children to harmful peer behaviour, schools should ban or deter
11 children from bringing unhealthy food to school to ensure that harmful peer behaviours are
12 not observable. Within schools, differential pricing policies can impose higher tax on
13 unhealthy products or subsidise the prices of healthy products (Garbarino *et al.*, 2018).
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30 Social influence on children can similarly extend beyond food consumption. Based
31 on the anecdotal discussions with the class teachers, it was suggested that schools could
32 arrange excursion activities to places of interest related to healthy eating, such as fruit
33 orchards, in order to enhance children's understanding of healthy consumption or the
34 consequences of unhealthy consumption. Governments could incentivise schools to
35 promote such programs and events as a part of their curriculum. Similarly, teachers can
36 influence children to exercise more. Policy makers and educational institutions can facilitate
37 this by providing proper playground and exercise facilities. Formal curriculum can also
38 include awareness of healthy eating, exercising, and their association with obesity.
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52 While our research provides important contributions, it also contains some
53 limitations which future studies can address. Beyond the context of Pakistan, future
54 research should compare the theoretical phenomenon across different cultures or
55 countries. For example, countries steeped in Confucian culture are known to hold teachers
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3 in high esteem, thereby possibly accentuating compliance influence (Park and Kim, 2008).
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5 As this study shows that peers could negate teachers' influence, it would be interesting to
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7 understand the extent of this negation in traditional Confucian countries (e.g., China or
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9 Japan) versus non-Confucian countries (e.g., US or UK). Given the experiment design, it was
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11 not feasible to assign individual students within the same class to different experimental
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13 conditions. Instead, all children within the same class were exposed to the same condition,
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15 thereby giving rise to potential random-effect bias across classes. In this study, all four
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17 confederates were male, and it remains unclear whether gender would make a difference to
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19 the results. While the online survey asked for food choice, it would be useful to replicate
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21 this study with actual food consumption as dependent variable, such as by observing what
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23 children actually eat during recess or break, after exposure to an influence message.
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30 Some researchers have suggested that the influence process is inherently dynamic
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32 and cross-sectional models that consider only a single time-point are inadequate in
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34 revealing the influence process (Mason *et al.*, 2007). Hence, future research should replicate
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36 this study by taking a longitudinal approach to determine how long the effect of a single
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38 exposure would last, as well as the effects of multiple exposures of each of the two types of
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40 social influence. As social influences can come from multiple sources (Mason *et al.*, 2007), it
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42 would be useful to understand how parents, or the home and neighbourhood environment
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44 in general, can reinforce what happens in classrooms. Given the popularity of social media,
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46 the same research idea applies to the role of social influencers. In other words, future
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48 research can consider how would a combination of explicit (formal) and implicit (informal)
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50 activities may influence children's food choice better than either approach alone.
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56 Similarly, Zhang and Gong (2021) suggest that the social contagion of adopting a new
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58 product increases as more network neighbours adopt a behaviour. This study uses just one
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3 student in each class as confederate, and it would be interesting to determine whether
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5 increasing the number of confederates would increase the contagion, especially when
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8 Zhang and Gong (2021) found an inverse-U relationship where the influence did not work as
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10 well at either extreme. Finally, we speculated that psychological reactance (Brehm and
11
12 Brehm, 1981) might have led to more children picking candies against the teachers'
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14 message about healthy eating. Future research should specifically measure the presence or
15
16 extent of reactance in order to test this postulation.
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Figure 1. Moderating Effects of Susceptibility to Compliance Influence (Experiment 1)

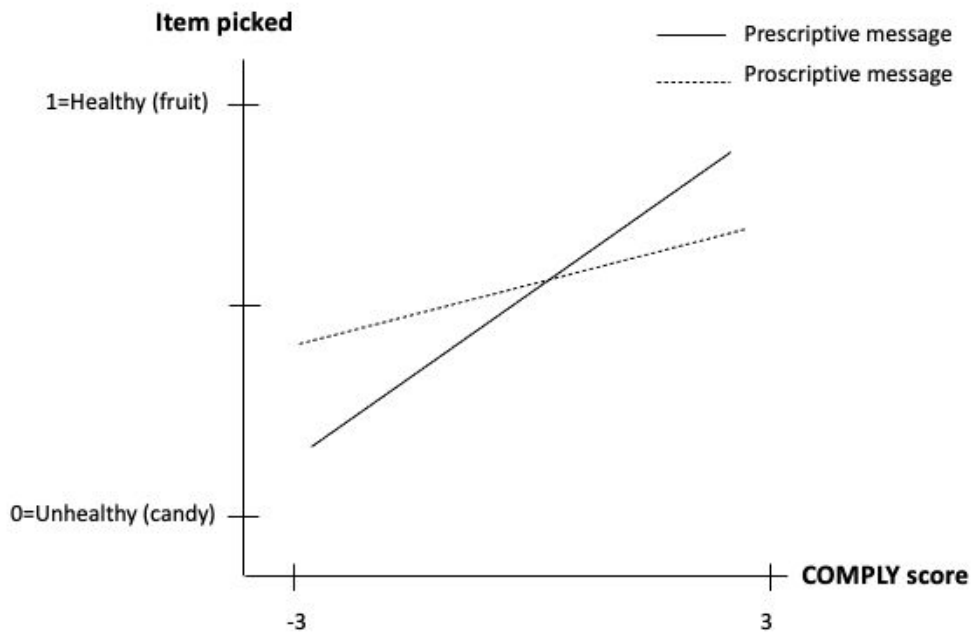


Figure 2. Moderating Effects of Susceptibility to Compliance and Conformance Influence (Experiment 2)

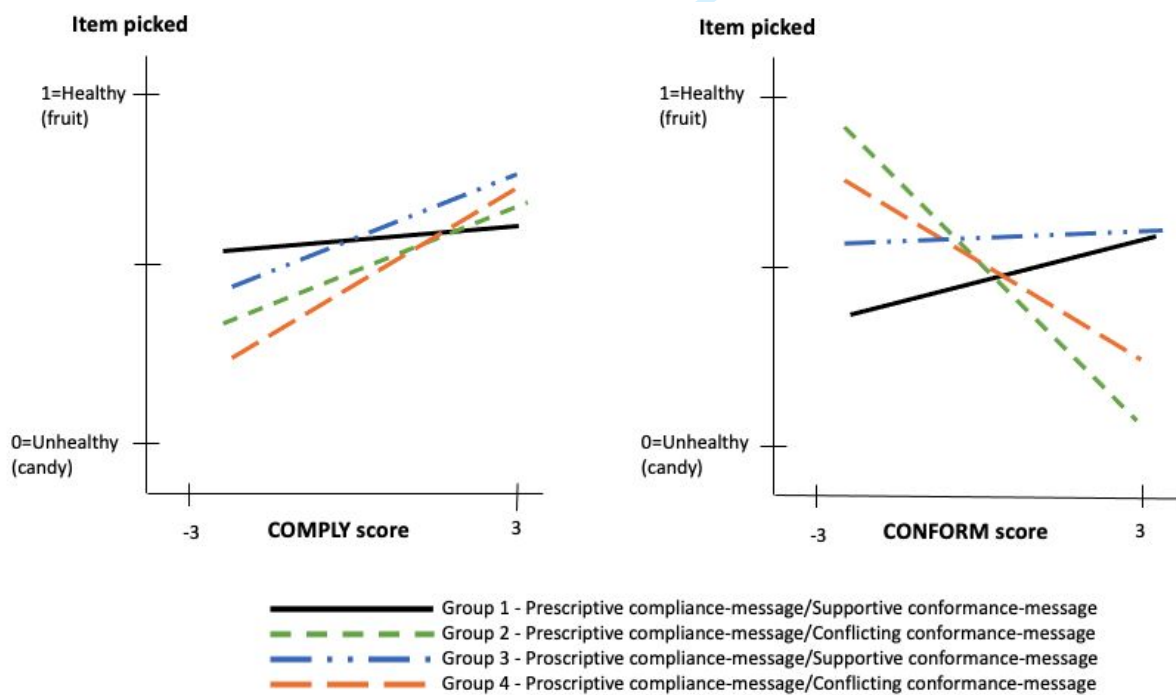


Table 1. Descriptive Statistics of Factor in Experiment 1

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