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Processes and effects of targeted online advertising among children

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Increasingly, information from children's profile pages on social network sites is being used to target online advertising, a phenomenon known as profile targeting. This practice has raised concerns in society and academia; however, its effects among children remain unstudied. Therefore, we investigated the effects of profile targeting on children's brand responses (i.e., brand attitude and purchase intention). We examined two types of targeting: targeting of product and of form (i.e., color). In addition, we tested three underlying mechanisms: liking the advertisement, perceived personal relevance of the advertisement, and recognizing the targeting aspect of the advertisement (targeting recognition). A between-subjects experiment among 231 children aged 9–13 years showed that targeting the product leads to more positive brand attitudes and purchase intentions. In addition, the effects were explained by ad liking and not by perceived personal relevance or targeting recognition. These findings suggest that, unlike adults, children do not process profile targeting on an elaborate critical level. Rather, the processing seems to be less elaborate.

Keywords: advertising; children; online targeting; social network sites; personal relevance

Many social network site users post vast amounts of personal information on their profile pages. They share their ages, favorite hobbies, brands, music, and books. Aided by technological innovations, advertisers increasingly use this personal information to target their campaigns to the interests of individual consumers (Köster et al. 2015; Villiard and Moreno 2012). This technique is called profile targeting (see, for example, www.facebook.com/advertising and www.instagram.com/about-ads). Profile targeting is defined as the customization of online advertisements based on knowledge of individual preferences expressed on profile pages of social network sites (cf. Hoekstra and Van Doorn 2013; Versanen 2007).

Profile targeting has raised concerns both in the public and academic domains because personal information from profile pages is used by advertisers for commercial purposes, and consumers may not always be aware of this practice (Taylor 2013; Tucker 2014; Turow et al. 2009). These concerns are more pronounced when children are involved as a target audience. Children are heavy users of social network sites even though they are officially not allowed to use some of them (Ofcom 2014; Rideout, Foehr, and Roberts

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2010). Because of their heavy use, the likelihood that children are being exposed to advertising that is targeted to their preferences, interests, and likes is high.

Because children lack the knowledge and skills necessary for recognizing and understanding subtle advertising formats such as profile targeting (John 1999; Livingstone 2009; Nairn and Fine 2008; Rozendaal et al. 2011; Shin, Huh, and Faber 2012; Youn 2009), they are assumed to be highly susceptible to it. Critics, therefore, label subtle advertising formats directed at children as inappropriate and unfair (Moore 2004; Nairn and Fine 2008), which in many countries has led to a call for restrictive policies regarding online advertising directed at children. However, little is known about how children actually respond to profile targeting. To inform the public and political debate, the objective of this study was to investigate whether and how children are influenced by profile targeting.

Specifically, the first aim of the study was to test the effects of profile targeting on children's brand responses (i.e., brand attitude and purchase intention). We investigated two types of targeting: targeting of product and of form (i.e., color; Facebook 2012; SanJosé-Cabezudo, Gutiérrez-Arranz, and Gutiérrez-Cillán 2009; Villiard and Moreno 2012). Profile information about interests, favorite hobbies for example, can be used to expose children to advertisements for products that fit their interests, thus targeting the product advertised (Facebook 2012; SanJosé-Cabezudo, Gutiérrez-Arranz, and Gutiérrez-Cillán 2009; Villiard and Moreno 2012). Profile information about children's preferences, favorite colors for example, can be used to adjust the advertisement's design, such as background color, thus matching the form of the advertising (SanJosé-Cabezudo, Gutiérrez-Arranz, and Gutiérrez-Cillán 2009). Therefore, we compared children's responses to advertising targeted to their favorite hobbies (i.e., product) and/or favorite colors (i.e., form) to their responses to non-targeted advertising.

The second aim of this study was to reveal the mechanisms that underlie the effects of profile targeting on children's brand responses. Based on the theoretical framework of young people's processing of commercial media content (PCMC; Buijzen, Van Reijmersdal, and Owen 2010), which models child and adolescent elaboration of non-traditional advertising formats, we focused on three underlying mechanisms that differ in their level of cognitive elaboration. Specifically, we tested the mediating roles of (1) children's appreciation of the advertisement (ad liking), (2) their perceptions of its personal relevance (perceived personal relevance), and (3) perceptions that online advertising is deliberately matched to their profiles (targeting recognition). It is expected that ad liking and perceived personal relevance positively mediate targeting effects on brand attitudes and purchase intentions and that targeting recognition negatively mediates them. We focused on children aged 9–13 years because they are an important target group for online advertising, yet they are unlikely to process targeted advertising critically (Ofcom 2014; Rozendaal et al. 2011).

Based on the PCMC model, this study investigated (1) the effects of profile targeting on children's brand responses and (2) the mechanisms that underlie these effects. As yet, little is known about how children are influenced by subtle digital advertising techniques such as profile targeting. This study contributes to the existing literature by taking a first step in gaining a better understanding of children's responses to this phenomenon. By testing various mechanisms that can explain the effects of profile targeting, theoretical insights into this increasingly popular advertising format are generated that can guide future research in examining this topic. Moreover, by testing some of the underlying assumptions of the PCMC, this study aids in the validation of this framework. Finally, the insights that result from our research can provide valuable input to the societal debate about the fairness of using profile targeting toward children and also aid in the development of appropriate advertising-related policies and education.

Effects of profile targeting

To investigate the effects of profile targeting on children, we focused on the effects of targeting with respect to product and form. Targeting of product is used to reach specific target groups based on customer data from personal profile pages on social network sites (Hoekstra and Van Doorn 2013). Targeting of form is expected to be very effective among children. Research has shown that children as young as six months of age prefer media messages that contain attractive colors (Valkenburg and Cantor 2001; Valkenburg 2004). Moreover, because children are limited in their cognitive capacities, they will focus primarily on visual attributes, such as color, to assess advertisements and products (John 1999). Research has indeed shown that colors in advertising and marketing can have strong effects on children's choice behavior (Gollety and Guichard 2011). Moreover, adapting services to children's favorite colors is applied in the field. For example, Ambani (2006) patented a child-friendly online financial service that adapts to the personal information of the child, among which is the child's favorite color.

Both product and form targeting may enhance the effects of ads on children. More specifically, research among adults showed that advertisements targeted based on people's interests and preferences were more persuasive. They increased the number of people clicking on the ads and those liking the advertised products (Cho and Cheon 2004; Hoekstra and Van Doorn 2013). In our case, the child's favorite color or hobby-related product is expected to evoke positive feelings because these things fit their interests and preferences. These feelings may spill over to the brand that is advertised, resulting in positive brand attitudes and increased behavioral intentions (Van Reijmersdal, Rozendaal, and Buijzen 2012). Targeting could thus have a positive effect on both brand attitudes and purchase intentions.

H1: Profile targeting (i.e., product and form targeting) has more positive effects on (a) children's brand attitudes and (b) purchase intentions than non-targeted online advertising.

We will also explore how the two types of targeting interact. Targeting an advertisement with respect to both product and form preferences means that richer insights are used, thus increasing the fit between the advertisement and the personal preferences of the receiver (Bleier and Eisenbeiss 2015; Hoekstra and Van Doorn 2013). When an online ad is more closely related to a consumer's preferences, increased persuasion outcomes (i.e., click through rates) might result, but only in a trusted online environment (Bleier and Eisenbeiss 2015). Therefore, it could be argued that targeting based on additional personal preference dimensions increases the persuasiveness of the ad among children. To test whether targeting both product and form indeed leads to stronger effects than targeting only the product or the form, the following hypothesis is formulated:

H2: Online advertising that uses both product and form targeting leads to more positive effects on children's (a) brand attitudes and (b) purchase intentions than online advertising that uses only product targeting or form targeting.

Understanding profile targeting effects

To provide a better understanding of why targeted online advertising affects persuasive outcomes such as brand attitudes and purchase intentions, we examined which mechanisms underlie these effects. Based on Buijzen, Van Reijmersdal, and Owen's (2010) PCMC framework, we discern three processes that vary from low to high levels of

cognitive elaboration. Cognitive elaboration is the level of processing of the available information in the advertisement (Buijzen, Van Reijmersdal, and Owen 2010).

The PCMC integrates dominant information processing theories (Chaiken 1980, Petty and Cacioppo 1986, 1996), assuming that recipients sometimes process persuasive messages systematically and carefully (the systematic or central process), while under some conditions, they use low-effort mechanisms and rely on shortcuts and cues to process information. In some cases, they rely on automatic, experiential, and often affective processes (Buijzen, Van Reijmersdal, and Owen 2010; Chartrand 2005; Heath 2000). The level of information processing determines the underlying mechanism involved. Thus, although outcomes (i.e., attitudinal or behavioral changes) based on different processing levels may be the same, the underlying mechanisms may differ depending on the level of cognitive elaboration. The processing levels, and thus the mechanisms, do not necessarily compete. Research insights into online persuasion show that multiple levels of cognitive elaboration can act together and exert a combined influence on brand attitudes and purchase intentions (SanJosé-Cabezudo, Gutiérrez-Arranz, and Gutiérrez-Cillán 2009). In the literature on the effects of using targeting online advertising with adults, three mechanisms that reflect the level of cognitive elaboration emerge: ad liking (low elaboration), perceived personal relevance (moderate elaboration), and targeting recognition (high elaboration; Antheunis and Van Noort 2012; Hoekstra and Van Doorn 2013; Maslowska, Van den Putte, and Smit 2011; Tam and Ho 2006; Turow et al. 2009).

The PCMC model expands on these information-processing models by taking a developmental perspective for explaining how the current commercialized media environment affects children. More specifically, the model explains how message characteristics and developmental characteristics determine a child's level of information processing. In the following sections, we hypothesize, based on the PCMC model, how the three mechanisms (ad liking, perceived personal relevance, and targeting recognition) underlie the effects of profile targeting on children's brand attitudes and purchase intentions.

Ad liking

Profile targeting may affect persuasion among children because targeted advertising enhances liking of the advertisement. Ad liking is defined as an overall favorable response to a particular advertising stimulus (cf. MacKenzie, Lutz, and Belch 1986). Ad liking refers to an affective process, involving relatively low elaborate processing. On such a low level of cognitive elaboration, recipients pay little attention to, or show low levels of awareness of, the persuasive message. Persuasion relies on affect-based learning mechanisms such as affect transfer (Heath 2000). Rather than activating thoughts about the message, feelings and liking are used as processing cues.

Research among adults has shown that targeted online advertising leads to more ad liking because the advertising fits recipients' interests (Antheunis and Van Noort 2012; Tam and Ho 2006). In turn, this may lead to more persuasion. Previous research has demonstrated a strong relationship between ad liking and attitude toward the advertised brand (Brown and Stayman 1992; MacKenzie, Lutz, and Belch 1986; Phelps and Hoy 1996). These effects are explained by affect transfer theory (MacKenzie, Lutz, and Belch 1986), which proposes that a feeling or evaluation induced by one object can be transferred to another object (Kim, Jeon-Su Lim, and Bhargava 1998; Mitchell and Olsen 1981). In this case, a positive evaluation of the advertisement becomes associated with the advertised brand (MacKenzie, Lutz, and Belch 1986; Van Reijmersdal, Smit, and Neijens 2010).

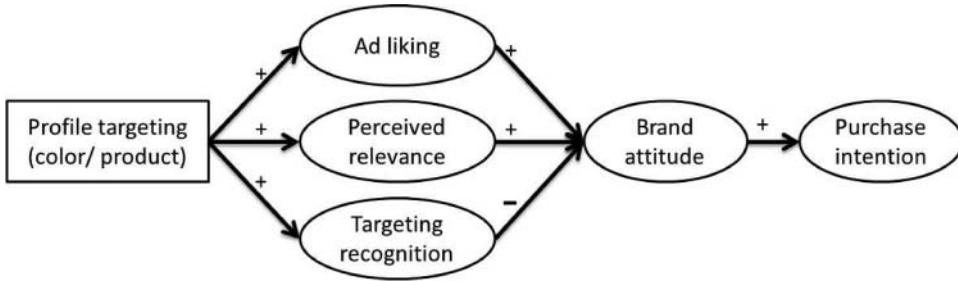


Figure 1. Hypothesized path models of the mediated effects of profile targeting via (1) ad liking, (2) perceived relevance, and (3) targeting recognition.

The PCMC model assumes that children are more prone to these affective and low elaborate mechanisms than adults because their cognitive capacities and information-processing skills, such as explicit memory storage and retrieval, have not fully matured (Buijzen, Van Reijmersdal, and Owen 2010; Van Reijmersdal, Rozendaal, and Buijzen 2012). In addition, they lack market-related experience, making it more difficult to process advertising on a high elaborate level (John 1999). Children are, therefore, more likely to be influenced via low elaborate levels of processing. The advertisement evokes positive feelings and attitudes, and these are then transferred to the child's brand attitudes, even without their knowledge (MacKenzie, Lutz, and Belch 1986; Moore and Rideout 2007). Therefore, we expect that the effects of profile targeting are mediated by ad liking. More specifically, we expect profile targeting of both product and form to have positive effects on children's ad liking, which has a positive effect on brand attitude, which in turn evokes increased purchase intentions. Because both product- and form-targeted advertisements fit children's preferences, both are expected to increase ad liking. This process is depicted in Figure 1. To test these expectations, we formulated the following mediation hypothesis:

H3: The effects of profile targeting (i.e., product and form targeting) on children's purchase intentions are mediated positively, first by ad liking and subsequently by brand attitude.

Perceived relevance

The second mechanism that may explain the effects of profile targeting on persuasion is enhanced perceived relevance of the advertisement. When targeted based on a child's favorites and hobbies, an advertisement is directly related to their interests. Therefore, the ad is more likely to be perceived as personally relevant (Cho 2003; Versanen 2007). A message has high perceived personal relevance if it is seen as responding to an individual's particular circumstances, interests, or preferences (Kreuter and Wray 2003).

Perceived personal relevance may be used as a heuristic when processing the advertisement. Heuristics are applied when recipients process information on a moderate level of elaboration and pay moderate levels of attention to the message (Buijzen, Van Reijmersdal, and Owen 2010; Petty and Cacioppo 1996). The heuristic cue serves to easily form an overall evaluation of the brand (Petty and Priester 1994). Research among adults has shown that targeting indeed increased perceived relevance (Tucker 2014) and, in turn, positively affected brand attitudes (Antheunis and Van Noort 2012; De Keyzer, Dens, and De Pelsmacker 2015; Maslowska, Van den Putte, and Smit 2011). Thus,

because of the increased perceived relevance of targeted advertising, these ads are more likely to evoke positive brand attitudes and increased purchase intentions.

Based on the PCMC model, we expect that this process is likely to occur in children as well. Because their information processing skills have not fully matured, children are more prone to relatively low levels of information processing. Research has shown that heuristic cues in advertising can easily persuade children (Calvert 2008; Shimp, Dyer, and Divita 1976). When an advertisement is targeted, children are likely to perceive it as personally relevant and use this as a cue to positively process the advertisement. As a consequence, brand attitudes and purchase intentions are expected to be enhanced (see Figure 1).

We expect these effects to occur for both forms of targeting: when the product is targeted toward the child's favorite hobby, it is likely to be linked to the child's self and to increase the perceived relevance of the content (Tam and Ho 2006); similarly, when the form is matched to the child's color preferences, this may be used as a peripheral cue that the advertisement is, in a way, relevant to the child. We therefore formulated the following hypothesis:

H4: The effects of profile targeting (i.e., product and form targeting) on children's purchase intentions are mediated positively, first by perceived relevance and subsequently by brand attitude.

Targeting recognition

Targeting recognition is the third mechanism that may explain the effects of profile targeting on persuasion among children and refers to an individual's awareness that targeting is used as a tactic in the specific persuasion attempt (Friestad and Wright 1994). Targeting recognition is an indicator of a high level of cognitive elaboration. On this level, recipients engage in relatively extensive, deliberate, and effortful cognitive elaboration (Petty and Cacioppo 1996). There is high awareness of, and attention to, the message, and recipients are aware of the persuasive intent of the message (Buijzen, Van Reijmersdal, and Owen 2010). This may trigger critical evaluations of the advertising message and the brand (Rozenaal et al. 2011).

Research among adults has indeed shown that targeted online advertising can be processed on a critical level (Baek and Morimoto 2012; Hoekstra and Van Doorn 2013; Turow et al. 2009; White et al. 2008). When people recognize targeting, and thus realize that their personal information is used by advertisers, their persuasion knowledge can be activated. An important component of persuasion knowledge is insight into the tactics advertisers use to persuade (Friestad and Wright 1994; Mahr et al. 2012). When a person has knowledge of targeted advertising tactics, this may be activated when confronted with profile targeting. It is recognized as such, and related knowledge about how this tactic influences people and why advertisers apply it can be used to cope with the specific persuasion attempt made by the advertisers (Friestad and Wright 1994).

Recognition of the targeting tactic may lead to critical elaborate processing because, in general, people do not like to be persuaded and want to preserve their freedom of choice (Brehm and Brehm 1981). As a consequence, they are likely to resist persuasion by forming negative brand attitudes and decreased purchase intentions. Studies indeed showed that recipients who were exposed to targeted online advertising and recognized the targeting formed negative ad evaluations and lower purchase intentions (Baek and Morimoto 2012; Hoekstra and Van Doorn 2013; Mahr et al. 2012; White et al. 2008).

Thus, research among adults showed that profile targeting led to recognition of targeting, which resulted in more negative brand attitudes and less purchase intention.

Product- and form-targeting may trigger targeting recognition. When consumers are confronted with an online advertisement for a product that fits their interests as expressed on their profile page, they may realize that the advertiser used the targeting technique. Although processing the form (i.e., color) of an advertisement may not require much attention or effort and is therefore more often associated with lower or medium levels of cognitive elaboration (SanJosé-Cabezudo, Gutiérrez-Arranz, and Gutiérrez-Cillán 2009), form targeting may activate persuasion knowledge and result in critical processing. When consumers recognize that the color of the ad is adjusted to their personal preferences, this can trigger them to think about the advertising technique in more detail and dedicate more cognitive resources to processing the ad critically (Hoekstra and Van Doorn 2013). Thus, although the color, per se, may not directly evoke higher levels of message elaboration, as a representative of the targeting technique, it may do so.

It remains unknown whether targeting of product and form triggers targeting recognition among children, and if so, whether this evokes the same critical and elaborate level of processing as seen in adults. On the one hand, the PCMC model assumes that children are less likely than adults to process advertising on high elaborate and critical levels (Buijzen, Van Reijmersdal, and Owen 2010; Rozendaal et al. 2011). On the other hand, the persuasion knowledge model by Boush, Friestad, and Rose (1994) states that persuasion knowledge develops with age and experience with advertising, but this knowledge is likely to be used in the same manner by children as it is by adults. Therefore, we propose that targeted online advertising may be perceived as such by children, which consequently can lead to negative effects on brand attitudes and purchase intention. Based on the persuasion knowledge model and research among adults, we formulated the following hypothesis:

H5: The effects of profile targeting (i.e., product and form targeting) on children's purchase intentions are mediated negatively, first by recognition of targeting and subsequently by brand attitude (see Figure 1).

Method

Design

In this study, we employed a 2 (targeted vs. non-targeted product) \times 2 (targeted vs. non-targeted form) between-subjects design. Based on the questions about their favorite hobbies and colors, children were exposed to a banner advertisement for a branded product that fit their hobby (product targeted) or not (product not targeted) and/or in their favorite color (form targeted) or not (form not targeted).

Sample

A total of 231 children with mixed socio-cultural backgrounds participated in the study. The participants were aged 9–13 years ($M = 10.82$, $SD = 0.80$, $n_{\text{age } 9} = 5$, $n_{\text{age } 10} = 81$, $n_{\text{age } 11} = 100$, $n_{\text{age } 12} = 43$, $n_{\text{age } 13} = 3$; 51.7% female) and were recruited from three elementary schools in urban and suburban areas in the Netherlands. They were randomly assigned to one of the four conditions (color and product targeted, $n = 79$; targeted product only, $n = 62$; targeted form only, $n = 54$; neither form nor product targeted, $n = 36$).

Procedure

Prior to participating, institutional approval, parental consent, and children's informed consent were obtained. All questions were posed in Dutch. First, general questions about children's internet use were posed, followed by questions about their favorite leisure time activity (for product targeting), color (for form targeting), food (filler), and animal (filler). These questions had pre-set response options (six for each question), allowing the stimulus advertisements to be targeted to the responses. Second, they were asked to scroll a social network webpage with the stimulus advertisement, which was integrated into the online questionnaire. After this question, the children were again exposed to the webpage and were specifically asked to pay attention to the advertisement, to assure all children could fill out the questionnaire. Finally, they were asked about their brand responses, ad liking, perceived relevance, and targeting recognition. Afterward, each child received a small gift and was told not to talk to their classmates about the research until all had participated.

Stimulus material

A total of 36 fictitious banner advertisements (6 products \times 6 colors) were created to manipulate targeting (see Appendix 1 for examples). The advertisement's background was either in red, blue, green, yellow, purple, or pink. The branded products were actual brands, and they were gender-neutral. The brands were *Swingball* (a ball game for children who preferred playing outside), *Crash Bash* (a computer console game for children who preferred playing computer games), *Oorlogswinter* (a novel for children who preferred reading), *Spangas* (a DVD for children who preferred watching television), *Levensweg* (a boardgame for children who preferred to play offline games), and *The Tag Factory* (a tinker package for children who preferred tinkering). These products were chosen based on their current popularity among children of this age. All advertisements contained a heading, indicating the leisure time activity that fitted the branded product (e.g., 'gaming'). Beneath that, the name of the brand and a picture of the product were portrayed. Aside from the product and color, the design of the banner advertisements was kept constant.

The advertisement was placed on a personal webpage of a fictitious child on the most popular Dutch social network site, *Hyves* (Duimel 2010). By using a webpage of a fictitious child, the context of the advertising was equal for all children. In addition, visiting other children's personal web pages is among the most popular activities on social network sites (Ofcom 2014); therefore, this is where they are likely to encounter profile targeting. To make the webpage equally attractive for boys and girls, the child was given a gender-neutral name ('Marijn,' comparable to the English name Robin), and the profile picture was a close-up of an eye, which could belong to either a boy or a girl. The stimulus advertisement was placed on the right-hand side of the social network webpage, covering about one-sixth of the webpage.

Measures

Dependent variables

Brand attitude was measured for the brand that the child was exposed to in the ad, using the question: 'Which grade would you give [product name]?' on a scale from 1 (*negative*) to 10 (*positive*) ($M = 6.48$, $SD = 0.55$; Bergkvist and Rossiter 2007; Van Reijmersdal

et al. 2010; Yang and Roskos-Ewoldsen 2007). In the Netherlands, children's schoolwork is also graded on a scale from 1 to 10, so children are familiar with the scale. Purchase intention was measured using four questions: 'Will you buy [brand] from your allowance?', 'Will you ask your parents for [brand]?', 'Do you want to have [brand]?', and 'Will you put [brand] on your wish list?' on a scale ranging from 1 (*no, definitely not*), 2 (*probably not*), 3 (*probably so*) to 4 (*yes, definitely*) (Cronbach's alpha = 0.90, $M = 1.96$, $SD = 0.79$; Rozendaal, Buijzen, and Valkenburg 2009). The four-point scale was based on methodological research among children, showing that an even number of answering options is optimal because children have a strong tendency to choose the midpoint of the scale when there are an uneven number of answer options (Borgers, Hox, and Sikkel 2004). In addition, four answering options made it easier for children to choose but still provide enough variance (Borgers, Hox, and Sikkel 2004). Moreover, we used questions rather than statements because children of this age have difficulty responding to statements (Borgers, De Leeuw, and Hox 2000; Greig, Taylor, and MacKay 2007).

Mediating variables

Ad liking was measured using six questions: 'Do you like the advertisement?', 'Do you think the advertisement is funny?', 'Do you think the advertisement is boring (reverse)?', 'Do you think the advertisement is great?', 'Do you think the advertisement is stupid (reverse)?', and 'Do you think the advertisement is ugly (reverse)?' The questions were based on Derbaix and Pecheux's (2003) and D'Alessio et al.'s (2009) scales for children's attitudes toward television advertising. The questions were answered on the scale: 1 (*no, not at all*), 2 (*no, not really*), 3 (*yes, a little bit*), and 4 (*yes, very much*; Cronbach's alpha = 0.88, $M = 2.48$, $SD = 0.69$).

Perceived personal relevance was measured using four questions: 'Do you think the advertisement suits you?', 'Do you think the advertisement is meant for you?', 'Do you think the product is meant for you?', and 'Do you think the product suits you?' (based on Antheunis and Van Noort 2012) on the same four-point scale. The questions were averaged to create a single measure of perceived personal relevance of the advertising (Cronbach's alpha = 0.83, $M = 2.07$, $SD = 0.72$).

Targeting recognition was measured using the question 'Do you think the advertisement is created especially for you?', and it was measured on the same four-point scale ($M = 1.79$, $SD = 0.83$). This measure was the only one not based on previous research; however, great care was taken to formulate it to be suitable for the children in our sample. For example, we formulated a question instead of using a statement, we used the four-point scale suitable for children, and we avoided long and complicated words (Borgers, Hox, and Sikkel 2004; Greig, Taylor, and MacKay 2007).

To check whether the three mediating variables are three separate factors, the items for all three mediators were subjected to a confirmatory factor analysis using structural equation modeling (AMOS 23.0). The fit of the model was evaluated using the Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI). Model fit is considered good when the CFI-value exceeds 0.95 and the RMSEA-value is lower than 0.05, and acceptable when the CFI-value exceeds 0.90 and the RMSEA-value is lower than 0.08 (Kline, 2005). The analysis showed poor model fit: $\chi^2 (DF = 40, N = 231) = 129.70$, $p < 0.001$, CFI = 0.930, RMSEA = 0.095, 90%CI[0.077; 0.114] with $p\text{-close} = 0.000$. An acceptable CFI-value was obtained, yet the RMSEA was too high. Because of this high RMSEA-value, *post hoc* analyses were conducted in order to

re-specify the model. The modification indices were used as guidelines to decide which paths to add to the model.

The modification indices indicated that adding correlations between the errors of certain pairs of variables would result in an improved model fit. We added correlations between the errors of items within one factor that show strong resemblance (Byrne, 2010). More precisely, the correlation between the following two pairs of variables were added, because they are indicators for the same factor (i.e., perceived personal relevance): (1) 'Do you think the advertisement is meant for you?' and 'Do you think the product is meant for you?' and (2) 'Do you think the product is meant for you?' and 'Do you think the advertisement suits you?' With these correlations added to the model, the CFI value became good and the RMSEA value acceptable: $\chi^2 (DF = 40, N = 231) = 85.23, p < 0.001$, CFI = 0.964, RMSEA = 0.070, 90%CI[0.049; 0.091] with p -close = 0.056. These results confirm the expected underlying factor structure.

To assess the discriminant validity of the mediators,¹ we used the heterotrait–monotrait ratio (HTMT) approach, which is more sophisticated than the Fornell–Larcker criterion (for detailed argumentation and formula, see Henseler, Ringle, and Sarstedt 2015). This approach relates the correlations between items of different constructs to the correlations between items for the same constructs. Discriminant validity is good when HTMT is smaller than 0.85. The analyses showed that the discriminant validity for ad liking and perceived relevance was good (HTMT = 0.81).

Control variables

Based on the literature, we included control variables that may be related to the central variables in our study. First, the literature shows that children's responses to advertising strongly depend on their age and sex (Valkenburg 2004). Furthermore, brand familiarity has been shown to play a role in responses to new advertising formats (Brennan and Babin 2004). Previous studies have also shown that the use and membership of social networks determines the effects of advertising on these platforms (Rozendaal et al. 2013). Therefore, the control variables that were measured were age, sex (dichotomous), whether the child knew the branded product that was advertised (dichotomous, 43% were brand familiar), and whether they had a profile on *Hyves* (dichotomous, 82% did). *Hyves* membership was not related to the manipulation or the dependent variables. Although age, sex, and brand familiarity were not related to the manipulation, these variables were significantly related to brand attitude and purchase intention (correlations ranged between -0.34 and 0.34). Therefore, age, sex, and brand familiarity were included as covariates in the analyses.

Results

To test our first two hypotheses (H1 and H2), we conducted MANCOVA with brand attitude, purchase intention, and the underlying processes as dependent variables, product targeting and form targeting as independent variables, and brand familiarity, age, and sex as covariates. The MANCOVA was used because the dependent variables and mediating variables were expected to be related.

The analysis showed that *product* targeting had a multivariate effect (Wilks' lambda = 0.95, $F(5,220) = 2.45, p = 0.04, \eta^2 = 0.05$, but *form* targeting did not (Wilks' lambda = 0.98, $F < 1$, ns. These multivariate effects were caused by the significant, positive, univariate effects of product targeting on brand attitude, $F(1,224) = 9.62, p = 0.002; \eta^2 = 0.04$, and purchase intention, $F(1,224) = 6.89, p = 0.009, \eta^2 = 0.03$,

Table 1. Ratings of dependent variables and mediators and their comparisons using MANCOVA.

	Color	Product		Total
		Non-targeted	Targeted	
Brand attitude ¹	Non-targeted	5.72 (0.31)	6.70 (0.24)	6.21 (0.20)
	Targeted	6.22 (0.26)	6.85 (0.21)	6.53 (0.17)
	Total	5.97** (0.20)	6.77** (0.16)	
Purchase intent ²	Non-targeted	1.73 (0.12)	2.06 (0.09)	1.89 (0.08)
	Targeted	1.86 (0.10)	2.07 (0.08)	1.97 (0.06)
	Total	1.80** (0.08)	2.06** (0.06)	
Ad liking ²	Non-targeted	2.34 (0.11)	2.52 (0.09)	2.43 (0.07)
	Targeted	2.41 (0.09)	2.58 (0.08)	2.50 (0.06)
	Total	2.37* (0.07)	2.54* (0.06)	
Perceived relevance ²	Non-targeted	2.00 (0.11)	2.15 (0.09)	2.07 (0.07)
	Targeted	1.97 (0.09)	2.11 (0.08)	2.04 (0.06)
	Total	1.98 (0.07)	2.13 (0.06)	
Targeting Recognition ²	Non-targeted	1.97 (0.14)	1.71 (0.11)	1.84 (0.09)
	Targeted	1.66 (0.11)	1.85 (0.09)	1.76 (0.07)
	Total	1.82 (0.09)	1.78 (0.07)	

Note: Data are expressed as estimated marginal mean (standard deviation).

¹Scale from 1 to 10.

²Scale from 1 to 4.

** $p < 0.05$ within the row.

* $p < 0.10$ within the row.

see Table 1). When the branded product in the advertisement was targeted toward the children's favorite hobbies, brand attitudes were more positive, and purchase intentions were stronger. Thus, H1(a) and H1(b) were supported for product targeting only.

The analysis showed no multivariate interaction effect between product and form targeting, Wilks' lambda = 0.97, $F(5,220) = 1.28$, ns. Therefore, a combination of product and form targeting did not enhance the persuasiveness of the advertisement compared to either type of targeting alone, providing no support for H2.

The covariate brand familiarity had a significant effect on brand attitude, $F(1,224) = 22.80$, $p < 0.001$, $\eta^2 = 0.09$, purchase intention, $F(1,224) = 30.80$, $p < 0.001$, $\eta^2 = 0.12$, and perceived relevance, $F(1,224) = 20.01$, $p < 0.001$, $\eta^2 = 0.08$. The covariate age had a significant effect on brand attitude, $F(1,224) = 9.92$, $p = 0.002$, $\eta^2 = 0.04$ and ad liking, $F(1,224) = 7.31$, $p = 0.007$, $\eta^2 = 0.03$. Sex had a significant effect on brand attitude, $F(1,224) = 15.55$, $p < 0.001$, $\eta^2 = 0.07$, purchase intention, $F(1,224) = 15.33$, $p < 0.001$, $\eta^2 = 0.06$, ad liking, $F(1,224) = 8.43$, $p = 0.004$, $\eta^2 = 0.04$, and perceived relevance, $F(1,224) = 18.60$, $p < 0.001$, $\eta^2 = 0.08$.

To test H3, we first examined the effects of product and form targeting on ad liking. The MANCOVA showed a positive effect of product targeting that was just not significant, $F(1,224) = 3.53$, $p = 0.06$, $\eta^2 = 0.02$, and an insignificant effect of form targeting, $F(1,224) = 1.59$, ns) on ad liking. Second, we used the PROCESS macro developed by Hayes (2013, model 6), which offers a statistical test of serial mediation using bootstrapping.

This analysis showed a significant serial mediation effect of product targeting on purchase intention via ad liking and brand attitude ($B = 0.05$, $SE = 0.03$, BC 95% CI[0.002,

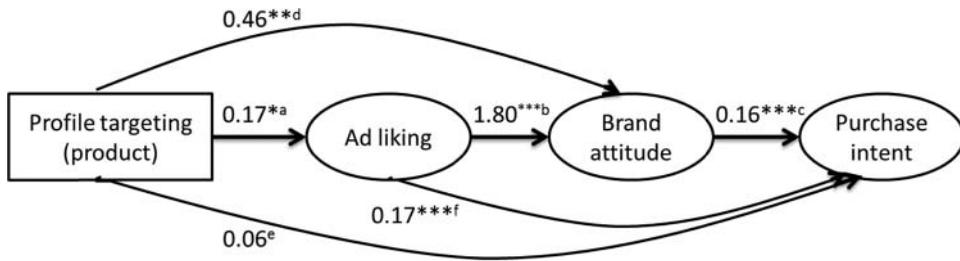


Figure 2. Observed path model of the hypothesized mediated effect of profile targeting on purchase intention via ad liking and brand attitude. Unstandardized coefficients (B) are portrayed. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.001$, $^a t = 1.86$; $^b t = 11.78$; $^c t = 7.10$; $^d t = 2.32$; $^e t = 0.79$; $^f t = 7.32$.

0.11]; see Figure 2). The analysis also showed a significant effect of product targeting on purchase intention via ad liking only ($B = 0.07$, $SE = 0.04$, BC 95% CI[0.001, 0.16]) and via brand attitude only ($B = 0.08$, $SE = 0.04$, BC 95% CI[0.01, 0.16]).

There was no significant indirect effect of form targeting through ad liking ($B = 0.02$, $SE = 0.03$, BC 95% CI[-0.03, 0.07]). Thus, H3 was supported only for product targeting and not for form targeting.

The mediation effects via perceived personal relevance (H4) and targeting recognition (H5) were tested with MANCOVA. No significant effect of form targeting on perceived personal relevance or on targeting recognition was found (F 's < 1 , ns). In addition, there were no significant effects of product targeting on perceived relevance, $F(1,224) = 2.49$, ns, or targeting recognition, $F < 1$, ns. Use of the PROCESS macro showed that neither perceived personal relevance ($B = -0.01$, $SE = 0.03$, BC 95% CI[-0.07, 0.04]) nor targeting recognition ($B = -0.001$, $SE = 0.004$, BC 95% CI[-0.02, 0.002]) mediated the effects of form targeting. There were also no indirect effects of product targeting through perceived personal relevance ($B = 0.04$, $SE = 0.03$, BC 95% CI[-0.009, 0.10]) or targeting recognition ($B = -0.001$, $SE = 0.004$, BC 95% CI[-0.01, 0.004]). Thus, H4 and H5 were not supported.

Discussion

In this study, we examined the effects of online profile targeting on children's brand responses and the mechanisms that mediate these effects. The results indicate that online advertisements that target products based on children's favorite hobbies evoke positive brand attitudes and consequently increase purchase intentions. In addition, these effects are mediated by ad liking, but not by perceived personal relevance or targeting recognition, indicating – in agreement with the PCMC model – that children show affect-based, low elaborate levels of processing of targeted online advertisements. Moreover, form targeting based on children's favorite colors had no effect and did not interact with product targeting. The present study is the first to show whether and how targeting based on information from children's profile pages affects brand responses. This study not only shows how targeting of products and form works, but also what does not seem to have an effect.

More precisely, three important conclusions can be drawn from these results. First, online advertisements that use profile information to target the product lead to positive brand attitudes and subsequently to increased purchase intentions among children. This agrees with previous studies conducted among adults that also showed that targeted online advertising led to more favorable brand attitudes and increased purchase intentions

(e.g., Tam and Ho 2006; Tucker 2014). Although there is no direct effect of product targeting on purchase intention, our findings show that product targeting does affect purchase intention via brand attitude.

Second, neither brand attitude nor purchase intention was affected by form targeting (i.e., based on favorite color). It seems that matching the product to the target audience results in favorable brand responses, but matching the form did not affect processing. The non-significant findings for form targeting may indicate that when form targeting is based on favorite color, it is not important enough in the processing of the ad to affect children's brand attitudes for purchase intentions. This result agrees with earlier research showing that when children were asked to choose a chocolate bar, the flavor of the chocolate was more important than the use of their favorite color in the packaging of the bar (Gollety and Guichard 2011). In the same way, we found that color targeting did not affect persuasion.

Third, the effects of profile targeting of product on brand attitude and purchase intention among children can be explained by an affective process indicating low levels of cognitive elaboration. Online advertisements that target the product are better liked by children than non-targeted advertisements, leading to more positive brand attitudes and increased purchase intentions.

Interestingly, the effects of targeting are explained neither by increased perceived personal relevance nor by targeting recognition. These results are contrary to findings among adults, which show that perceived personal relevance positively mediated targeting effects (Antheunis and Van Noort 2012; De Keyzer, Dens, and De Pelsmacker 2015; Tam and Ho 2006) while targeting recognition explained negative effects (Baek and Morimoto 2012; Hoekstra and Van Doorn 2013; White et al. 2008). These contradictory findings suggest that children process product-targeted online advertising fundamentally different than adults. Among children, profile targeting seems to evoke low elaborate processing. Children are susceptible to product-targeted online advertising, not because these advertisements are perceived as more relevant, but because they positively influence children's ad liking and are not recognized as being targeted. Thus, children seem to process targeted online advertising in a noncritical manner.

Theoretical and practical implications

This study has some important theoretical implications. Compared to studies among adults, our findings indicate that children process targeted advertising fundamentally differently. Unlike adults, they do not seem use moderate or high levels of cognitive elaboration to process advertising that is product targeted. They rely instead on affective mechanisms and process targeted advertising with a minimum of cognitive effort. These results confirm Buijzen, Van Reijmersdal, and Owen's (2010) PCMC framework which postulates that children's developmental characteristics can influence the way they process advertising. Specifically, because children have immature cognitive skills, they lack the ability to process advertising at a high elaborate level (Buijzen, Van Reijmersdal, and Owen 2010). Therefore, they are more prone to less elaborate information processing, which requires little cognitive effort.

In addition, our study shows that children are unable to recognize targeted online advertising as a marketing technique. Their levels of targeting recognition did not differ between targeted and non-targeted advertisements. Concurring with the theoretical and empirical literature, our findings show that children have difficulties in understanding new marketing techniques (Owen et al. 2013; Waiguny and Terlutter 2011). Theoretical

models representing the effects of targeted online advertising should take the recipient's level of persuasion knowledge into account.

Another implication of our findings relates to the ethics of using targeted online advertising with children. Children are unaware of the tactics used in profile targeting, which makes them vulnerable to persuasion. They are unable to recognize profile-based targeting of either the product or form, and as a consequence, critical processing is not activated. It seems that children need help understanding this new marketing technique. Therefore, educational programs about advertising literacy should include information about online targeting techniques so that children can critically evaluate targeted online advertising.

Limitations and directions for future research

Although this study provides valuable new insights into the effects and mechanisms of profile targeting toward children, there are some limitations. First, this study focused on children aged 9–13 years. We showed that children of this age process profile targeting fundamentally differently than adults using a less elaborate and less critical level of cognitive processing. However, future research is needed to see when children begin to process this new advertising technique in an adult manner. It would be interesting to explicitly compare children, teenagers, and adults in a single study to gain more insights into the types of processing each uses and to pinpoint when children or teenagers can be expected to process targeted advertising on an adult-like level.

Our study showed no effects of form targeting, that is, adjusting the advertisement to the recipient's favorite color, on brand responses or the underlying mechanisms. Future research is needed to examine whether other types of targeting have stronger impacts. More specifically, the research should investigate whether different types of targeting differ in their effects. To our knowledge, no studies have been performed that compared different forms of profile targeting. However, two recent studies that manipulated targeting on social network sites focused on other types of targeting. One was based on educational background (Tucker 2014) and another based on the content of a private message sent to a 'friend' (Aguirre et al. 2014) by applying a scenario-based design. Targeting based on educational background is not relevant for the age group in our study, but targeting based on a private message may be a stronger type of targeted advertising than the ones we used. Although it is difficult to manipulate in a realistic and natural way, it is worth the effort to examine this form of targeting in future studies in the context of social network sites.

In our study, it was necessary to use pre-set answers for favorite hobbies and colors so that the children could be assigned randomly to targeted or non-targeted advertisements within the online research tool. It is possible that a child's favorite hobby or color was not on the list, and he or she had to choose a hobby or color that was second-best. This may have weakened the effects of targeting. Future research may use real targeted online advertisements based on children's profile pages to further explore the effects of various types of targeted online advertisements on children.

To guarantee that all children had seen the online advertisements and to keep the circumstance of exposure as constant as possible, we used forced exposure and explicitly asked children to look at the ads. This design allowed examination of the mechanisms that underlie exposure to targeted online ads. Our results showed that even when children were asked to pay attention to the ads, they did not recognize them as being targeted toward their interests and did not perceive them as personally relevant. It is unlikely that

these effects occur when children surf the web and do not explicitly pay attention to advertisements, because their levels of processing would be lower. Our study is a first and valuable step in unraveling how targeted online advertisements affect children's processing and persuasion. However, future research is needed to further examine these effects under more natural conditions, for example, by adding a control group in which participants' attention is not explicitly drawn to the online ad. Furthermore, future research may use a pre-test/post-test design. Measuring attitudes prior to exposure would allow examination of attitude changes within individuals.

Based on the literature, we used four-point scales for most of our measures (Borgers, Hox, and Sikkel 2004). We used a ten-point scale for brand attitude, because in the Netherlands, children's schoolwork is also graded on a scale from 1 to 10. Thus, children are familiar with the scale. However, to be able to make better comparisons between measures and to avoid confusion among the children especially in countries where there is no 1–10 grading system, future research may use scales with the same number of points for all measures.

Due to the sample size of this study, we were unable to use structural equation modeling (SEM) to test our hypotheses. With SEM it would be possible to test the hypotheses simultaneously using one model. Future research may include a larger sample size to test the hypotheses using SEM.

Future research may also use qualitative methods, allowing children to talk about this practice through use of tools such as focus groups or in-depth interviews. Qualitative methods may provide insights into which aspects of targeting are clear or unclear to children. Such research is needed to gain deeper insights into a child's understanding of profile targeting as an advertising technique.

Conclusion

This study provides new insights into how children process online advertising that is targeted based on their information on social network sites. We show that targeting products in online advertisements based on children's hobbies increases advertising effectiveness. Product targeting results in greater brand liking and increased purchase intention. These effects are explained by increased ad liking. Unlike findings among adults, the children in our study did not think that profile-targeted ads are more relevant, and they also did not seem to understand the targeting tactic. Moreover, in our study, targeting colors in online advertisements had no effect.

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Note

1. Because targeting recognition was measured with one item, no discriminant validity could be calculated for this variable. Therefore, only ad liking and perceived relevance were added to test discriminant validity.

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Appendix 1. Examples of stimulus materials

