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Interethnic weak ties online and out-group attitudes among Dutch ethnic majority adolescents

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ABSTRACT
Interethnic contact is essential to move past out-group prejudice. However, prior work on the relationship between interethnic contact and out-group attitudes mostly considers core social ties. Here, I consider ethnic majority adolescents' interethnic weaker ties. To do so, I embrace a key feature of adolescent contemporary social life: they overwhelmingly maintain relations online that snapshot hundreds of ties. Using a combination of survey data among Dutch ethnic majority adolescents and linking this with information on their large circle of online contacts, I study whether and to what extent interethnic weak ties online correlate with out-group attitudes. I conjecture and find that interethnic contacts online correlate to less-negative out-group attitudes. Yet, there is a diminishing return for interethnic contacts on less-negative out-group attitudes. These patterns are carried by the Dutch majority's out-group contacts with Turkish and Moroccan backgrounds. I discuss the implications of these results and suggest directions for future research.

Introduction

A vehicle to overcome negative ethnic out-group attitudes are positive interethnic interactions (Allport 1954; Pettigrew and Tropp 2006; Pettigrew *et al.* 2011). Moving past negative ethnic out-group attitudes is crucial for social cohesion in contemporary, increasingly multiethnic societies (Castles *et al.* 2013). Overcoming ethnic prejudice by a country's

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ethnic majority, for instance, may be key for minorities with a migration background to be more fully accepted and to successfully integrate (Berry 2001). In turn, this promotes socio-economic opportunities for ethnic minorities (Blommaert et al. 2013) and may reduce intergroup conflict. As such, interethnic contact can help glue societies together into more-resilient and cohesive wholes (Skvoretz 2013).

Adolescence in particular is a period in which out-group attitudes are formed and cemented (Alwin and Krosnick 1991; Wölfer et al. 2016). Yet, research consistently shows that especially ethnic majority adolescents' closest social ties are intra- instead of interethnic (Mouw and Entwisle 2006; Vermeij et al. 2009; Currarini et al. 2010; Smith et al. 2014; Hofstra et al. 2017). This presents a conundrum: for adolescents of an ethnic majority it is difficult to reduce negative ethnic out-group attitudes through their closest relationships, because these core social ties hardly span any ethnic boundaries.

Adolescents' contemporary social lives, however, offer alternative routes to interethnic contact that are meaningful to consider. Specifically, adolescents overwhelmingly adopted social network sites when these platforms rose to prominence during the last decade (Hofstra et al. 2016a).[1] Social network sites such as Facebook are web-based communication platforms where individuals construct a uniquely identifiable (semi-)public profile (see Ellison and Boyd 2013). On these platforms, adolescents form and maintain hundreds of their social ties, thus opening up new windows into their wider social circles (Hofstra et al. 2021). Online ties can be defined as the other users that individual members articulate in a list on their profiles. This provides opportunities for the study of interethnic contacts and out-group attitudes among adolescent ethnic majority members that moves beyond close – mostly intra-ethnic – social ties. This is what motivates the premise of this study. I set out to study whether and to what extent interethnic contacts online correlate with ethnic majority adolescents' ethnic out-group attitudes.

To the best of my knowledge, there is little research about large numbers of interethnic ties online and their relationship to ethnic out-group attitudes. There are studies, however, that may indirectly proxy interethnic weaker tie contacts by considering individuals' opportunity spaces for social contact. Often scholars consider the (relative) sizes of different ethnic groups in school classes, schools, neighborhoods, or

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[1]About 95% of Dutch adolescents were Facebook members in 2014 (Hofstra et al. 2016a). Facebook itself claims that the average user spends approximately 50 minutes per day on the platform (Hofstra 2017).

regions (e.g. Bekhuis *et al.* 2013; Janmaat 2014; Savelkoul *et al.* 2017; Bubritzki *et al.* 2018). These studies find support, no support, or counter-support of reducing negative out-group attitudes through such opportunity spaces for interethnic contact (support: Van Geel and Vedder 2010; Janmaat 2014; Bubritzki *et al.* 2018; no support: Kokkonen *et al.* 2010; Bekhuis *et al.* 2013; countersupport: Vervoort *et al.* 2011; Savelkoul *et al.* 2017). Whether or not these contexts proxy the relationship between interethnic contact beyond core ties and out-group attitudes remains elusive. As such, we know little how broader circles of interethnic contacts relate to ethnic out-group attitudes. Against this backdrop, there are two contributions – an empirical and substantive one – I make to the literature by studying the relationship between interethnic weak ties online and ethnic out-group attitudes among ethnic majority members.

Empirically, online networks of adolescents shed light onto interethnic contacts among a broad circle of their *weaker ties* and weaker ties' relationship with attitudes. Early research on the Internet argued that online spaces would potentially open up a vista of social opportunities that were 'intrinsically unlimited in size' (Dunbar *et al.* 2015: 39), such that online space could become pathways to diverse networks that potentially overcame offline boundaries and viewpoints. Recent empirical work, however, challenges such popular beliefs. This line of work theoretically and empirically shows that the typical online network seems to proxy larger sets offline ties (e.g. Mayer and Puller 2008; Wimmer and Lewis 2010; Van Zalk *et al.* 2014; Hofstra *et al.* 2017; Hofstra *et al.* 2021).

Accordingly, I assume that online social networks snapshot interethnic contacts among hundreds of offline weaker ties.[2] Advantages of considering these online networks vis-à-vis, for instance, network contacts measured via more-traditional methods, are that they are less restricted to specific (friendship) contexts, less prone to network recall biases (see Brashears *et al.* 2016; Hofstra *et al.* 2021), and less susceptible to social desirability biases (see DiPrete *et al.* 2011: 1272). The focus on interethnic contacts online allows scholars to move beyond the usual core ties which are likely to be intra-ethnic among Dutch majority adolescents. This focus also enables the study of majority's interethnic weak ties and their relationship with out-group attitudes towards several distinct ethnic minority groups. By exclusively considering core ties, this would

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[2]Usually, weak ties are defined as those social relationships that do not involve much time, intimacy, emotional intensity, or reciprocal services (Granovetter 1973: 1361).

be challenging as these likely hardly vary by ethnicity. If there are only three best friends (likely intra-ethnic), it is difficult to study how relationships among *different* ethnic out-groups relate to prejudice towards those specific out-groups. As such, I contribute to prior work by studying interethnic *weak* ties, which allows me to contribute a study of interethnic weak ties among *several* out-groups and their associations with outgroup attitudes.

I also substantively consider the relationship between interethnic contacts among weaker ties online and out-group attitudes. It is surprising that prior work hardly studied this relationship, because weaker ties are often argued to be instrumental to many sociologically relevant outcomes. For instance, weak ties are instrumental in network diffusion dynamics and social capital extracted from networks (Granovetter 1973; Aral 2016), labor market outcomes (Lin 1999), and health, wellbeing, and social support (Holt-Lunstad *et al.* 2010). As such, it seems only reasonable to study out-group attitude formation in relation to weaker ties as well, particularly because there are substantive, theoretical grounds to argue that they are connected. I will briefly discuss prior work on both social network formation (e.g. Blau 1977; Feld 1981; McPherson *et al.* 2001) and intergroup contact theory (Allport 1954). Such a combination is helpful as it considers a fuller range of dynamics underlying intergroup contact and attitude formation (see Wölfer and Hewstone 2017). It also helps putting qualifications on factors that *prohibit* intergroup contact's influence on out-group attitudes (see Pettigrew and Tropp 2006). I specify which assumptions from these theories are or are not necessary to connect online interethnic weak ties to out-group attitudes. As such, I lay out why and in what way online interethnic weak ties may correlate with out-group attitudes among Dutch ethnic majority adolescents.

To achieve these aims, I make use of a survey of Dutch adolescents, which includes detailed measures on out-group attitudes in 2014 (Kalter *et al.* 2015; Jaspers and Van Tubergen 2014). Uniquely, I link these data with adolescents' interethnic contacts among on Facebook that capture hundreds of these adolescents' friends (Hofstra *et al.* 2015). This linkage combines advantages of both survey data (indepth measures of attitudes) and digital trace data (capturing large networks without recall issues) (Hampton 2017). Note that in the study of out-group contacts and attitudes it is often challenging to establish causality. Likewise, the design of this study does not allow for strict causal tests between out-group contacts and attitudes. This study is

an intermediate step between studies on out-group core ties and attitudes on the one hand, and future study designs that can establish more-causal claims between out-group weak ties and attitudes on the other. Yet, this study is among the first to theorize about and empirically unveil (the nature of the) associations between interethnic weak ties and out-group attitudes. In what follows, I first discuss theories on social tie selection and intergroup contact theory and derive the main conjectures. I then introduce the empirical site, describe the analytical setup, and test these conjectures.

Theory

The genesis of (weak and strong) social ties

Two key mechanisms for the genesis of social ties are opportunity structures that potentially enable or constrain tie selection and the homophilous selection of ties.[3] Structural opportunities are crucial in the formation of weaker social ties (e.g. Wimmer and Lewis 2010; Hofstra et al. 2017). Such opportunities are roughly captured by two distinct (but interrelated) dimensions: relative group sizes in a population (Blau 1977) and social foci (e.g. workplaces, organizations, etc., Feld 1981). Opportunities for interethnic contact reflect the distributions of ethnic groups in a given population. For instance, when a population consists of 30% minority and 70% majority members, individuals' networks will tend to gravitate towards that distribution – i.e. out-group size fosters out-group contact (Savelkoul et al. 2015). Additionally, individuals participate in and form relationships in foci (Feld 1981). Foci are shared spaces 'around which joint activities are organized' (Feld 1981: 1016). Typical examples of foci are sport clubs or schools; places in which people share positive interactions that enable them to first form and then maintain social relationships. Because foci themselves are often segregated by ethnicity or race – i.e. individuals choose and spread non-randomly over these foci – outgroup contact is affected by the structural characteristics of foci.

Yet, the combination of such processes does not solely capture the genesis of social ties. Within an opportunity set for contacts or within foci, individuals often select those that resemble them. This is captured

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[3]I am aware that there are many other mechanisms – e.g. structural network mechanisms such as balance, third party effects, etc. – that explain relationship formation (in interaction with other mechanisms), but I do not elaborate on these here for brevity and parsimony.

by the micro-mechanism of homophily: a *preference* of individuals to form ties with similar others along some characteristic (e.g. ethnicity, gender, etc.) (Lazarsfeld and Merton 1954; Byrne 1971; McPherson *et al.* 2001). This is either caused by a shared identity and an inherent need to sort oneself and others into distinct social categories (Tajfel 1974; Turner 1975) or by lower costs for social interaction with similar rather than dissimilar others through shared norms, culture, beliefs, and informal fit (Kalmijn 1998; Windzio and Bicer 2013).

The dynamic interplay between relative group sizes, how these groups select and spread over foci, and what contacts individuals prefer causes networks to be ethnically hetero- or homogenous. Such a perspective on network composition brings into focus the link between macro- (relative group-sizes), meso- (foci), and micro-mechanisms (homophily) in weak and strong tie formation. Larger sets of weak ties likely reflect the structural features of meeting opportunities. Essentially, most (non-kin) social ties start as weaker ties, for instance by meeting someone at work for the first time. Over time, some of these ties will then transition into stronger bonds. Individuals arrive at social situations with group-specific norms and habits, and when those are shared, social ties grow stronger. Hence, weaker ties characterized by dyadic similarity (e.g. co-ethnic pairs) are more likely to transition into stronger ties as time proceeds: shared socialization experiences enable easier interaction (Kalmijn 1998). Additionally, those stronger ties that are characterized by dyadic *dissimilarity* are broken off more frequently (Smith, *et al.* 2012). In sum, opportunity spaces affect what weaker tie networks look like, and from that set of weaker ties individuals will prefer to interact more often with those that look like them. As such, stronger ties – if the opportunity set permits it – are more homogenous than weaker ties (Hofstra *et al.* 2017).

Interethnic contacts and interethnic attitudes

Intergroup Contact Theory (Allport 1954) offers an instrumental toolkit to explain ethnic prejudice. The main premise of intergroup contact theory is that interaction between different social groups, under a set of favorable conditions, can effectively reduce out-group prejudices or negative out-group attitudes. This is because it can enhance intercultural understanding and mitigates unfounded negative opinions of out-group members (Allport 1954). The favorable conditions for positive out-group contact are usually specified as the distinct groups having

(a) equal status, (b) common goals, (c) intergroup cooperation, and (d) formal support.

Meta-analyses of this proposition among a myriad of different samples, from a wide variety of contact settings, and capturing various forms of social contact, generally show support for the contact theory proposition (Pettigrew and Tropp 2006; Zhou et al. 2019). Interestingly, Pettigrew and Tropp (2006) find empirical support for a positive relationship between out-group contact and lower levels of negative out-group attitudes even in the absence of some of the specified conditions for optimal contact. Even though the inclusion of such conditions generally provides stronger support for the contact hypothesis, it facilitates the relationship rather than being a necessary requirement (Schlueter and Scheepers 2010; Janmaat 2014).

Interethnic contacts online and interethnic attitudes

How do interethnic contacts among weaker ties online relate to interethnic attitudes? The base expectation derived from contact theory would hypothesize that more out-group contacts among weaker ties relates to less-negative out-group attitudes, facilitated by but not conditional on intergroup contact theory's favorable conditions. This base expectation extends prior findings on the relationship between interethnic core ties and out-group attitudes.

There are several ways in which such a relationship comes about. One mechanism is rooted in the assumption that online *contacts* strongly mirror offline *contact*. As mentioned before, prior work increasingly shows that contacts on social media validly snapshot large numbers of 'real-world' weaker ties. Specifically, college students have very few Facebook contacts that are online-only contacts (Mayer and Puller 2008; Ellison et al. 2007, 2011). Among adolescents, the overwhelming majority of their Facebook ties are formed and maintained as a result of existing offline contacts (Subrahmanyam et al. 2008; Van Zalk et al. 2014). The online networks of adults are predominantly populated by family, friends, neighbors, or colleagues (Duggan et al. 2015). Additionally, offline meeting opportunities are essential to form Facebook contacts (Wimmer and Lewis 2010; Hofstra et al. 2017), which is highly similar to how offline contacts are formed. Prior work thus convincingly shows that online contacts capture many offline weaker ties. Building on this line of work by reasonably assuming that such online *contacts* strongly resemble offline *contact* and by means of intergroup contact

theory, one can conjecture that more interethnic contacts online relate to less-negative ethnic out-group attitudes (*linear exposure hypothesis*).

Note that direct offline out-group contact is not a precondition to reduce prejudice. One could posit the same conjecture even without assuming that online contacts proxy offline contact. For instance, the secondary transfer effect of out-group contact (Pettigrew 2009) argues that positive contact experiences with out-group A can relate to prejudice reduction towards out-group B even in the absence of contact experiences with out-group B (Pettigrew 2009) – e.g. Dutch majority adolescents may report lower prejudice towards those with a Turkish background even if they only had out-group contact with those of Moroccan backgrounds. Additionally, *extended* out-group contact – when friends of in-group friend are out-group members – relates to out-group prejudice reduction too (Wright *et al.* 1997; Zhou *et al.* 2019). In the context of Facebook: having more interethnic Facebook contacts may instill on majority members positive notions about their culture, habits, and norms through exposure by simply observing Facebook pages and feeds and observing ethnic out-group Facebook contacts' posts. This is not unlike negative (or positive) media exposure to out-groups that can increase (or reduce) prejudice (Van Klingeren *et al.* 2015; Boer and Van Tubergen 2019). This study does not empirically distinguish between online contacts and offline contact (as detailed later on) and does not distinguish these mechanisms. Yet, both (interdependent) dynamics lead to the same conjecture: more ethnic out-group members in online networks correlate to less-negative ethnic out-group attitudes.

One way to unbox a mechanism explaining interethnic weak ties online and their relationship with out-group attitudes is by looking explicitly at different numbers of ethnic out-group friends among ethnic majority adolescents. Approximately 79% of the Dutch population consists of ethnic majority members (Statistics Netherlands 2015). Ethnic majority adolescents are thus overrepresented in many opportunity spaces and are often surrounded by intra- and not interethnic others. They have many opportunities to homophilously choose ties, leading to many intra-ethnic social ties (see Hofstra *et al.* 2017). Given that ethnic majority members are so often surrounded by intra-ethnic friends, the exposure effect of interethnic contacts to reduce negative out-group attitudes may be strong among those with few interethnic contacts but gradually diminish as that number grows. Specifically, in situations with few interethnic contacts, there is a lot to learn about dissimilar others' habits, norms, and cultures, and each additional out-

group contact will strongly help with that. But with increasing interethnic representation in networks, majority members may find less and less to learn, such that the exposure bonus for positive contact to reduce negative out-group attitudes becomes increasingly smaller. As such, I conjecture that there is a diminishing return for interethnic contacts on less-negative out-group attitudes as the number of interethnic contacts increases (*diminishing returns hypothesis*). Note that both conjectures (linear exposure versus diminishing returns) cannot be true simultaneously. I explore which of the two will be most supported by the data.

Data

I use data on Dutch adolescents, titled 'Children of Immigrants Longitudinal Survey in the Netherlands' (CILSNL) (Jaspers and Van Tubergen 2014). This is a follow-up survey to a larger survey project, which is titled 'Children of Immigrants Longitudinal Survey in Four European Countries' (CILS4EU) (Kalter *et al*. 2015). I use the third (CILS4EU) and fourth (CILSNL) wave because information from these waves were used to collect Facebook data. Starting in 2010, 14–15-year-old adolescents were surveyed for seven consecutive years with a one-year time lag.[4] These data include measures on individual characteristics, attitudes, and so forth. The data are stratified by the proportion of non-Western immigrants attending schools. Within these strata, schools were selected with a probability proportional to the school size using the number of students at the relevant educational track level.

In wave 1 (2010–2011), two school classes were sampled randomly within schools, resulting in 4963 participating respondents.[5] Classroom composition changes are common in the Netherlands, so some pupils from the first wave could be distributed among different classes at the onset of the second wave. To ensure that wave 1 pupils also participated in wave 2 (2011–2012), schools were asked to participate with all of the classes that wave 1 respondents were attending, even though they could be placed in new classes. Therefore, 2118 new students were

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[4]The project started out as a three-year project under the CILS4EU heading and continued under the CILSNL heading for four additional years. Throughout these two projects, waves of data collection are counted sequentially, where the first wave of the CILS4NL is considered the *fourth* wave as the adolescents were already surveyed three times under the CILS4EU header.
[5]Six hundred pupils in the first CILS4EU were not part of the sampling frame because some schools wanted to participate with more than the two randomly drawn classrooms. This yields a *random* sample of 4363 pupils in wave 1. Because of attrition between waves, representativeness of the data cannot be assured. Therefore, I include all respondents in the sample for analyses, including newcomers (nonrandom) in later waves and the nonrandom sample of wave 1.

interviewed, and 3803 students who participated in wave 1 participated in wave 2 as well (76.6%, N_{WAVE2} = 5921). Similar changes occurred between waves 2 and 3 for those still in high school (yet on a smaller scale). In wave 3 (2012–2013), 4272 (N_{WAVE3}) respondents participated, of which 3722 participated in wave 2 (87.1%). In wave 4 (2013–2014, first year the survey continued as the CILSNL), 4072 (N_{WAVE4}) respondents participated, of which 3613 had also participated in wave 2 (88.7%). The code used to generate the variables, run the analyses, and generate the figures and the descriptions of the code and data (including repository links) is found on SocArxiv (https://osf.io/sv7tq/).

The Dutch Facebook survey

These Dutch survey data are crosslinked to unobtrusive, behavioral data from Facebook using the Dutch Facebook Survey (DFS) (Hofstra *et al.* 2015). The DFS was collected in the summer of 2014. Of the 4864 respondents that indicated Facebook membership in waves 3 (2012–2013; N = 3423) or 4 (2013–2014; N = 3595) of the CILS surveys, 4473 (92%) were tracked on Facebook ($N_{FACEBOOK}$). For those respondents with a *public* friend list, we downloaded their *Facebook friend lists* (N = 3374; 75.4% of all tracked respondents on Facebook). These friend lists are the prime focus of this study.[6] The social relationships within these lists are a consequence of members on Facebook that send out 'friendship' invitations to other Facebook members. If these other members choose to accept such invitations, contacts in these lists depict undirected and 'reciprocated' (the contact invitation is accepted) ties between two Facebook members. As such, social ties depicted in these lists are indistinguishable with regard to tie strength (Lewis *et al.* 2008).

Sample selections

This study considers adolescents with a Dutch ethnic background – i.e. whose biological parents are both born in the Netherlands. Such classifying of ethnicity based on biological parents' birth countries is standard practice in research on Dutch ethnic groups (e.g. Vermeij *et al.* 2009; Statistics Netherlands 2012). In wave 4 3030 (~74%) and in wave 3 3160

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[6]The collection of these Facebook data and its use for scientific purposes were approved by an internal ethical review board for the social and behavioral sciences.

(~74%) Dutch ethnic majority respondents participated. In wave 4, I can potentially analyze $N = 2190$ cases; these are Dutch ethnic majorities participating in wave 4 and whose Facebook friend list was public (see Hofstra *et al.* 2016b). I report descriptive statistics for those Dutch ethnic majority adolescents who participated in wave 4 *and* who have a public Facebook friend list (*and* who participated in wave 3 when I relate them to metrics from that wave). For the cross-sectional inferential analyses, I exclude cases with missing values on variables (~7%). For the longitudinal analyses (detailed later), I can potentially analyze $N = 1793$ cases; these represent Dutch ethnic majorities participating in both waves 3 and 4 and whose Facebook friend lists was public. Here I also exclude cases with missing values leading to ~14% to 25% item non-response depending on the dependent variable I consider. In the longitudinal analyses this item non-response mostly results from combining waves 3 and 4 and their associated out-group attitude variables. Appendix A details a series of missing data analyses depicting these patterns; some of the results may be skewed towards those who have more out-group contacts online. Yet, selectivity analyses show that out-group attitudes of majority members did not vary between those who did or did not have a public Facebook friend list nor between those who were and were not included in the DFS. As such, out-group attitudes of ethnic majorities do not seem to relate to the Facebook sample selection procedure. Table 1 shows the inclusion criteria among the respondents for the analyses in this study.

Measures

Dependent variables – ethnic out-group attitudes

To measure Dutch ethnic majority's *negative out-group attitudes*, I use the commonly used and validated 'feeling thermometer' (Bobo and

Table 1. Inclusion criteria for the analyses among Dutch ethnic majority adolescents.

	Observations
Inclusion in descriptive and cross-sectional inferential analyses:	
W4 of the CILSNL ($N = 3030$)	
Public friend list on Facebook ($N = 2672$)	
Number of observations meeting these criteria	2190
Inclusion in longitudinal inferential analyses:	
W4 of the CILSNL ($N = 3030$)	
W3 of the CILS4EU ($N = 3160$)	
Public friend list on Facebook ($N = 2672$)	
Number of observations meeting these criteria	1793

Zubrinsky 1996; Alwin 1997; Bubritzki *et al.* 2018). In waves 3 and 4, respondents were prompted with the following question:

> Please rate how you feel towards the following groups in the Netherlands on a scale from 0 to 100. The higher the number, the more positive your feelings towards that group. The lower the number, the more negative your feelings towards that group.

Respondents then rated on a scale, ranging from 0 (negative) to 100 (positive) in 10-point intervals, how positively they felt towards those of Turkish, Moroccan, Dutch Antillean, and Surinamese ethnic backgrounds. The survey question thus contained 11 intervals: 0–0, 1–10, … , 10–100. I reverse the scale such that higher values reflect negative attitudes toward these groups, and use the interval points rather than the nominal interval categories, thus using the 11 interval points ranging from 0 (positive) to 10 (negative).[7] I consider the *average* ethnic out-group attitudes as the mean score of these four items. Uniquely, I also consider three negative out-group attitudes separately; those towards Turks, Moroccans, and Dutch Caribbean as the number of Facebook friends allows for sufficient variation in contacts of members of each of these groups. I combine the out-group attitudes for Surinamese and Dutch Antillean as 'Dutch Caribbean' as the DFS considers these two groups combined as well. This enables to study the relation between Dutch Caribbean contacts on Facebook and attitudes towards Dutch Caribbean more accurately. Turks, Moroccans, and Dutch Caribbean are some of the largest ethnic minority groups with a migration background in the Netherlands (Castles *et al.* 2013). Reliability scores for these three items are sufficiently high (Cronbach's $\alpha_{\text{WAVE3}} = 0.878$; Cronbach's $\alpha_{\text{WAVE4}} = 0.909$).

Figure 1 depicts Dutch ethnic majority adolescents' out-group attitudes averaged for all ethnic groups combined and split by group. On average, Dutch ethnic majority adolescents rate ethnic out-groups approximately neutral with a slight skew towards 'positive' on the thermometer (wave 3 = 4.641; wave 4 = 4.603). This positive skew is largest for attitudes towards Dutch Caribbean groups (wave 3 = 4.190; wave 4 = 4.214) and is less-positive towards Moroccans (wave 3 = 5.432; wave 4 = 5.358). There is intrapersonal variation over time in out-group attitudes towards groups. Specifically, because correlations between waves

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[7] Respondents could also indicate 'I don't know that group'. Those answers were coded as missing values.
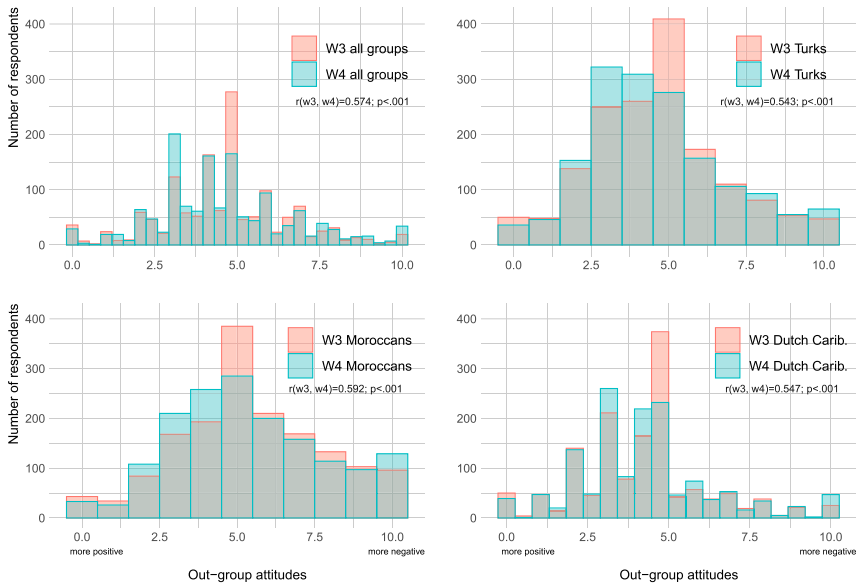
Figure 1. Dutch ethnic majority out-group attitudes on average and split by ethnic group.

Note: The number of bins vary as two of the metrics average out-group attitude across groups.

are in the range of 0.543–0.592 there seems to be sufficient variation to study the *change* in attitudes.

Independent variables – interethnic contacts on Facebook

Facebook friend lists do not directly capture the ethnic backgrounds of Facebook contacts. Therefore, I assigned Facebook contacts' ethnic background using first names through register data of the Dutch population ($N = 15,785,208$; Bloothooft and Schraagen 2011). These data contain the fraction of name carriers' fathers and mothers who were born in the ethnic migration background groups mentioned before (Turkey, Morocco, the Dutch Caribbean). By matching first names in these register data to the first names of all respondents that ever participated in any of the CILS surveys as a training dataset, I can use a pre-validated process (Hofstra *et al.* 2017; Hofstra and De Schipper 2018) to infer ethnic background of Facebook contacts. This yields an accurate indicator of Facebook contacts' ethnic background (see Appendix B for details). For each Dutch ethnic majority respondent, I measure the number of contacts on Facebook that carry a Turkish, Moroccan, or Dutch Caribbean ethnic background to capture *interethnic contacts*
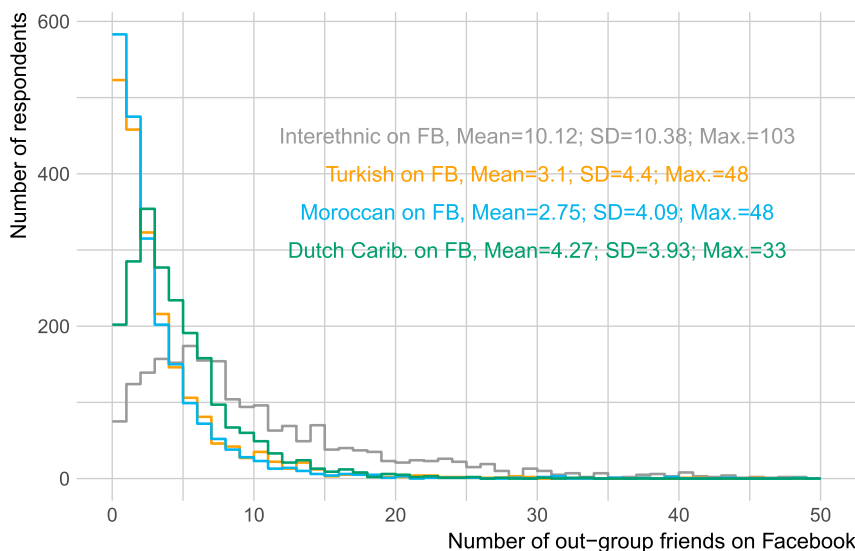
Figure 2. The number of interethnic contacts on Facebook for Dutch majority adolescents.

online. I also do this for each ethnic out-group separately. Figure 2 depicts the number of interethnic Facebook contacts of Dutch majority adolescents.

Control variables

I consider six control variables from wave 4 of the CILSNL. Interethnic *best friends* may contribute to reducing out-group prejudice, over and beyond weak tie interethnic contact. Respondents could nominate up to three best friends and then report some information about them in a 'name generator' question. Appendix C shows how little variation exists in the number of interethnic best friends. Therefore, in order to control for out-group best friends with sufficient variation, I measure whether respondents report *at least one out-group best friend*, independent of best friends' ethnic background.

Individuals vary in out-group attitudes by gender (Kokkonen *et al.* 2015) and education (Lancee and Sarassin 2015). Hence, I control for whether respondents indicate to be a *girl* (1) or a *boy* (0). Dutch adolescents in high schools are placed in various educational tracks. By the time of data collection, some were still attending high school, indicative of being in the 'University preparatory' track. Others were attending tertiary 'Vocational education' or 'Higher vocational education', and again others

are working, unemployed, or attending university. The 'working' ($N = 96$; 4.4%) and 'unemployed' and ($N = 28$; 1.3%) groups are small. I classify adolescents into two groups: (1) attending high school, 'Higher vocational education', or university, or (0) attending 'Vocational education', working, or unemployed. This accounts for whether respondents are preparing for or are attending what is labeled *Higher education* in the Netherlands. I account for intra-cohort age variation through controlling for *Age in months* (and exclude 15 outlier cases whose age is $> 2 \times \text{SD}$ from the mean). Additionally, I control for whether individuals *Trust others* in general (yes/no) as it relates to attitudes towards general others. I control for how often adolescents use Facebook (1 – less than an hour–5 – more than four hours). Finally, the analyses include the number of Facebook friends (divided by 100, measured from the DFS) to report estimates independent of network size. Table 2 depicts the control variables' descriptive statistics.

Analytical strategy

To test the main conjectures, I model the dependent variables in a series of linear regression analyses. Figure 1 depicts the dependent variables as relatively normally distributed (Skewness = 0.015–0.684). Analytically, these models take the following form:

$$Y_{\text{out-group attitudes}} = \beta_0 + \beta_1 X_j + \ldots + \beta_k X_j + \varepsilon, \qquad (1)$$

where β_0 represents the intercepts, $\beta_1 X_j + \ldots + \beta_k X_j$ represents the vector of covariates from the first to the kth variable, and ε represents the error terms, all for the jth respondent. $Y_{\text{out-group attitudes}}$ represents combined attitudes towards ethnic out-groups and separately towards Turks, Moroccans, or Dutch Caribbean groups. All estimated models' residuals follow normal distributions and all associated variance inflation factors are below two.

Table 2. Descriptive statistics for the control variables.

	Mean	SD	Min.	Max.	Observations
Out-group best friend (1 – Yes)	0.128	–	0	1	2190
Sex (1 – Girl)	0.539	–	0	1	2150
Education (1 – 'Higher education')	0.474	–	0	1	2183
Age in months W4	219.711	6.549	173.753	241.381	2121
Trust others (1 – Yes)	0.527	–	0	1	2188
Hours FB per day	1.725	1.004	1	5	2136
FB network size/100	3.367	1.733	0.010	13.780	2120

I take a two-step approach to these analyses. I first estimate the relationship between the number of interethnic Facebook contacts and out-group attitudes in wave 4 of the data (Table 3, *linear exposure hypothesis*). As mentioned before, a fundamental issue in the study of the relationship between out-group friends and attitudes is that it is challenging to account for reverse causality, where interethnic ties may result from earlier ethnic out-group attitudes. This study by no means solves this issue (nor is that its goal). In another analysis setup, I estimate out-group attitudes in wave 4 while accounting for those attitudes in wave 3 (Table 4). This models change in negative out-group attitudes, but this does not address causality issues. For instance, I do not consider changes in interethnic contacts caused by earlier out-group attitudes. Lagged dependent variables may also introduce endogeneity to the model where the error term correlates with the independent variable.

Table 3. Regressing negative out-group attitudes on the number of interethnic contacts on Facebook.

Negative attitudes towards …	… out-groups		… Turks		… Moroccans		… Dutch Carib.	
	Coef. (SE)[b]	p[a]	Coef. (SE)	p	Coef. (SE)	p	Coef. (SE)	p
Interethnic contacts on FB								
# Interethnic	−0.016 (0.005)	***						
# Turkish			−0.060 (0.012)	***				
# Moroccan					−0.059 (0.013)	***		
# Dutch Caribbean							−0.027 (0.014)	
FB network size/100	0.093 (0.030)	**	0.103 (0.031)	***	0.128 (0.033)	***	0.060 (0.033)	
Control variables								
Out-gr. best friend (1 – Yes)	−0.197 (0.166)		−0.207 (0.177)		−0.054 (0.192)		−0.275 (0.175)	
Sex (1 – Girl)	−0.585 (0.094)	***	−0.453 (0.104)	***	−0.987 (0.109)	***	−0.443 (0.098)	***
Education (1 – Higher educ.)	−0.502 (0.093)	***	−0.516 (0.103)	***	−0.491 (0.109)	***	−0.502 (0.097)	***
Age in months	−0.011 (0.007)		−0.020 (0.008)	**	−0.020 (0.008)	*	−0.002 (0.007)	
Trust in others (1 – Yes)	−0.873 (0.093)	***	−0.850 (0.103)	***	−0.984 (0.108)	***	−0.823 (0.098)	***
Hours FB per day	0.102 (0.049)	*	0.110 (0.054)	*	0.154 (0.056)	**	0.068 (0.052)	
Constant	7.722 (1.508)	***	9.685 (1.711)	***	10.599 (1.793)	***	5.391 (1.627)	***
R-squared	0.082		0.069		0.096		0.064	
Observations	2037		2042		2041		2038	

[a]Two-sided p-values: * < .05; ** < .01; *** < .001.
[b]Robust standard errors.

Table 4. Regressing negative out-group attitudes on the number of interethnic contacts on Facebook and out-group attitudes $t − 1$.[a]

Negative attitudes towards …	… out-groups		… Turks		… Moroccans		… Dutch Carib.	
	Coef. (SE)[c]	p[b]	Coef. (SE)	p	Coef. (SE)	p	Coef. (SE)	p
$t − 1$ Neg. attitudes towards …								
… ethnic out-groups	0.569 (0.026)	***						
… Turks			0.533 (0.024)	***				
… Moroccans					0.567 (0.023)	***		
… Dutch Caribbean							0.546 (0.027)	***
Interethnic contacts on FB								
# Interethnic	−0.010 (0.005)	*						
# Turkish			−0.031 (0.013)	*				
# Moroccan					−0.034 (0.013)	*		
# Dutch Caribbean							−0.025 (0.014)	
FB network size/100	0.065 (0.031)	*	0.095 (0.031)	**	0.072 (0.031)	*	0.060 (0.032)	
R-squared	0.356		0.321		0.377		0.327	
Observations	1344		1542		1542		1353	

[a]Control variables as found in Table 3 are part of this model, but not shown for parsimony.
[b]Two-sided p-values: * < .05; ** < .01; *** < .001.
[c]Robust standard errors.

Hence, the chosen approach – cross-sectional analyses (Table 3) and modeling change (Table 4) by no means establishes causal relationships. My approach illuminates whether out-group weak tie contacts of majority members *correlate* to out-group attitudes (independent of past values of such attitudes) in various different model setups and for various different minority ethnic groups. The combination of this evidence is a next step in the analyses between interethnic weak ties and out-group attitudes, whereas future work could study this in a more-causal way.

In the second set of results I consider the logarithm (base ten) of the number of ethnic out-group contacts, thus testing whether the added benefit of additional out-group contacts gradually diminish (*diminishing returns hypothesis*).[8] This is done similar to the first set of results: first

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[8]A logarithmic transformation spreads out the variation between the x-values differently compared to a quadratic transformation. Both transformations test a diminishing return hypothesis: the logarithmic function assumes an increasingly more-gradual diminishing return, whereas the quadratic function assumes a rapidly diminishing and then more linear return. A quadratic transformation yields

considering the wave 4 data cross-sectionally (Table 5), and then examining the change in out-group attitudes over time (Table 6). Each of the analyses estimates robust standard errors and considers attitudes towards ethnic out-groups both combined and separately for each out-group.

Results

In Table 3, I regress out-group attitudes on the number of out-group contacts on Facebook among Dutch majority adolescents. The main finding from these cross-sectional analyses is that a higher number of interethnic contacts online relates to less-negative out-group attitudes. Specifically, an increase in the number of interethnic contacts of one standard deviation (= 3.93), relates to a reduction in average negative out-group attitudes of about 0.079 points ($p < .001$) – or a 7.9% reduction if we would interpret that finding on the 'feeling thermometer' that ranges from 0 to 100. This correlation seems to be stronger if we consider out-group attitudes towards Turks and Moroccans in particular. For instance, a one standard deviation increase in the number of Turkish (4.4) or Moroccan (4.09) Facebook contacts, decreases the negative attitudes towards these groups with 0.112 ($p < .001$) and 0.096 ($p < .01$), or an 11.2% and 9.6% reduction, respectively. For out-group attitudes towards Moroccans in particular this may flip the scale to the 'more-positive' side – e.g. from the 'more-negative' mean of 5.382 to below 5. This finding, however, does not hold for out-group attitudes towards Dutch Caribbean groups, and this null finding is consistent throughout the analyses for this out-group.

I briefly consider the control variables in Table 3. Girls, those in (preparatory) higher education and those who trust others carry more-positive out-group attitudes than their counterparts. Additionally, spending *less* time on Facebook correlates with less-negative out-group attitudes, except for attitudes towards Dutch Caribbean groups. Although the direction of the coefficients seems to indicate that having one out-group best friend reduces prejudice, they do not statistically deviate from zero across the different out-groups.

In Table 4, I regress out-group attitudes on the number of out-group contacts on Facebook and those attitudes one year earlier. The control variables are included in the remainder of the analyses, yet are not

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mostly non-significant results in the longitudinal analyses. Only by selecting those Dutch majority members with less than 25 out-group contacts are some of the longitudinal quadratic results comparable with the logarithmic results.

Table 5. Regressing negative out-group attitudes on the logged number of interethnic contacts on Facebook.[a]

Negative attitudes towards …	… out-groups		… Turks		… Moroccans		… Dutch Carib.	
	Coef. (SE)[c]	p[b]	Coef. (SE)	p	Coef. (SE)	p	Coef. (SE)	p
Interethnic contacts on FB								
log(# Interethnic + 1)	−0.536 (0.154)	***						
log(# Turkish + 1)			−0.713 (0.155)	***				
log(# Moroccan + 1)					−0.641 (0.169)	***		
log(# Dutch Caribbean + 1)							−0.357 (0.186)	
FB network size/100	0.113 (0.032)	***	0.112 (0.032)	***	0.135 (0.034)	***	0.064 (0.034)	
R-squared	0.083		0.068		0.095		0.064	
Observations	2037		2042		2041		2038	

[a]Control variables as found in Table 4 are part of this model, but not shown for parsimony.
[b]Two-sided p-values: * < .05; ** < .01; *** < .001.
[c]Robust standard errors.

Table 6. Regressing negative out-group attitudes on the logged number of interethnic contacts on Facebook and out-group attitudes $t − 1$.[a]

Negative attitudes towards …	… out-groups		… Turks		… Moroccans		… Dutch Carib.	
	Coef. (SE)[c]	p[b]	Coef. (SE)	p	Coef. (SE)	p	Coef. (SE)	p
$t−1$ Neg. attitudes towards …								
… ethnic out-groups	0.568 (0.026)	***						
… Turks			0.534 (0.024)	***				
… Moroccans					0.567 (0.023)	***		
… Dutch Caribbean							0.545 (0.024)	***
Interethnic contacts on FB								
log(# Interethnic + 1)	−0.399 (0.159)	*						
log(# Turkish + 1)			−0.406 (0.154)	**				
log(# Moroccan + 1)					−0.418 (0.167)	*		
log(# Dutch Caribbean + 1)							−0.329 (0.186)	
FB network size/100	0.084 (0.031)	**	0.104 (0.031)	***	0.080 (0.032)	*	0.063 (0.033)	
R-squared	0.357		0.321		0.377		0.327	
Observations	1344		1542		1542		1353	

[a]Control variables as found in Table 3 are part of this model, but not shown for parsimony.
[b]Two-sided p-values: * < .05; ** < .01; *** < .001.
[c]Robust standard errors.

shown in the tables for parsimony. I find that earlier out-group attitudes relate to later out-group attitudes, but that the number of interethnic contacts relate to changes in less-negative out-group attitudes independent of those earlier attitudes. The correlations between interethnic contacts online and negative ethnic out-group attitudes do seem smaller in the longitudinal compared to the cross-sectional analyses. Some of the change in out-group attitudes possibly occurs indirectly from earlier out-group attitudes through interethnic contacts to those attitudes later. Net of this, however, interethnic online contacts relate to less-negative out-group attitudes. This holds particularly for Turkish ($p < .05$) and Moroccan ($p < .05$) contacts. As such, the coefficient of combined interethnic contacts ($p < .05$) seems to be carried by Turkish and Moroccan online contacts and not Dutch Caribbean contacts. The combined results from Tables 3 and 4 provide evidence in support of the linear exposure conjecture, and particularly so for contact with Turkish and Moroccan out-groups: interethnic weak ties online relate to less-negative ethnic out-group attitudes among Dutch majority adolescents.

In Table 5, I regress out-group attitudes on the logarithm of the number of out-group contacts. The results suggest that the number of interethnic contacts relates to less-negative ethnic out-group attitudes, but that the added benefit for additional out-group friends gradually diminishes (i.e. a negative coefficient for the natural logarithms). Table 5 shows a similar pattern as before, where the natural logarithm of the number of Turkish and Moroccan Facebook contacts relate to less-negative attitudes towards these groups ($p < .001$), whereas this pattern seems less-pronounced among Dutch Caribbean out-group contacts.

In the final Table 6, I regress out-group attitudes on the logarithm of the number of out-group contacts on Facebook and those attitudes one year earlier. The correlations between interethnic contacts and out-group attitudes are lower in Table 6 than in Table 5, perhaps suggesting an indirect relation between earlier and later out-group attitudes via the logarithm of the number of interethnic contacts. Yet, the main findings seem to hold here too: out-group contacts of Turkish ($p < .01$) and Moroccan ($p < .05$) backgrounds relate to less-negative out-group attitudes towards those groups but that correlation becomes less and less pronounced with more of those out-group contacts. In sum, the results provide evidence in support of the diminishing returns conjecture for Dutch majority adolescents' out-group friends: there is a diminishing return for interethnic weak ties on less-negative out-group attitudes as

the number of interethnic contacts increases. Yet, this finding is carried by weak tie out-group contacts of Turkish and Moroccan backgrounds.

Finally, I consider which of the two conjectures – linear exposure versus diminishing returns – is most supported by the data. To that end, I perform *seemingly unrelated estimations* with the *suest* postestimation command using *Stata* where I use the prior regression results as input. I do this for each of the four outcomes, where each outcome is then estimated with two seemingly unrelated equations that both contain the same set of control variables, but have a distinct central independent variable: the raw number of interethnic contacts or the logarithm of the number of interethnic contacts. This is made possible by combining the regression results in terms of their parameter estimates and associated (co)variance matrices despite overlapping data and variables. Such an approach is typically used to test cross-model hypotheses (StataCorp 2013a,b). As such, I can test for equality of coefficients of both variables – i.e. the raw number or its logarithm – across models and observe whether the linear or the logarithm variable is the larger one.

For all relevant comparisons (and for both the cross-sectional and longitudinal analyses), I find that the natural logarithm is the larger coefficient compared to the linear number (all at least $p < .05$). These post-hoc analyses seem to suggest that the diminishing-returns hypothesis is most supported by these data. Yet, the predicted values of out-group attitudes by the (logarithmic) number of out-group contacts on Facebook mostly overlap as depicted in Figure 3. Only at extreme values of out-group contacts do the two lines deviate from one another in their predicted values. Additionally, it also seems that the first five (steeper drops) to ten (gradually diminishing to an almost horizontal pattern) out-group friends are most responsible for reducing negative out-group attitudes.

Conclusions and discussion

Whether and to what extent do interethnic weak ties correlate with ethnic out-group attitudes among Dutch ethnic majority adolescents? I set out to study this question by linking detailed survey data (Jaspers and Van Tubergen 2014; Kalter *et al.* 2015) with observed Facebook networks (Hofstra *et al.* 2015). Empirically, this enabled the study of interethnic contacts among weaker social ties, providing richer variation in the number of interethnic contacts and its potential relationship with out-
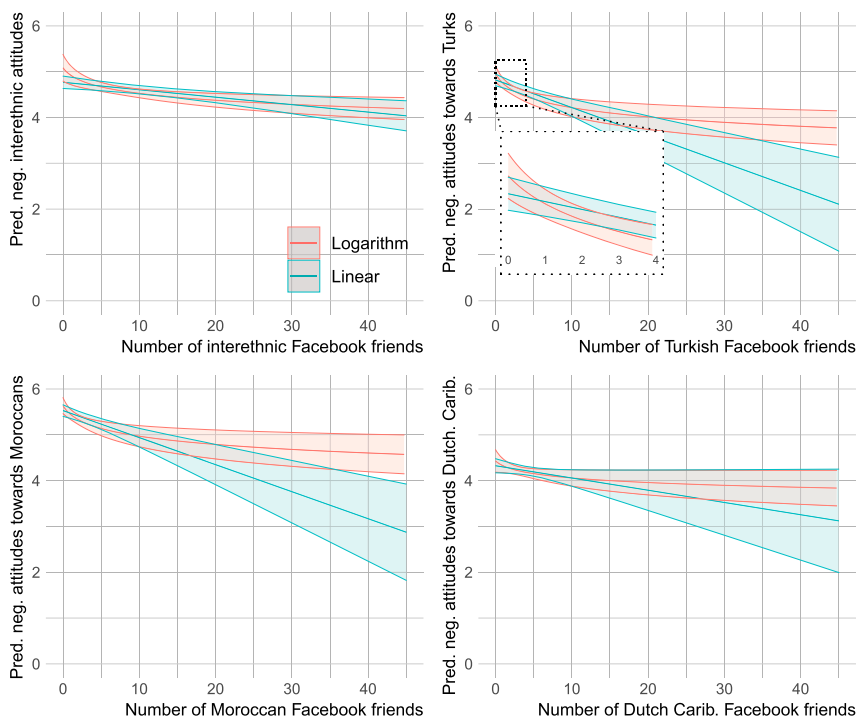
Figure 3. Predicted values for out-group attitudes for both the linear and logarithmic number of out-group contacts on Facebook (based on results from Tables 3 and 5).

group attitudes. Substantively, I considered why and how interethnic weak ties may relate with out-group attitudes.

Do interethnic weak ties online correlate with ethnic out-group attitudes among Dutch ethnic majority adolescents? By and large, yes, having more interethnic contacts relates to less-negative out-group attitudes among Dutch ethnic majority adolescents. The detailed answer to this question is more nuanced, however. This overarching finding seems to be carried mostly by out-group contacts of Turkish and Moroccan ethnic backgrounds. Moreover, the size of the correlations in the analyses were substantive yet not remarkably high. Interestingly, the data suggest that especially the 'diminishing return' hypothesis holds: interethnic contacts' relation with less-negative out-group attitudes becomes less and less pronounced with increasing number of interethnic contacts, more so than a linear correlation between interethnic weak ties and out-group attitudes. These conclusions are insensitive to either cross-sectionally or longitudinally analyzing the data and are insensitive to having an out-group best friend or not.

There are several broader implications to these conclusions. First, this study adds further credence to the large body of work on contact theory showing that out-group contact can reduce prejudice (see Pettigrew and Tropp 2006; Pettigrew *et al.* 2011; Zhou *et al.* 2019); (interethnic) weak ties, too, relate to less-negative (ethnic) out-group attitudes. Second, and perhaps more importantly, there may be a limit to what interethnic weak ties could achieve when it comes to reduce prejudice due to the segregated nature of social ties by ethnic background. Structural factors (Blau 1977; Feld 1981) first strongly restrict ethnic majorities to have intergroup contact. Simultaneously only the first five to ten out-group ties seem to relate most-strongly to less-negative attitudes, whereas thereafter the relationship becomes increasingly smaller. As such, there exists sort of a 'double wall' difficulty. Dutch ethnic majorities are structurally limited to become acquainted with interethnic others. And if they do, interethnic others relate to less-negative attitudes to an increasingly smaller extent.

There are at least two limitations to this study that merit acknowledgement. First, because I did not use information about longitudinal change in both interethnic weak ties online and attitudes, it is not possible to claim a causal effect of online interethnic contacts on out-group attitudes. Reverse causality, where out-group attitudes influence interethnic tie formation, may occur. A few out-group weak ties, for instance, might encourage forming a strong out-group tie (i.e. third party effects) that, in turn, reduce negative outgroup attitudes. As a result, more new weak interethnic ties are not beneficial as it is mostly the newly formed strong out-group tie that mattered in relation to outgroup attitudes. To the best of my knowledge, however, there are few studies that link detailed survey data on self-reported attitudes with out-group contacts among large numbers of weak ties online such as in this study. As such, I view this study as the intermediate step towards studies that longitudinally observe both interethnic weak ties and out-group attitudes with the use of a representative sample. I commend follow-up work that is able to measure both independent and dependent variables longitudinally. Second, the longitudinal data collection of the CILS4EU/CILSNL may have led to non-random attrition rates over the different data waves that I was unable to account for given the already fairly complex setup. Additionally, the item non-response resulting from combing waves 3 and 4 in the longitudinal analyses skewed the analyses somewhat towards those majority members who already have more out-group friends. As a result, it is uncertain to what extent the results of this

study generalize to the Dutch majority adolescent target population (see also Note 5). The fact that this study only considers Dutch ethnic majority adolescents alleviate this issue somewhat if they participate at high rates, but attrition within this group that correlates with the outcome variable may occur.

This study opens up directions for future research into the study of out-group contact beyond the traditional focus on out-group contact among core ties. Recent work already established similar patterns by studying news coverage in the media about certain groups (e.g. see Van Klingeren *et al.* 2015; Boer and Van Tubergen 2019): a form of positive or negative indirect contact that also relates to prejudice. Extending this line of inquiry, a potential future route is to capture the *sentiment* of interactions between people online; the advent and continuous development of natural language processing techniques (Jurafsky and Martin 2008) could determine whether and which out-group interactions on social media are positive and negative interactions. Future probes could also compare different types of interethnic contact – e.g. weaker ties on Facebook versus news coverage versus core contacts – or consider the role of algorithms – e.g. network closure induced by friendship recommendations on Facebook – to further consider the roles of different mechanisms relating to out-group attitudes.

Finally, considering whether online contacts indeed measure weaker ties in *what period* is key given the volatile popularity of social media platforms. For instance, in 2010 in the Netherlands, the Dutch social media platform Hyves was the most-popular one (Hofstra *et al.* 2016a). Shortly after, Facebook took over as the most-popular platform among Dutch adolescents (Hofstra 2017) (and among US teens [Lenhart *et al.* 2015]), rendering Facebook contacts suitable to study weaker ties in those periods (approximately 2011–2016). Yet in 2018, popularity shifted once again; Snapchat and Instagram took over as the most-popular social media platform among US teens (Anderson and Jiang 2018). Finally, in 2021, Instagram was the most-popular social media platform among young adults in the US (Auxier and Anderson 2021). As such, to study weaker ties among adolescents (and adults), one has to pay particular attention to the timeline of data collection vis-à-vis platform popularity.

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