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Do mass mediated stereotypes harm members of negatively stereotyped groups? A meta-analytical review on media-generated stereotype threat and stereotype lift

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Abstract Stereotype threat theory suggests that negative stereotypes and devaluing content in the media impair the cognitive and educational achievement of members of the negatively portrayed groups (e.g., Latino Americans, women), whereas non-stereotyped recipients are not affected or even show reversed effects (stereotype lift). A meta-analysis of 33 experiments (n = 1831) yielded an overall mean effect size of -0.38 (random effects model) in support of the stereotype threat assumption. The results further involve a check on publication bias and moderator analyses with respect to the portrayed group, the dependent variable (academic identification vs. performance), the media format (ads vs. news vs. entertainment), and the world region in which the study was conducted. A second meta-analysis on the *stereotype lift* hypothesis yielded an overall mean effect size of 0.17 (k = 12, n = 589, non-significant, random effects model). Our meta-analytical findings are in support of stereotype threat theory, indicating that negative stereotypes and devaluing content in the media impair members of negatively stereotyped groups, whereas non-members are not affected. Implications and open research questions are outlined.

Keywords: Media Stereotypes; Social Identity; Stereotype Threat; Stereotype Lift; Meta-Analysis

Societies worldwide are faced with the challenge of low educational achievement of many immigrant and non-White ethnic and racial groups (OECD, 2015a), and with the underrepresentation of women in science, technology, engineering, and mathematics (OECD, 2015b). Stereotype threat theory and related work suggest that mass mediated stereotypes and the portrayal of stereotyped groups in subordinate roles can exert a stress-related and aversive extra pressure not to fail. This can lead members of stereotyped groups to disidentify from some domains or school altogether, and to perform worse during learning and test taking (Schmader, Johns, & Forbes, 2008; Steele & Aronson, 1995; Steele, 1997). Stereotypes in the media possibly contribute to the *threat in the air* (Steele, 1997) that members of negatively stereotyped groups are exposed to. The prevalence of stereotypes in the media could be one of the factors responsible for educational achievement gaps – an assertion with important implications for researchers and stakeholders in politics and the industry alike. Other researchers, however, have questioned the validity of stereotype threat theory and results (e.g., Finnigan & Corker, 2016; Flore & Wicherts, 2015; Ganley et al., 2013). A systematic theoretical and empirical overview of research on media-generated stereotype threat is missing. Indeed, findings on the impact of media stereotypes in the achievement context have been mixed; whereas some researchers found that negative stereotypes displayed in the media impair members of the stereotyped group (Davies et al., 2002; Davies, Spencer, & Steele, 2005), others identified no negative effects (Oswald & Harvey, 2000-2001), or findings were somewhat inconclusive (Gupta, Turban, & Bhawe, 2008). The aim of the current work is to take stock: What do we know about the influence of media stereotypes on academic identification and test performance concerning members of negatively stereotyped groups? And how do non-stereotyped individuals respond to such media stereotypes – do the results indicate an increase in academic identification and test performance (*stereotype lift*, cf. Walton & Cohen, 2003)?

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Note that our focus here is on experimental research based on stereotype threat theory and research (for an early meta-analysis on TV use and gender stereotyping see for example Herrett-Skjellum & Allen, 1996). Before we outline this theoretical framework in more detail, current work on stereotypes in the media is introduced.

Media Stereotypes

Over the last decades, a number of content analyses examined how women, immigrants, and members of non-White ethnic and racial groups, as well as old people are portrayed in various media and formats[1]. Over the years, portrayals of gender, ethnicity, and age have changed, but inequalities still remain. When it comes to the depiction of both genders, more recent analyses suggest that women are underrepresented in popular media (cf. Collins, 2011), such as top-grossing movies (Smith & Granados, 2009), local TV news (Desmond & Danilewicz, 2010), primetime TV (Sink & Mastro, 2016), music videos (Turner, 2011), and video games (Downs & Smith, 2010; Waddell, Ivory, Conde, Long, & McDonnell, 2014). When women are presented, they are typically younger than males, and they are more likely to be portrayed in a sexualized manner (e.g., Aubrey & Frisby, 2011; cf. Collins, 2011). Women are more often presented at home or in a domestic environment than at work (Kay & Furnham, 2013; Tartaglia & Rollero, 2015). Men are more likely to be presented in leadership positions, and to exert power at work (Lauzen & Dozier, 2004). Regarding women in advertising, a meta-analytic study showed that women are much more likely than men to be presented as product users, rather than authorities (Eisend, 2010). Women in advertising are often depicted with a male voice-over – if female characters provide an argument for product use, it is more often an opinion or a non-scientific argument than a factual or scientific argument.

Latino Americans are underrepresented in English language TV channels in the US. Whereas they amount to 16% of the US population, only 2-5% of the people on prime time TV are Latino Americans (Mastro, 2009; Mastro & Behm-Morawitz, 2005; Tukachinsky, Mastro, & Yarchi, 2015). According to Behm-Morawitz and Ortiz (2013), the *Latin lover* and the *buffoon* (an unintelligent, lazy, and disrespected character) are TV stereotypes of Latino Americans that have prevailed until today. They further suggest that news about illegal immigration can activate the stereotype of a group of poor, dangerous, and criminal individuals. A content analysis of video games shows that Latino American characters are largely absent in this medium (Williams, Martins, Consalvo, & Ivory, 2009). Regarding immigrants in Europe, underrepresentation and similar stereotypical roles were observed (e.g., Lukesch et al., 2004).

The proportion of African Americans on TV is equal to or exceeds the real-life proportion in the population. Traditional stereotypes of African Americans (such as the *black mammy* or the *buffoon*) are not prevalent in today's TV fiction (Mastro & Behm-Morawitz, 2005). Regarding TV news, African Americans are overrepresented as criminals and underrepresented as victims compared to real-world crime statistics (Dixon & Linz, 2002; cf. Behm-Morawitz & Ortiz, 2013). Possibly, the combination of a substantial prevalence of successful African Americans in TV fiction and the representation as criminals in (local) TV news stimulates the stereotype of a group that has every chance to succeed, but fails due to a natural inferiority (Behm-Morawitz & Ortiz, 2013). In video games, African American characters are less frequent than on TV, and the typical roles for males are those of criminals or athletes; female African American characters are largely absent in video games (Waddell et al., 2014; Williams et al., 2009).

Older people tend to be underrepresented on TV and in movies; particularly older women are rare (Lauzen & Dozier, 2005; Signorielli, 2004). Few older characters are found in video games (Williams et al., 2009). When older people are presented in advertising, positive as well as negative stereotypes have been documented (for magazine ads: Miller, Miller, McKibbin, & Pettys, 1999; for TV ads: Roy & Harwood, 1997). An analysis of prime-time drama and comedies showed that if older characters are present, they are presented somewhat more negatively than younger characters (Harwood & Anderson, 2002). TV shows and movies often include older characters for comic purposes, building on the stereotype of physical or mental incompetence (Montepare & Zebrowitz, 2002).

Effects of Media Stereotypes: The Stereotype Threat Perspective

A number of studies over the last decades examined how stereotypical portrayals in the media influence recipients' attitudes, beliefs, and behavior (for an overview see Behm-Morawitz & Ortiz, 2013; Mastro, 2009; Smith & Granados, 2009). Much of this research focused on the effects on men or White Americans, that is, those who were not members of the stereotyped group, indicating that stereotypes in the media can activate and shape stereotypes about outgroup members. Less emphasis has been given to the consequences of being exposed to media stereotypes about one's own group (for cross-sectional studies see, for example, Ortiz & Behm-Morawitz, 2015; Rivadeneyra, Ward, & Gordon, 2007).

Stereotype threat theory (Steele & Aronson, 1995; Steele, 1997; 2010) provides a framework to address the influence of media portrayals on members of a negatively stereotyped group: stereotype threat is an aversive state that is characterized by stress and worries to confirm a negative view held by others (Steele & Aronson, 1995; cf. Inzlicht & Schmader, 2012). It is elicited in situations in which individuals are confronted with negative ability stereotypes against a group they identify with (e.g., women, African Americans). Stereotype threat, or the alternative term *social identity threat*, can also have a broader meaning, characterizing a state of discomfort whenever individuals are confronted with a negative stereotype (e.g., African Americans are criminal), or the group is otherwise despised or generally devalued in a specific context (e.g., STEM seems like an "old boys' club"; therefore, it does appear as if women do and cannot belong to the field).

In situations of stereotype threat or social identity threat, individuals fear that they might confirm the negative stereotype through their own behavior, or that they could be

[1] This is not meant to be an exhaustive list of potentially negatively stereotyped groups that received scholarly attention. This paper focused on these groups due to availability of primary studies included in this meta-analysis.

judged based on their group membership respectively. Stereotype threat is characterized by negative emotions and cognitions, along with a physiological stress response and attempts at regulating these aversive thoughts and feelings. These processes consume working memory capacity, which is unavailable for any demanding cognitive activity at hand (for an integrative model of mechanisms, see Schmader et al., 2008).[2]

As the psychological state of stereotype threat is discomforting, individuals are motivated to avoid negatively stereotyped activities in the future. The stereotype threat perspective is typically applied to questions of educational success and career trajectories (cf. Appel & Kronberger, 2012; Inzlicht & Schmader, 2012). Stereotype threat can lead to a reduced interest in and disidentification from stereotyped domains (e.g., women do not further pursue leadership aspirations; African Americans quit school early; cf. Cheryan, Plaut, Davies, & Steele, 2009). Stereotype threat can further impair individuals' ability building process at times of preparation and learning (e.g., Taylor & Walton, 2011), and if stereotype threat occurs during a test taking situation, stereotyped individuals cannot perform up to their full abilities (e.g., Steele & Aronson, 1995).

Stereotype threat is considered to result from a cognitive imbalance of three concepts: the concept of self, the concept of group, and the concept of an ability domain (Schmader et al., 2008). Stereotype threat is expected when a) individuals identify with a group (an individual's self-concept is linked to the concept of a group), b) individuals initially identify with a domain (an individual's self-concept is linked to the concept of an ability domain) and c) individuals are confronted with a negative group stereotype (the domain is negatively linked to the in-group). This pattern of self-related cognitions elicits an aversive state of cognitive imbalance (e.g., 'I am a woman', 'physics is important to me', 'people think women are bad at physics'), initiating a physiological stress response and the negative cognitions and emotions as outlined above.

Stereotypes can be communicated and activated in different ways. In Steele and Aronson's (1995) first experiments on stereotype threat, African Americans were either told that a test was diagnostic (vs. not diagnostic) of one's intellectual ability (Experiments 1-3), or they were asked to indicate their race prior to taking a test (Experiment 4). These subtle manipulations of the test taking context were sufficient to elicit stereotype threat for members of the negatively stereotyped group, and thus, to reduce their performance. Other experiments included more explicit statements about the supposed inferiority of one group's ability as compared to another group (e.g., Aronson et al., 1999), or signaled threat by showing that a group is underrepresented in a domain (e.g., Murphy, Steele, & Gross, 2007).

Given the proliferation of stereotypes in the media, media stereotypes might activate negative associations of the group an individual identifies with (the domain is negatively linked to the in-group), and therefore, could be a chief source of stereotype threat (Schmader, Block, & Lickel, 2015). On a more cautious note, it needs to be taken into consideration that classic stereotype threat studies often relied on threat manipulations that were an integral part of the test-taking situation, such as instructions provided by the test administrator. Media products and their creators, for example comedians or journalists, are independent of the test-taking situation, which might facilitate a mental compartmentalization of media stereotypes encountered, and the test-taking situation and the tasks to be mastered.

In a seminal series of experiments (Davies et al. 2002; 2005), participants watched a set of TV commercials. For half of the participants the set included gender-stereotypical commercials (among neutral commercials), for the other half, the set included counter-stereotypical commercials (Davies et al., 2002, Experiment 1), or all gender portrayals in the commercials were neutral in the control condition (Davies et al., 2002, Experiments 2 and 3; Davies et al., 2005). As expected, women exposed to the stereotypical ads – as compared to women in the control condition – performed worse in a subsequent math test, preferred verbal tasks over math tasks, and were less interested in a leadership position. In line with stereotype threat theory, men – exposed to the identical stimuli – were unaffected by the stereotypical portrayals of women or their results were opposite to those of the female subgroup.

The latter finding is a crucial distinction from much of the work on media priming, which suggests that recipients activate (and act upon) the attributes that media characters display, irrespective of the recipient belonging to the same group as the media character (cf. Appel, 2011; Roskos-Ewoldsen, Roskos-Ewoldsen, & Carpentier, 2009). According to the priming literature, all individuals confronted with stereotypes are equally susceptible to their effects – it does not matter whether or not recipients self-identify with the group portrayed. For stereotype threat theory and research, the relevance of the stereotype to the individual is of critical importance (e.g., Spencer, Logel, & Davies, 2016; Wheeler & Petty, 2001). Stereotype threat is expected only if an individual identifies with the stereotyped group. Participants who are exposed to a stereotype about a group that is not the group they identify with (e.g., men confronted with a negative stereotype towards women) should show no disidentification from the stereotyped domain and no decreased performance. On the contrary, non-stereotyped individuals may show a boost in performance. The improved performance of individuals who are exposed to a negative achievement stereotype regarding an outgroup is referred to as *stereotype lift* (Walton & Cohen, 2003). This increase in performance occurs when the ability or worth of an outgroup is devalued, and downward comparisons to the stereotyped group can be drawn (Walton & Cohen, 2003). Per definition, stereotype lift can only occur among individuals who do not identify with a negatively stereotyped group (e.g., White Americans exposed to a stereotype about Latino Americans).

Stereotype threat theory and research is not the only approach that can be used to explain and predict effects of media stereotypes on members of negatively stereotyped groups (priming, and differences between priming and stereotype threat were mentioned above). Cultivation theory, for example, would suggest that exposure to media stereotypes by and by changes the beliefs and stereotypes held about social groups, including one's own group, as well as oneself (cf. Morgan, 1987; Ward, 2004).

[2] There are several psychological factors that can affect identification and performance of students, such as learned helplessness (Seligman, 1975) or low self-efficacy (Bandura, 1977). Stereotype threat is different in a sense that targeted individuals may believe that the stereotype is inaccurate or that they personally have high abilities in a domain. It is the struggle with the stereotype encountered that leads to disidentification and underperformance (cf., Logel, Walton, Spencer, Peach, & Zanna, 2012).

Acknowledging the existence and value of other lines of theory and research, the goal of the present work is a meta-analytical assessment of studies on media-generated stereotype threat and stereotype lift, not of all available research on the correlates or effects of media stereotypes, or on media and identity more generally (cf. Mastro, 2003).

Rationale and Overview

Today, stereotype threat is a contested field of research. Whereas many studies replicated the original work by Steele and Aronson (1995), other studies could not replicate the stereotype threat effect. Available meta-analytic findings were generally in support of the stereotype threat effect, but publication bias was observed as well (Appel, Weber, & Kronberger, 2015; Flore & Wicherts, 2015). Several authors expressed doubts about the robustness of the effect (e.g., Finnigan & Corker, 2016; Ganley et al., 2013). Our focus here is on media and to what extent stereotypes in newspaper articles, ads, or TV series can elicit stereotype threat. Is stereotype threat a media effect that is substantiated by empirical research? As yet, a comprehensive assessment of the current state of research is missing.

The present work is meant to fill this gap by providing a meta-analytic summary of the findings on media-generated stereotype threat. We examined effects on members of the stereotyped group (e.g., women, Latino Americans), as well as effects on recipients whose group was not portrayed in a negative and/or stereotypical manner by media stimuli (e.g., men, White Americans; cf. *stereotype lift*). Based on stereotype threat theory we expected lower identification and worse performance among recipients belonging to negatively stereotyped groups who were exposed to the negative media stereotype as compared to recipients in a control condition. In terms of the stereotype threat model by Schmader and colleagues (2008), media stereotypes were expected to activate a negative link between the domain and the in-group – provided that the recipients were members of the stereotyped group.

Variations in the empirical studies were addressed as research questions and were statistically taken into account by moderator analyses. The following variables were chosen because potential study subgroup differences could inform theory and point out future research directions. The first characteristic of interest was the dependent variable – are media stereotypes equally disruptive for the identification with a stereotyped domain and for the performance in a test-taking situation? Second, we were interested in the stimulus genre. Stereotypical portrayals can be found in media with a persuasive intent (such as TV ads), information and news (such as newspaper articles), or entertainment fare (such as TV series or comedies). Are stereotype threat effects different for media belonging to these broad genres? Furthermore, we examined whether the potentially disruptive effect of media stereotypes holds for different stereotypes and samples. We examined stereotype threat effects among different stereotyped groups (e.g., women vs. older people). We further examined potential moderator effects of the recipients' age group (e.g., K-12 vs. undergraduates), and the world region in which the studies were conducted.

A second meta-analysis focused on the effects of stereotypical media content on recipients who were not members of the stereotyped group (e.g., men, Whites; cf. Mastro, 2015). The expected effect of stereotypes on non-targeted individuals is a crucial distinction between the stereotype priming and the stereotype threat perspective. Theories that explain priming (such as the ideomotor account) would lead to the assumption that whenever individuals are confronted with media stereotypes they are equally susceptible to their influence, irrespective of the fact whether or not they self-identify with the group. In stark contrast to priming, stereotype threat theory and research put a crucial emphasis on the link between the stereotyped group and an individual's identification with that group – only recipients whose social identity is targeted by the mediated stereotype are vulnerable to stereotype threat (Spencer et al., 2016). Prior research showed that for non-targeted individuals, effects could even be reversed (albeit smaller in effect size), a phenomenon called *stereotype lift* (e.g., Walton & Cohen, 2003). Do individuals who are exposed to negative stereotypical media portrayals of an outgroup perform better or identify more with the domain addressed by the stereotype?

Method

Literature Search and Selection Criteria

Search process. To identify relevant studies, we conducted a thorough literature search in October 2015, which was repeated in December 2016 to account for most recent studies. The databases Communication and Mass Media Complete, PsycINFO, Psyc*ARTICLES, PSYNDEX, ERIC, SocINDEX,* and *Psychology and Behavioral Sciences Collection* were searched for the terms "stereotype threat" or "social identity threat" and at least one of the terms "media*", "television", "TV", "commercial", "advert*", "news*", "video*", "computer*", or "game". Our database search for literature published until December 2016 resulted in 258 references. If an article was found through more than one search query, it was counted multiple times (see Figure 1, phase 1: identification). Subsequently, Google scholar was searched for additional documents. Additionally, we requested information about published or unpublished studies through international e-mailing lists and social media. These efforts resulted in an additional number of 35 references. After duplicates were removed, the total number of records amounted to 240, all of which were screened regarding our inclusion criteria.

Inclusion criteria. Studies were included in the meta-analytic database according to the following conditions: A) The study needed to be an experiment. B) The study involved a comparison between an experimental condition, in which stereotype threat or social identity threat was activated, and a control group (neutral control or nullifying condition). C) In the threat condition, the stimulus material consisted of mass media products, e.g., newspaper articles, TV ads, comics, poster ads, or video games. D) The media products included a stereotypic portrayal or the devaluation of a group the participants self-identified with. If the study design included a group of non-stereotyped individuals (as a control group), results of this group were used separately for the analyses on stereotype lift. E) A measure of domain identification or a measure of cognitive performance served as a dependent variable. F) The study contained available data to calculate a standardized mean difference (e.g., sample sizes, means, standard deviations) between treatment groups among members of the stereotyped

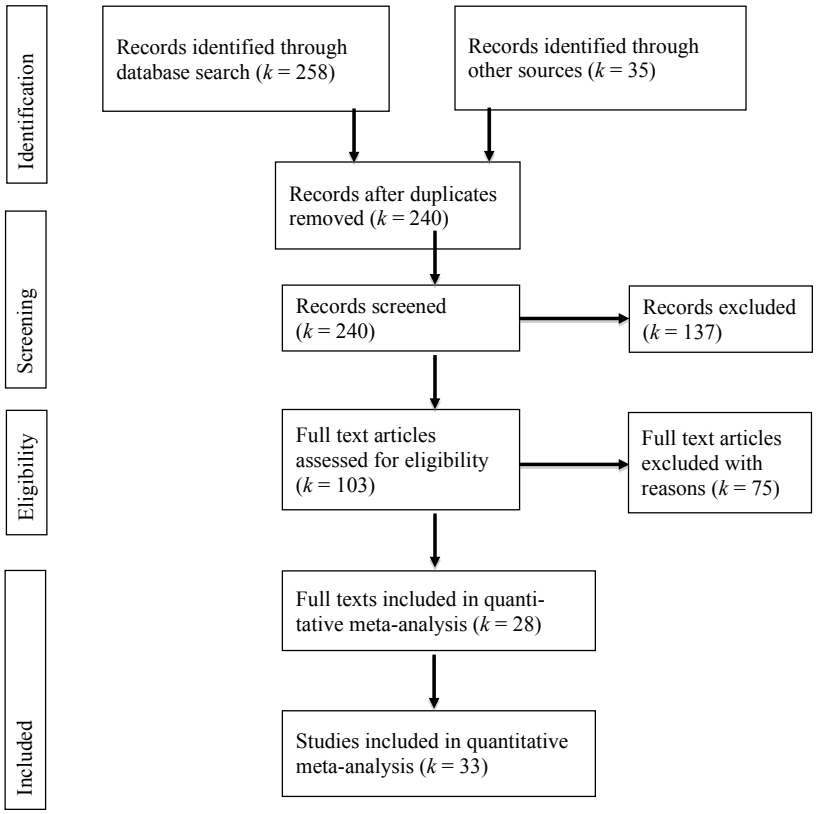

Figure 1. Flow diagram illustrating the search strategy and inclusion criteria: PRISMA Statement

group (e.g., women, immigrants), members of a non-stereotyped group (e.g., men, non-immigrants), or both. In case key statistical information was missing in the publication, we approached the study authors. When we failed to obtain the missing information, the study could not be included.

Studies with media stimuli that involved media characters without a stereotypic portrayal or devaluation were not included (e.g., playing a video game with a female avatar, which did not clearly have stereotypical characteristics, Ratan & Sah, 2015). Further, studies where the stimuli did not clearly represent a mass media product, or the treatment involved a mass media product along with some other means to elicit threat, were discarded (e.g., Smith, Sansone, & White, 2007; Van Loo, & Rydell, 2014; Yeung & von Hippel, 2008). Two studies were excluded that examined the potential effects of a stereotype regarding cannabis users (Looby & Earlywine, 2000) and Christians (Rios, Cheng, Totton, & Shariff, 2015), because these stereotypes stand out as not addressing the more invariant characteristics of gender, age, and racial/ethnic background. We included studies in which the media product was edited or created for the sake of the study, and we included studies in which the low stereotype threat condition was meant to reduce stereotype threat, rather than representing a zero-effect control.

Study Pool and Coding

We retrieved 33 studies with 45 effect sizes that fit our inclusion criteria (see Figure 1 for a flow chart of the search process). All studies included participants who were members of a negatively stereotyped group, and, as part of the experimental design, a subset of participants was exposed to media portrayals that varied in their potential to elicit threat (e.g., women were exposed to gender-stereotypic versus neutral TV commercials). Twelve of the studies included participants who were exposed to the same stereotypic stimuli, but who were members of a non-stereotyped group (e.g., men, White Americans). Based on these studies, a meta-analytic summary of the stereotype lift effect was conducted.

The meta-analytic procedure followed the Hedges and Olkin (1985) tradition, and was based on the random effects approach recommended by Hedges and Vevea (1998; see also Borenstein, Hedges, Higgins, & Rothstein, 2009; Lipsey & Wilson, 2001). The standardized mean difference (Cohen's *d*) was chosen as the effect size measure, and a coding sheet was developed to gather all relevant information to calculate the effects sizes and to specify scores of the moderating variables. Our analyses were based on descriptive data (e.g., *M*s, *SD*s, *n*s) for the treatment group and the control group. If these were unavailable, formulas to calculate the standardized mean difference from available statistics (e.g., *t*-tests, *F*-tests) were used (cf. Lipsey

& Wilson, 2001). Whenever scores for two or more dependent variables were reported (e.g., scores for two or more subtests of a cognitive performance test), the effects were combined to guarantee independence of effect sizes. Likewise, if the study design involved more than one stereotyped stimulus as part of a between subjects design, the scores were combined.

Dependent measures. We distinguished studies that examined cognitive performance as a function of the experimental media exposure (e.g., performance in an intelligence test, performance in a math test) from studies that used measures of domain identification, such as task choice or career preference.

Stimulus genre. Different media genres and formats were investigated in the primary studies. Some studies examined the influence of stereotypical or devaluing ads. A second group of studies examined news and information (such as newspaper articles re-iterating a stereotype). The remaining studies involved some form of entertainment medium, such as cartoons, comedies, or excerpts of TV series.

Stereotyped group. The majority of studies examined mediated stereotype threat among women. A smaller subset of studies examined effects of portrayals of older people on members of this age group, another smaller subset used samples of Latinos and African Americans in the US or immigrants in Europe. Two studies examined stereotypes regarding men (low emotional and verbal abilities).

Sample age. We categorized whether the samples consisted of K-12 students, undergraduates, or adults.

World region. The majority of studies were conducted in North America, a smaller number of studies were conducted in Europe or Asia. No primary study was located in another world region.

Results

Overview

The meta-analytic data analysis was conducted with the software *Comprehensive Meta Analysis* (CMA, Version 2, Borenstein, Hedges, Higgins, & Rothstein, 2005) and followed standard procedures and recommendations (e.g., Lipsey & Wilson, 2001). This software is widely used and based on the Hedges and Olkin approach to meta-analysis (1985; Hedges & Vevea, 1998). The inverse variance served as a weight that was allotted to each effect size (see Lipsey & Wilson, 2001, and Borenstein et al., 2009, for the respective formulas). Following our general approach and due to a lack of reliability estimates provided in the primary studies, we did not adjust effects for measurement errors and range restrictions (cf., Johnson, Mullen, & Salas, 1996; Schmidt & Hunter, 1999).

Negative effect sizes indicate a worse performance or lower identification when participants were exposed to the stereotyped media content as compared to the control condition. If stereotype threat theory applied to media stimuli, a significant negative effect was expected for stereotyped group members. This effect should be smaller or even reversed among members of a non-stereotyped group (i.e., stereotype lift). The basic characteristics of the primary studies are reported in Table 1 (Table S1 of the online supplement provides more details on the media stimuli).

We first present the average effect results for members of the stereotyped group (stereotype threat), and subsequent analyses of sampling bias. Next, we present the average effects and analyses of sampling bias for recipients, who are not members of the stereotyped group (stereotype lift). We then proceed with moderator analyses of stereotype threat effects.

Stereotype Threat and the Media: Average Effects and Sampling Bias

Effect size estimates. The average effect regarding the influence of negative media stereotypes over all 33 studies amounted to d = -0.38 for the random effects model (95%CI = -0.50; -0.26), SE = 0.06, Z = -6.16, p < .001 (see also Table S2 of the online supplement in which fixed effect results are reported as an indicator of sensitivity, and supplement Figure S1 for the forest plot). This analysis – the first meta-analytical assessment of stereotype threat effects by media stimuli – indicates that negative media stereotypes impair members of the stereotyped group. The analysis of effect size heterogeneity yielded a significant effect, Q (32) = 49.01, p = .028, I^2 = 34.71, suggesting more effect size variation than expected by chance. Before we examine potential moderators that might explain this variability, the studies are inspected for publication bias.

Analysis of publication bias and file-drawer analysis. We present several approaches to identify a *small studies effect* that are typically used to indicate a bias in the study sample. The underlying assumption common to these approaches is that meta-analysts have particular troubles retrieving studies with small samples that provide non-significant findings, or that provide findings that are contrary to what could be expected from theory. Studies of this kind are more likely to be dismissed, forgotten, not presented at conferences, formally written down, etc. This practice can produce a meta-analytical bias towards identifying support for a theory. Our first step to identify potential biases was to plot the effect sizes against the standard error of the studies. The funnel plot indicated some non-synchronicity (see Figure S2 of the online supplement); there appears to be a tendency for studies with higher standard error (studies with smaller sample sizes) to show findings in line with the theory, whereas studies with higher standard error that do not support the theory are rare. One way to go from here is a trim and fill analysis (Duval & Tweedie, 2000). It is considered a standard procedure despite the critique it attracted (see for example Moreno et al., 2009; Terrin, Schmid, Lau, & Olkin, 2003). The trim and fill procedure imputed 8 studies, yielding a modified point estimate of -0.28, 95%CI [-0.36; -0.19], for the random effects model. This analysis suggests that despite the asynchronicity due to a small studies effect, a significant effect was observed after the trim and fill procedure, speaking to the robustness of the findings. Whereas Egger‘s regression intercept of -2.36, 95% CI [-3.80; -0.92], p = .002, showed evidence for a small studies effect (Sterne & Egger, 2005), a fail-safe number analysis indicated that 503 unpublished studies with null results would be needed to alter the effect to be non-significant (15 for each identified study). This fail-safe number speaks to the robustness of the identified effect. In sum, our results yielded indications of a small studies effect, but additional analyses show that it is unlikely that the average stereotype threat effect we identified can be entirely attributed to publication bias.

Table 1

Main Characteristics of the Primary Studies

Study No.	Study	Sample; Origin	Stereotyped group	N_s (N_{n-s})	Media Stimuli	DV(s)	*Effect Stereotype Threat (d)*	*Effect Stereotype Lift (d)*
1.	Appel, 2012	Adolescents; Austria	Immigrants	46 (49)	Political party poster ads	Intelligence test performance	-0.41	0.19
2.	Appel et al., 2011, Study 2	Undergrads; Austria	Women	40	News articles on women	Note taking	-0.72	No data
3.	Barber & Mather, 2013, Study 1a	Adults (age 60-79 years); USA	Older adults	56	News articles on memory and age	Working memory performance	-0.01	No data
4.	Barber & Mather, 2013, Study 1b	Adults (age 59-78 years); USA	Older adults	56	News articles on memory and age	Working memory performance	-0.03	No data
5.	Ben-Zeev et al., 2012 [a]	Undergrads; USA	Men	43 (41)	Video excerpts of popular films	Interest in acting as an affective facilitator in a discussion	-0.65	-0.18
6.	Bond, 2016 [b]	Female elementary school students, USA	Women	60	Video clips taken from TV shows	STEM-related career interest; stereotypical career interest (reverse coded)	-0.50	No data
7.	Cheryan et al., 2013	Undergrads; USA	Women	30 (24)	News articles on computer science	Interest in pursuing a career in computer science	-0.86	0.20
8.	Davies et al. 2002, Study 1	Undergrads; Canada	Women	25	TV commercials	Math test performance	-0.80	No data
9.	Davies et al. 2002, Study 2	Undergrads; Canada	Women	34	TV commercials	Math test performance	-0.91	No data
10.	Davies et al. 2002, Study 3	Undergrads; Canada	Women	32	TV commercials	Interest in verbal vs. math-oriented careers	-0.87	No data
11.	Davies et al., 2005, Study 1	Undergrads; Canada	Women	31	TV commercials	Interest in leadership role vs. problem-solver role	-0.72	No data
12.	Davies et al., 2005, Study 2	Undergrads; Canada	Women	58	TV commercials	Interest in leadership role vs. problem-solver role	-0.85	No data

13.	Ellithorpe et al., 2015	Undergrads; USA	Women	136	Video games	Math test performance	-0.32	No data
14.	Fischer, 2016 [a]	Undergrads; Germany	Women	92	Video excerpts of popular films	Figural test and math test performance	0.06	No data
15.	Gaillard et al., 2011 [b]	Adults (age 55-70 years); Belgium	Older adults	61	News articles on age and driving	Multiple choice test performance on driving	-0.32	No data
16.	Ganley et al., 2013, Study 1	8th grade students; USA	Women	110 (102)	Videos portraying a scientist	Math test performance	0.14	0.00
17.	Good et al., 2010	9th and 10th grade students; USA	Women	52 (29)	Photos accompanying a study text	Chemical studies comprehension test performance	-0.29	0.26
18.	Gupta & Bhawe, 2007	Undergrads; USA	Women	80	News articles on entrepreneurship	Entrepreneurial intentions	-0.45	No data
19.	Gupta et al., 2008 [a]	Undergrads; USA	Women	109 (120)	News articles on entrepreneurship	Entrepreneurial intentions	0.02	-0.22
20.	Gupta et al, 2014, Study 1	Undergrads; Turkey	Women	60 (64)	News articles on entrepreneurship	Entrepreneurial intentions	-0.40	0.47
21.	Gupta et al, 2014, Study 2	Undergrads; Turkey	Women	69 (80)	News articles on entrepreneurship	Entrepreneurial intentions	-0.37	0.67
22.	Hess et al., 2003	Adults (age 62-84 and 18-30); USA	Older adults	32 (32)	News article on age and memory	Memory test performance	-0.71	-0.17
23.	Ihme & Mauch, 2007	7th and 8th grade; Germany	Women	74	TV commercials	Math test performance	-0.70	No data
24.	Latsch & Hannover, 2014, Study 2	9th grade students; Germany	Men	49 (51)	News articles boys and school	Reading comprehension	-0.70	0.71
25.	Oswald & Harvey, 2000-2001 [c]	Undergrads; USA	Women	72	Cartoon on math and gender	Math test performance	0.28	No data
26.	Prasad, 2011	Undergrads; USA	Women	45 (45)	Print ads	Preference for leadership role over problem-solver role	-0.99	-0.16
27.	Richman et al., 2011 [d]	Mixed sample; USA	Women	58	Video ad for acad. conference	Interest in attending the conference	-0.70	No data

28.	Rivadeneyra, 2001	9th to 12th grade students; USA	Latino/a Americans	204	Video clips from popular TV shows	Verbal test and math test performance	-0.02	No data
29.	Scott, 2012	Undergrads; USA	African Americans	90	Video clips from films	Intelligence test performance	0.01	No data
30.	Simon & Hoyt, 2013, Study 2	Undergrads; USA	Women	60	Print ads	Leadership aspirations	-0.52	No data
31.	Volkmar, 2015	Undergrads; Germany	Women	102	Video clips (comedy)	Figural test and math test performance	-0.47	No data
32.	Weber, et al., 2015, Study 1[a]	8th grade students; Austria	Immigrants	81 (51)	News articles on school success	Intelligence test performance	-0.11	0.05
33.	Westerhof et al., 2010[e]	Adults (age 65-75); The Netherlands	Older adults	26	TV commercials about old people	Memory test performance	-0.73	No data

Notes. [a] Control group vs. combined effect of experimental groups blatant and subtle. [b] Promotion and prevention group combined, control and counter-stereotype groups combined. [c] Removed and non-removed conditions combined. [d] Subgroups combined. [e] Subsample who self-identified with old people. Warm incompetent group vs. combined effect of warm competent and cold competent group. No data = Non-stereotyped individuals did not participate or reported data was insufficient. N_s = sample size stereotyped group; $N_{n\text{-}s}$ = sample size non-stereotyped group

Media Stereotype Lift: Average Effects and Sampling Bias

Twelve studies with sufficient documentation compared the effects of media stereotypes (vs. control) among recipients who were not members of the stereotyped group. The average effect in this group amounted to $d = 0.17$ for the random effects model (95%CI = -0.03; 0.37), $SE = 0.10$, $Z = 1.63$, $p = .10$, and $d = 0.17$ (95%CI = 0.001; 0.33) for the fixed effects model, $SE = 0.09$, $Z = 1.98$, $p = .048$ (see also Table S1 of the online supplement). In contrast to the results obtained for stereotyped individuals, this average effect size is positive, and approaches (random effects model) or reaches significance (fixed effects model). This pronounced difference suggests that the effects obtained for the stereotyped individuals are unique to this group, ruling out mere priming as the underlying mechanism. The funnel plot indicated low non-synchronicity (see online appendix), and a trim and fill analysis did not identify missing studies with low sample sizes that were contrary to stereotype lift effects. Likewise, Egger's regression intercept amounted to -0.23 (95% CI = -3.46; 3.00, $p = .877$), suggesting no evidence of publication bias. Effect size heterogeneity was not significant, Q (11) = 15.46, $p = .162$, $I^2 = 28.85$, indicating no systematic effect size variation. Due to this finding and the rather low number of studies, moderator analyses of stereotype lift effects were suspended.

Media Threat: Moderator Analyses

Stereotype threat effects, however, did show a substantial heterogeneity of the results. Moderator variables might therefore provide insight into the boundary conditions of the observed media threat effect (Table 2). Our first moderator was the type of dependent measure examined. Studies examining the identification with a stereotyped domain ($k = 14$) yielded somewhat larger effects ($d = -0.53$, 95%CI = -0.71, -0.36) than studies on cognitive performance ($k = 19$; $d = -0.26$, 95%CI = -0.40; -0.11), Q (1) = 5.84, p = .016. Importantly, separate analyses for both dependent variables showed that both average effect sizes are significant. Based on our findings, media stereotypes affect both, identification with a stereotyped domain, as well as performance in that domain.

Next, we examined potential differences depending on the media format of the stereotype threat manipulation. The effects for ads ($k = 11$, $d = -0.71$, 95%CI = -0.90, -0.51) were stronger than the effects for news and information ($k = 14$, $d = -0.28$, 95%CI = -0.43, -0.13) and the effects for entertainment ($k = 8$, $d = -0.17$, 95%CI = -0.33, -0.01), Q (2) = 19.00, $p < .001$. Media-generated threat effects were significant for all three genres.

The majority of studies addressed stereotypes against women ($k = 22$); other groups investigated were old people ($k = 5$, e.g., effects of portraying old people to be senile), non-white ethnic groups and immigrants ($k = 4$, portrayed in stereotypical roles and of low intelligence), and men ($k = 2$, negatively associated with emotional and verbal abilities). The effect sizes of these four groups (women, old people, immigrants and members of non-White ethnic or racial groups, men) did not differ significantly, Q (3) = 4.91, $p = .178$. However, separate analyses for each group yielded a significant effect only for women ($d = -0.42$, 95%CI = -0.56; -0.28) and men ($d = -0.68$, 95%CI = -1.21; -0.16).

Finally, we inspected age group and the world region the study was conducted in as potential moderators. Like in much of the available experimental research, undergraduates were the most studied participant group ($k = 18$), followed by K-12 students ($k = 8$), and adults or mixed samples ($k = 7$). No significant difference between these groups emerged, Q (2) = 1.07, $p = .586$. Likewise, the world region the study was conducted in (North America, $k = 20$; Europe, $k = 9$; Asia, $k = 4$) did not significantly affect the average effect size, Q (2) = 0.16, $p = .921$.

Discussion

Since Lippman (1922) introduced the concept of the stereotype to the social sciences, communication scholars have examined the prevalence of stereotypes in the media, as well as the effects of stereotypical portrayals on media audiences (cf. Berelson & Salter, 1946; Dale, 1938; Seiter, 1986). Work on the influence of media stereotypes on recipients has focused for a large part on individuals who were exposed to stereotypes about a group they did not belong to themselves (cf. Mastro, 2009; Behm-Morawitz & Ortiz, 2013). Much less is known about the influence of media stereotypes on members of the group that is negatively stereotyped. Based on stereotype threat theory, we examined the assumption that negative media portrayals impair stereotyped group members in cognitive tasks, and that negative media portrayals lead to a disidentification from negatively stereotyped domains. We identified an overall effect of $d = -.38$ (random effects, 95%CI = -0.50; -0.26) that replicated across several boundary conditions: exposure to high vs. low threatening media impaired members of a devalued group, irrespective of the group investigated (women, old people, immigrants and members of non-White ethnic or racial groups, men), and irrespective of the sample's age and the world region the studies were conducted in. Larger effects were observed when identification with a stereotyped domain rather than cognitive performance after media exposure was investigated (although smaller in size, the average effect on performance was significant as well). Effects of ads containing threatening vs. non-threatening content were larger than the effects of news portraying stereotypes, and larger than the effects of entertainment media (e.g., excerpts of movies or TV series).

Negative stereotypes in the media had no negative effects on people who do not belong to the negatively portrayed group. If anything, our second meta-analysis found some evidence for a stereotype lift effect (Walton & Cohen, 2003): exposure to devaluations or negative stereotypes increases identification and performance – unless recipients belong to the group that is negatively stereotyped. This supports the assumptions made by stereotype threat theory, and undermines the idea that priming might be the underlying mechanism.

Implications

There is little doubt that today's media represent and promulgate the stereotypes held in a society (cf. Behm-Morawitz & Ortiz, 2013), but evidence for a link between media stereotypes and the performance and career preferences of stereotyped groups had never been gathered in any form of systematic review (quantitative or non-quantitative). The current meta-analysis amends this shortcoming. Much of the work in communication

Table 2

Summary of the moderator analyses, random effects model

Variable	***k***	***N***	**Subgroup Effect Size**	**By Group Analysis**
Dependent measures, between groups analysis, Q (1) = 5.84, p = .016				
Identification	14	731	d = -0.53 (95%CI = -0.71; -0.36, SE= 0.09, Z = -6.02, p < .001)	Q (13) = 10.59, p = .645
Performance	19	1149	d = -0.26 (95%CI = -0.40; -0.11, SE= 0.07, Z = -3.48, p < .001)	Q (18) = 31.10, p = .037
Stimulus Genre, between groups analysis, Q (2) = 19.00, p < .001				
Ads	11	447	d = -0.71 (95%CI = -0.90; -0.51, SE= 0.10, Z = -7.20, p < .001)	Q (10) = 2.80, p = .986
News and Information	14	802	d = -0.28 (95%CI = -0.43; -0.13, SE= 0.08, Z = -3.75, p < .001)	Q (13) = 16.22, p = .237
Entertainment	8	631	d = -0.17 (95%CI = -0.33; -0.01, SE= 0.08, Z = -2.14, p = .033)	Q (7) = 10.99, p = .139
Stereotyped Group, between groups analysis, Q (3) = 4.91, p = .178				
Women	22	1298	*d = -0.42 (95%CI = -0.56; -0.28, SE= 0.07, Z = -5.91, p < .001)*	*Q (21) = 37.39, p = .015*
Old people	5	221	*d = -0.31 (95%CI = -0.68; 0.07, SE= 0.19, Z = -1.60, p = .110)*	*Q (4) = 2.76, p = .599*
Immigrants / non-White	4	293	*d = -0.11 (95%CI = -0.43; 0.20, SE= 0.16, Z = -0.69, p = .488)*	*Q (3) = 1.52, p = .679*
Men	2	77	*d = -0.68 (95%CI = -1.21; -0.16, SE= 0.27, Z = -2.54, p = .011)*	*Q (1) = 0.01, p = .917*
Age group, between groups analysis, Q (2) = 1.07, p = .586				
K-12 Students	8	539	d = -0.28 (95%CI = -0.51; -0.05, SE= 0.12, Z = -2.37, p = .018)	Q (7) = 12.90, p = .074
Undergraduates	18	993	d = -0.43 (95%CI = -0.59; -0.26, SE= 0.09, Z = -7.12, p < .001)	Q (17) = 29.50, p = .030
Adults or Mixed Sample	7	348	d = -0.39 (95%CI = -0.69; -0.10, SE= 0.15, Z = -2.62, p = .009)	Q (6) = 4.30, p = .636
Region, between groups analysis, Q (2) = 0.16, p = .921				
North America	20	1131	d = -0.36 (95%CI = -0.52; -0.20, SE= 0.08, Z = -4.45, p < .001)	Q (19) = 34.88, p = .014
Europe	9	506	d = -0.42 (95%CI = -0.66; -0.19, SE= 0.12, Z = -3.50, p < .001)	Q (8) = 8.43, p = .393
Asia	4	243	d = -0.37 (95%CI = -0.72; -0.02, SE= 0.18, Z = -2.07, p = .039)	Q (3) = 4.76, p = .190

science and media psychology is focused on the effects of media, and the stereotypical portrayal of gender and non-White ethnic and racial group members has fueled a substantial part of research in this field. Stereotype threat perspectives have not been common in communication science, though. Our review and meta-analysis provides an assessment of the state-of-the-art. We consider this meta-analysis as a starting point for communication scholars to increase their efforts at investigating the responses and effects of recipients who are exposed to negative stereotypes about their group. This includes the selective exposure to media stimuli under stereotype threat (Luong & Knobloch-Westerwick, 2016). Although our meta-analysis could not capture the complex interplay between media effects and media exposure (cf. Slater, 2007; 2015), we believe our work provides an important contribution to assessing the validity of the stereotype threat framework.

Stereotype threat more generally, and media-generated stereotype threat specifically are certainly not the only sources of achievement gaps, and the overall effect observed in our meta-analysis is small to moderate in size. That said, we believe that the effect is substantially larger than zero and well-established by current standards of research in the social sciences. Showing that stereotypes in the media negatively affect members of non-White groups (such as Latino Americans) corroborates the notion that the true capabilities of many members of stigmatized groups are underestimated. We suggest that journalists, TV producers, scriptwriters, comedians, YouTubers, and everyone else who may or may not communicate stereotypes to large audiences should be knowledgeable about stereotype threat. Moreover, raising awareness of media-generated stereotype threat effects among recipients could be a way to reduce the detrimental effects (Schmader et al., 2015), as knowledge about stereotype threat was found to decrease its impact (e.g., Johns, Schmader, & Martens, 2005).

Directions for Future Research

The effects were larger for disidentification and career preferences than for cognitive performance as the dependent variable. However, the primary studies were one-shot experimental studies, and therefore, actual career choice (such as the decision for or against a STEM major for women) could not be assessed. Future studies are encouraged to provide additional evidence on the link between media stereotype exposure and actual career trajectories using longitudinal designs. Second, studies that were based on advertising material as experimental stimuli yielded larger effects than news or entertainment fare. Possibly, stereotypes in advertising elicit more negative emotions and cognitions as well as related stress, because stereotyped individuals despise stereotypes about their group in advertising more than stereotypical reports in news (which might be perceived as the unbiased reporting of statistics), or stereotypes in entertainment, in which humor could mitigate negative responses. This hypothesis, however, is still to be tested empirically.

We envisage the role of humor as a major topic of future research. Much of the stereotypical content in entertaining media fare arguably involves a humorous notion (even if the product is not a comedy in a formal sense). The role of humor is currently not well understood in this field. The tongue-in-cheek communication in humorous scenes imparts that the sender of the message distances him or herself from the content. Recipients may consider that no protagonist or media professional involved actually believes in the stereotype, which could alleviate the threat response. Moreover, humor could increase the ability to cope with stereotypic content. Prior research suggests that individuals who respond with cheerfulness in a range of situations, that is, those who score high on sense of humor measures, responded less anxious in stressful situations (e.g., Kuiper, Martin, & Olinger, 1993). This included a study in which coping sense of humor was associated with less anxiety and better performance in a potentially threatening situation in which women were informed that an upcoming test was diagnostic of mathematical ability, and that it had shown gender differences in the past (Ford, Ferguson, Brooks, & Hagadone, 2004). Unlike other mechanisms to cope with a threatening situation, humor may effectively alleviate the imposed stress response (cf. Freud, 1905/1960). As humorous stimuli increase the likelihood of a humorous response, threat effects could be reduced or even diminished when the stereotype is communicated in a humorous way (cf. Geisler & Weber, 2010). We believe that empirical research focusing specifically on the effects of disparagement humor on members of the groups made fun of is an important avenue for future research.

More generally, little is known about the particular features of presentation and content that increase or decrease the influence of stereotypical portrayals. This is a key research direction, as stereotype-consistent media presentations might not be avoided (e.g., presenting results on racial achievement gaps in the news, women doing household chores). Future research is encouraged to investigate ways of showing stereotype-consistent information and characters that do not lead to negative effects. Prior research on abilities, for example, shows that framing abilities as malleable, with a potential to grow, can improve the achievement of students (Dweck, 2000).

Stereotype threat theory and research is rooted in questions of achievement and performance differences at schools and universities (cf. Steele, 2010). Some available research suggests that the stress elicited by being exposed to negative stereotypes could affect stereotyped group members more broadly (Inzlicht, Tullett, & Gutsell, 2012; Lewis & Sekaquaptewa, 2016); the effects could spill-over to domains and behaviors which are not stereotyped. Inzlicht and Kang (2010), for example, found that women under threat of underperforming in a math test responded with greater hostility and ate more unhealthy food, compared with women in a stereotype-neutralizing group. These spill-over effects of threat-induced stress are difficult to explain from a priming perspective, providing additional evidence for the difference between both psychological processes. Based on these results, it is not far-fetched to assume that media stereotypes of low achievement could be accountable for lower health and higher conduct problems among some non-White ethnic and racial group members – even if health or aggression were not included in the stereotypical portrayal. Clearly more research on potential spill-over effects is needed.

Our second meta-analysis showed that the negative effects of stereotypic portrayals do not extend to non-stereotyped individuals. The meta-analytic findings tend to support the stereotype lift hypothesis, suggesting that non-stereotyped individuals engage in social comparisons with members of negatively stereotyped groups, leading to higher self-efficacy and improved performance (Walton & Cohen, 2003). This effect

highlights the differences between media-elicited stereotype threat on the one hand and media priming on the other. Based on the latter framework, Appel (2011) argued that whenever individuals are deeply immersed or transported into the world of a well-crafted story, recipients tend to activate traits similar to those displayed by main characters and act accordingly – rather than comparing themselves with the protagonist (see also Sestir & Green, 2010; Richter et al., 2014). Possibly, processes of empathy and identification can lead to underperformance, even if a negative achievement stereotype is associated with a character that does not belong to the recipient's gender, age, or ethnicity. Future studies need to provide further evidence on the circumstances under which media portrayals lead to behavior that is in line with or opposite to the attributes of the main characters.

Finally, this work focused on media products as the source of detrimental effects for negatively stereotyped groups. Mass media, however, might as well have positive effects on stereotyped individuals. Presenting positive role models instead of stereotypical depictions could be a straightforward implication, but additional research is needed to better understand when positive role models yield positive effects, when role models yield no effect, and when backfire effects occur (e.g., Aronson, Jannone, McGlone, & Johnson-Campbell, 2009; Ferguson, 2012; Mastro & Tukachinsky, 2011; McKinley, Mastro, & Warber, 2014; Ramasubramanian, 2011, 2015; cf. Leavitt, Covarrubias, Perez, & Fryberg, 2015). Moreover, negative effects of stereotypes can be buffered by increasing self-affirmation (Martens, Johns, Greenberg, & Schimel, 2006), and some forms of media use have been associated with increases in self-affirmation. Activities on Social Networking Sites, such as Facebook, were connected to heightened feelings of self-worth and self-integrity (e.g., Toma, 2013). We expect future research to explore the potential of media communication to alleviate the detrimental effects of negative stereotypes, helping to close the achievement gaps in societies around the world.

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* Study included in the meta-analysis

Online-Supplement for

Do mass mediated stereotypes harm members of negatively stereotyped groups? A meta-analytical review on media-generated stereotype threat and stereotype lift

Journal: Communication Research

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Table S1

Primary Studies and Details on Media Stimuli

Study No.	Study	Stereotyped group	Media Stimuli
1.	Appel, 2012	Immigrants	Poster ads: included anti-immigrant ads of a radical right party (high threat) vs. neutral ads of more centrist parties (low threat)
2.	Appel et al., 2011, Study 2	Women	News articles: On the uniqueness of women (high threat) vs. there are no gender differences researchers found (low threat)
3.	Barber & Mather, 2013, Study 1a	Older adults	News articles: described research on memory decline with age (high threat) vs. research on preservation and improvement with age (low threat)
4.	Barber & Mather, 2013, Study 1b	Older adults	News articles: described research on memory decline with age (high threat) vs. research on preservation and improvement with age (low threat)
5.	Ben-Zeev et al., 2012 [a]	Men	Video clips: excerpt of *Bandits* showing a blatant male withdrawal from an emotionally charged conversation (blatant threat) vs. excerpt of *Bullit* showing a subtle withdrawal (subtle threat) vs. excerpt of the neutral control *Reptiles and Amphibians* (low threat)
6.	Bond, 2016[b]	Women	Video clips: Three out of five clips portrayed girls stereotypically (excerpts from *JINX*, *Sadie J*, *Life With Boys,* high threat), portrayed girls in counter-stereotypical activities (related to robots and rockets, *Ask an Astronomer*, *Smart Girls at the Party*, *Head Rush*), or neutral clips only (control).
7.	Cheryan et al., 2013	Women	News articles: reported that computer science continues to be dominated by geeks (high threat) vs. is no longer dominated by geeks (low threat)
8.	Davies et al. 2002, Study 1	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. counter-stereotypical commercials (low threat)
9.	Davies et al. 2002, Study 2	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. only neutral commercials (low threat)
10.	Davies et al. 2002, Study 3	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. only neutral commercials (low threat)
11.	Davies et al., 2005, Study 1	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. only neutral commercials (low threat)
12.	Davies et al., 2005, Study 2	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. only neutral commercials (low threat)
13.	Ellithorpe et al., 2015	Women	Video games: sexualized (high threat) vs. non-sexualized female avatar (low threat)
14.	Fischer, 2016 [a]	Women	Video clips: excerpt of *Clueless,* which portrays females as stupid (blatant threat) vs. excerpt of *Housebunny* showing females in a sexualized manner (subtle threat) vs. excerpt of the non-stereotypical control *Cinderella Story* (low threat)
15.	Gaillard et al., 2011 [b]	Older adults	News articles: older drivers portrayed as bad drivers (high threat) vs. good drivers (low threat)
16.	Ganley et al., 2013, Study 1	Women	Videos portraying a scientist: math intelligence is fixed and women have lower natural ability (high threat) vs. math intelligence is fluid and women have equal natural ability (low threat)
17.	Good et al., 2010	Women	Three photos accompanied a study text: male scientists only (high threat) vs. mixed-gender group (low threat)

18.	Gupta & Bhawe, 2007	Women	Fictitious news articles: describing entrepreneurs as having masculine attributes (high threat) vs. gender-neutral attributes (low threat)
19.	Gupta et al., 2008 [a]	Women	Fictitious news articles: describing entrepreneurs as having masculine attributes (high threat) vs. gender-neutral attributes (low threat)
20.	Gupta et al, 2014, Study 1	Women	Fictitious news articles: describing entrepreneurs as having masculine attributes (high threat) vs. gender-neutral attributes (low threat)
21.	Gupta et al, 2014, Study 2	Women	Fictitious news articles: describing entrepreneurs as having masculine attributes (high threat) vs. gender-neutral attributes (low threat)
22.	Hess et al., 2003	Older adults	Newspaper report that related old age to lower memory performance: report presented (high threat) vs. not presented (low threat)
23.	Ihme & Mauch, 2007	Women	TV commercials: included gender-stereotypical commercials (high threat) vs. only neutral commercials (low threat)
24.	Latsch & Hannover, 2014, Study 2	Men	Newspaper articles: describing the scholastic underperformance of boys ("Smart girls, dumb boys", high threat) vs. neutral article (low threat)
25.	Oswald & Harvey, 2000-2001 [c]	Women	Cartoon that showed a girl struggling with an easy math problem, while a boy is solving a more difficult math problem: cartoon presented on wall facing participant (high threat) vs. not presented (low threat)
26.	Prasad, 2011	Women	Slide show of print advertisements: included gender-stereotypical slides (high threat) vs. neutral slides only (low threat)
27.	Richman et al., 2011 [d]	Women	Video clips: advertisement for a fictitious academic conference which was male-dominated (high threat) vs. gender-balanced (low threat)
28.	Rivadeneyra, 2001	Latino/a Americans	Clips from popular TV shows: depicted Latino/as in stereotypical roles and showed stereotype of low intelligence (high threat) vs. non-stereotypical content (low threat)
29.	Scott, 2012	African Americans	Video clips: excerpt of *Menace II Society,* which takes place in a poor, violent, predominantly Black, drug-infested neighborhood (high threat) vs. excerpt of neutral control *Spongebob Squarepants* (low threat)
30.	Simon & Hoyt, 2013, Study 2	Women	Print magazine advertisements: ads pictured women in gender-stereotypical roles (high threat) vs. women pictured in non-stereotypical roles (low threat)
31.	Volkmar, 2015	Women	Comedy clips: video excerpt of gender-stereotypical comedy by *Mario Barth* (high threat) vs. non-stereotypical comedy by *Luke Mockridge* (low threat)
32.	Weber et al., 2015, Study 1[a]	Immigrants	Fictitious news article: reported on successful students with explicit threat cues (explicit threat) vs. subtle threat cues (subtle threat) vs. neutral control article on irrelevant topic (low threat)
33.	Westerhof et al., 2010 [e]	Older adults	TV advertisements: portraying older characters as warm and incompetent (high threat) vs. warm and competent vs. cold and competent

Notes. [a] Control group vs. combined effect of experimental groups blatant and subtle. [b] Promotion and prevention group combined, control and counter-stereotype groups combined. [c] Removed and non-removed conditions combined. [d] Subgroups combined. [e] Subsample who self-identified with old people. Warm incompetent group vs. combined effect of warm competent and cold competent group.

Table S2

Effects of Media Stereotypes: Stereotype Threat and Stereotype Lift

			Average Effect				Heterogeneity				Tau-statistics		
	No. of Studies	N	*Effect Size (d)*	SE_d	95% *CI*	*p*	*Q*	*Df (Q)*	*p*	I^2	τ^2	*SE*	τ
Stereotype Threat													
Fixed Effects Model	33	1831	-0.344	0.048	[-.438; -.250]	< .001	49.013	32	.028	34.711	.041	.030	.201
Random Effects Model	33	1831	-0.377	0.061	[-.497; -.257]	< .001							
Stereotype Lift													
Fixed Effects Model	12	589	0.167	0.085	[.001; .333]	.048	15.460	11	.162	28.851	.036	.053	.189
Random Effects Model	12	589	0.169	0.103	[-.034; .371]	.103							

Figure S1

Media-generated stereotype threat: Forest plot of the study effects and confidence intervals

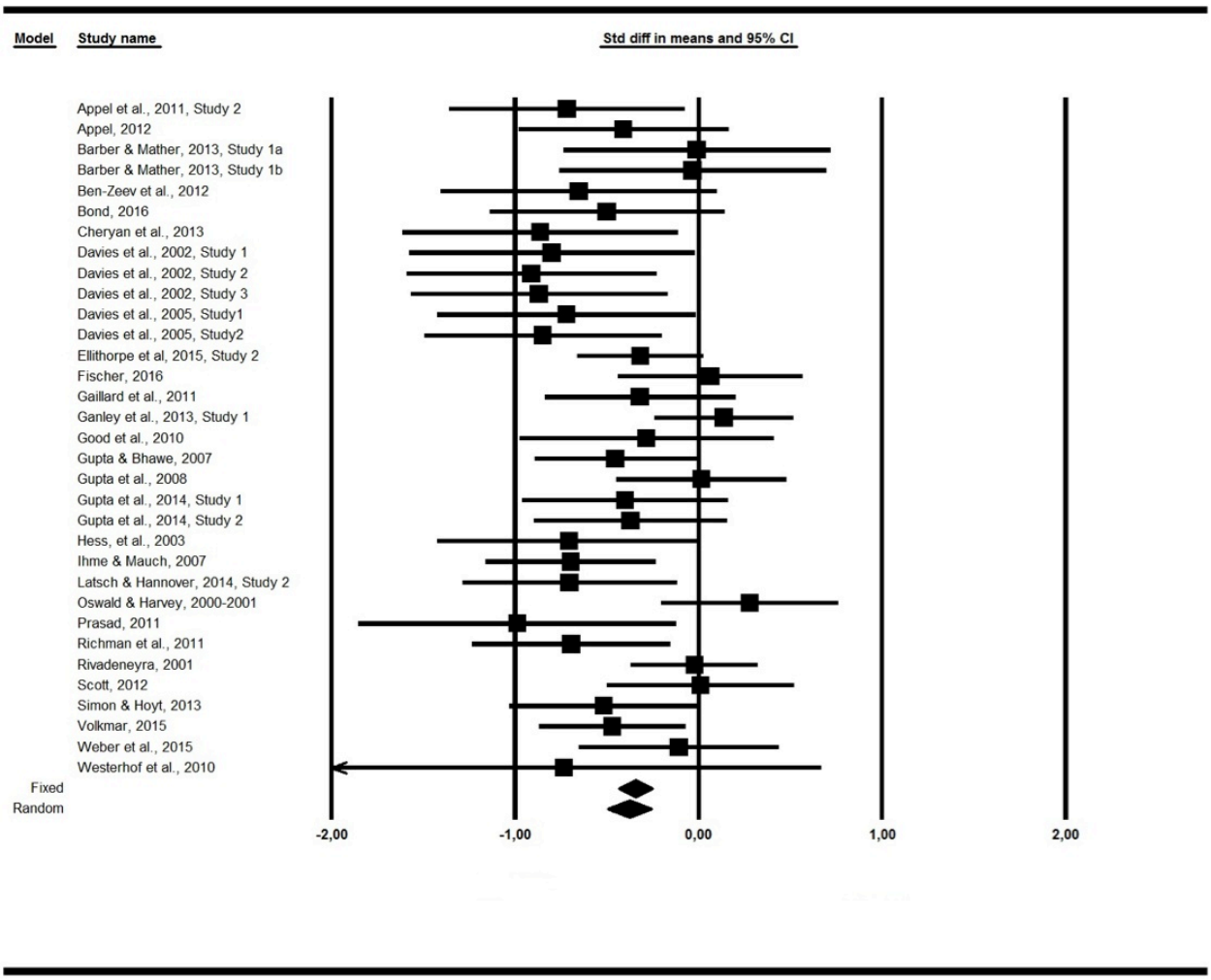
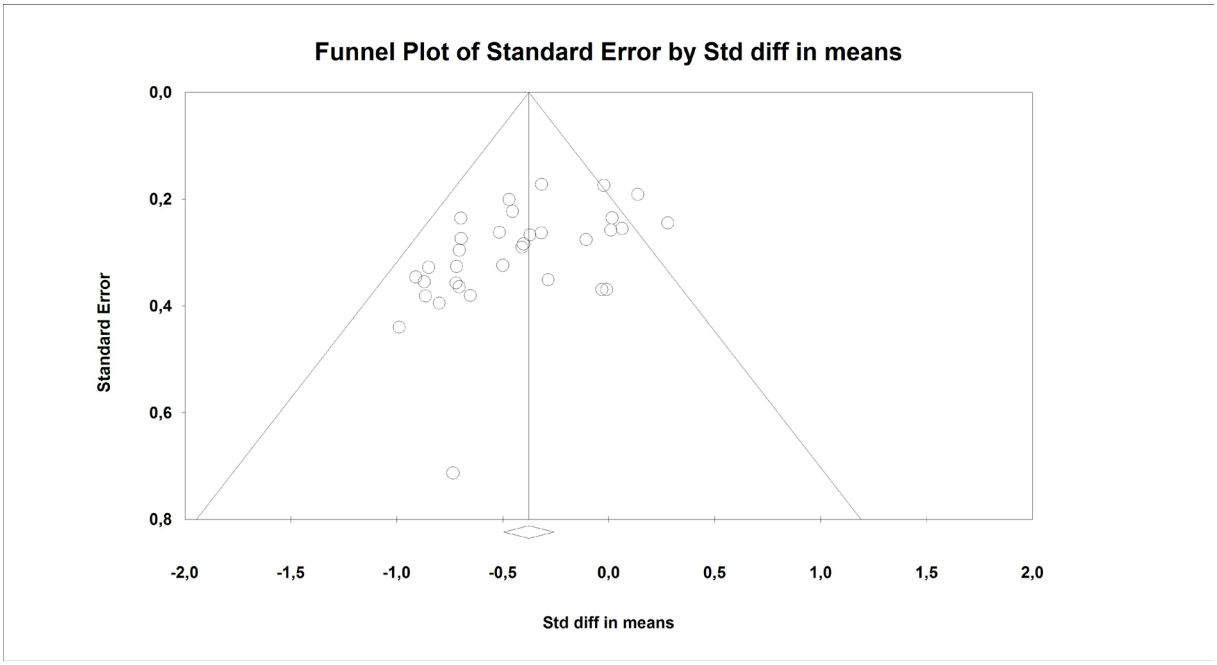


Figure S2

Media-generated stereotype threat: Funnel plot



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