Abstract

Identity fusion —a visceral feeling of connection with a group— is a powerful predictor of willingness to engage in extreme pro-group behavior. Here we propose that identity fusion also reinforces willingness to fight and die for one's siblings and we explore one of the underlying mechanisms producing this effect. We additionally controlled for a powerful predictor of family investment, perceived psychological similarity with the sibling. Our study shows that fusion with sibling, but not perceived similarity, is positively associated with willingness to fight and die for the sibling. This relation is mediated by the imagined personal consequences of losing one's sibling. This research extends previous work on fusion with groups to pairs of individuals and identifies a new mediator of the effect of fusion on willingness to fight and die for others. Overall, these results suggest that identity fusion might contribute to explain self-sacrifice among genetically related individuals as predicted by the theory of kin selection.

Keywords: identity fusion, sibling relationships, extreme behavior, perceived psychological similarity.

Why Die for My Sibling? The Positive Association between Identity Fusion and Imagined Loss with Endorsement of Self-sacrifice

Identity fusion is a visceral connection between personal and group identities that consistently predicts willingness to perform extreme sacrifices for that group and its members (Swann, Jetten, Gómez, Whitehouse, & Bastian, 2012). Individuals who are strongly fused with a group (e.g., country or religious group) are extraordinarily willing to fight others threatening that group and to self-sacrifice for the sake of other group members. Although identity fusion was originally developed to explain the alignment between an individual and extended groups (e.g., one's country), it is hard to explain how such a psychological propensity could evolve under natural selection. Identity fusion could, however, be readily explained by kin selection, an evolutionary strategy favoring the reproductive success of genetic relatives even at a reproductive cost to the actor.

Preliminary evidence shows that fusion with one's siblings has similar motivational properties as fusion with groups (Vázquez, Gómez, Ordoñana, & Paredes, 2015). In particular, stronger fusion with sibling stimulates greater willingness to fight and die for him/her. This would be consistent with the hypotheses that fusion is at least in part an outcome of kin selection but has been extended through evolution to larger groups that mimic cues of genetic relatedness, by emphasizing phenotypic similarity, kin terminology, or shared defining experiences (Jong, Whitehouse, Kavanagh, & Lane, 2015; Whitehouse & Lanman, 2014). Our aim here is to identify what might lead individuals who are strongly fused with their siblings to fight and die for them.

Identity fusion with groups and dyads

Identity fusion theory (Gómez & Vázquez, 2015; Swann et al., 2012) was developed to explain why people make extreme sacrifices for a group. Identity fusion

emerges when the boundaries between the personal and the social identities are blurred, which generates a visceral sense of oneness with a group and reciprocal strength. The social identity of strongly fused individuals becomes an essential part of their personal self while the essential properties of their personal self are shared with the group (Buhrmester, Fraser, Lanman, Whitehouse, & Swann, 2015). Such synergistic combination of personal and social identities promotes extraordinary altruistic actions on the group's behalf. In particular, identity fusion predicts endorsement of fighting others threatening group members (Bortolini, Newson, Natividade, Vázquez, & Gómez, 2018; Gómez, Brooks, et al., 2011) and self-sacrificing to save the life of fellow group members in moral dilemmas (Gómez, Brooks, et al., 2011; Swann, Gómez, Dovidio, Hart, & Jetten, 2010; Swann, Gómez, et al., 2014), donating personal funds to group members who are in need (Buhrmester et al., 2015; Swann, Gómez, Huici, Morales, & Hixon, 2010), engagement in front line combat in favor of the 2011 Libyan revolution (Whitehouse, McQuinn, Buhrmester, & Swann, 2014), and also undergoing major surgery to join their desired sex in a sample of transsexuals (Swann et al., 2015).

Research on identity fusion has mainly focused on the alignment of individuals with large groups such as country. A study conducted in six continents and 11 countries (Swann, Buhrmester, et al., 2014) found a positive association between identity fusion and endorsement of extreme behavior for one's country. However, when people were asked about their willingness to die for different groups, they overwhelmingly chose family. In another study with frontline fighters who were risking their lives in combats against the Islamic State revealed that family was the group with which they were mostly fused (95% of Peshmerga, 94% of Iraqi Army Kurds, and 100% of the participants from the Arab Sunni militia, see Gómez et al., 2017). Thus, family seems to be the group that best embodies the fusion metaphor. Family members usually share

genes, values and experiences, all of which are known to increase fusion and willingness to fight and die for group members (Jong et al., 2015; Swann, Buhrmester, et al., 2014).

Recent findings indicate that monozygotic twins are more fused with each other than dizygotic twins and in turn more willing to prioritize their twin over other relatives (Vázquez, Gómez, Ordoñana, Swann, & Whitehouse, 2017). Vázquez et al. (2015) also found that higher identity fusion is positively associated with willingness to fight and die for one's sibling. These studies show that identity fusion with siblings is strongly related to endorsement of extreme behavior for them, but the mechanisms underlying this association are still unexplored.

Why identity fusion predicts endorsement of pro-sibling behaviors

A fine-grained analysis of mediator mechanisms would help achieve a better understanding of how fusion strengthens the willingness to fight and die for the sibling. Previous findings revealed that fusion with a group affects endorsement of fighting and dying for group members by means of three mediator mechanisms: personal agency, perceived invulnerability and familial ties (Gómez, Brooks, et al., 2011; Swann, Buhrmester, et al., 2014; Swann, Gómez, Huici, et al., 2010). Strongly fused persons retain a salient personal self and channel their feelings of personal agency into progroup behavior (Swann et al., 2012). They also experience a sense of reciprocal strength that makes them conclude that they are invulnerable, which, in turn, facilitates their engagement in extreme behavior (Swann et al., 2012). Furthermore, strongly fused individuals perceive other group members as brothers and sisters and, consequently, they feel a moral obligation to protect them (Swann, Buhrmester, et al., 2014). These three mechanisms, heightened personal agency, perceived invulnerability and the perception of familial ties with other group members, mediate the effects of identity

fusion on progroup actions (Gómez, Brooks, et al., 2011; Swann, Buhrmester, et al., 2014).

These mediators may also be influential in interpersonal relationships. For instance, those who are strongly fused with another person (i.e., a family member, a romantic partner) often put their feelings of personal agency at the service of that individual. Feeling invulnerable could also reinforce their proneness to help him/her even at the expense of important personal costs. In the case of family members familial ties are literal more than metaphorical, but many people see and treat their best friends as if they were family. Nevertheless, besides these mediators, we conjecture that distinctive interpersonal factors might be driving the effect of fusion on willingness to engage in pro-sibling behavior.

In particular, we propose that those persons who are strongly fused with their sibling endorse fighting and dying for him/her to a greater degree than weakly fused because they imagine that their life will be worse without them. Unlike the other mediators of identity fusion that are focused on the present (i.e. current perception of agency), we explore an anticipatory mechanism related to hypothetical, but plausible situations. We propose that identity fusion might intensify the psychological impact associated with the potential loss of the sibling due to a journey or to death and, in turn, stimulate extreme pro-sibling behavior. We base our predictions on different empirical findings.

Lester (1994) proposes that fear of death is a multidimensional construct that includes the fear of death of others. In a study conducted in China (where people is extremely willing to self-sacrifice for their family, see Swann, Buhrmester, et al., 2014) participants reported more anxiety toward the dying and death of close individuals than toward the dying and death of themselves (Hui & Fung, 2008). For those people for

whom personal relationships are central (i.e., fused persons), anticipating the loss of close others can be an extremely anxious experience. Strongly fused individuals express more tension, distress, and anxiety than weakly fused when they know that several ingroup members are in danger (see Swann, Gómez, et al., 2014). The sense of oneness and reciprocal strength would lead them to link their potential happiness to the fate of the group. In fact, previous research shows that identity fusion influences how people imagine their future wellbeing. Buhrmester et al. (2012) found that individuals who were fused with their political party anticipated more negative personal consequences than non fused in case their party lost the national elections. However, those who were "merely" identified, but not fused with their party did not make such negative predictions. Likewise, we predict that those individuals who are fused with their sibling will also foresee more negative personal consequences than weakly fused when they are asked to imagine an irrevocable separation from their sibling.

A more negative perception of life after an irrevocable separation should increase the willingness of strongly fused individuals to fight and die for their sibling. Strongly fused individuals do not conform to the extinction of the relationship with the group with which they are fused, but increase their compensatory behaviors (e.g., willingness to fight and die for the group) to reaffirm their social identity as a group member (Gómez, Morales, Hart, Vázquez, & Swann, 2011). Extending these results to sibling relationships, we expect that strongly fused individuals will counteract the threat posed by the potential loss of their sibling by endorsing fighting and dying for him/her.

A competing explanation for investment in the sibling

To estimate the influence of identity fusion on behavioral intentions on behalf of the sibling we compared the effect of fusion with the effect of a strong predictor of family investment, perceived psychological similarity. Previous research suggests that

physical and psychological similarities determine how people behave and feel towards members of their family. For instance, fathers invest more in children who look most like them (Apicella & Marlowe, 2004) and resemblance to a younger sibling also predicts investment in that sibling (Tifferet, Pollet, Bar, & Efrati, 2016). Whereas identity fusion is remarkably related to extreme actions (see Gómez & Vázquez, 2015, for a review), the link between similarity and costly behaviors is not as robust. Therefore, we expect that fusion with sibling will be more strongly associated with willingness to fight and die for the sibling than psychological similarity. In line with previous evidence on the effects of similarity on bereavement (Littlefield & Rushton, 1986), we can also expect positive associations between psychological similarity with the sibling and the potential mediator. Nevertheless, the visceral connection to the sibling involved in identity fusion should overcome the influence of perceived similarity.

To test these hypotheses we conducted a study with pairs of natural siblings in which we examined how identity fusion and perceived similarity affect the imagined negative consequences of losing one's sibling as well as the willingness to fight and die for him/her. We predict that, as compared with perceived similarity, fusion with sibling would be more strongly associated with the willingness to fight and die for the sibling and with the imagined negative consequences of his/her loss. Additionally, we expect that the imagined negative consequences of the loss of a brother or sister would mediate the effect of fusion on willingness to fight and die for the sibling.

Method

Participants

We recruited 248 Spaniards (58.9% females, M_{age} = 31.95, *SD* = 9.78) to participate in a study about sibling relationships online. A quarter of participants were

undergraduate students of Psychology, who asked his/her sibling and another pair of siblings to take part. Participation was voluntary and unpaid. Participants received a link to access a questionnaire in the Qualtrics platform. The data were collected in a manner consistent with ethical standards for the treatment of human subjects.

Procedure

The first part of the questionnaire included measures of fusion and perceived similarity with the sibling. In the second part, we assessed the imagined negative consequences of the loss and the willingness to fight and die for one's sibling. All scales ranged from 0 (completely disagree) to 10 (completely agree).

Identity fusion with sibling was measured by an adapted version of the scale of Gómez, Brooks, et al. (2011), consisting of three items: "I am one with my sibling", "I'll do for my sibling more than any other family members would do", and "My sibling is stronger because of me", $\alpha = .72$.

Similarity with the sibling was measured by means of three items: "My sibling and I have the same core characteristics", "My sibling and I are totally different (rec.)", and "My sibling and I are cut from the same cloth", $\alpha = .71$.

To measure *imagined loss of the sibling* we asked participants to imagine how they would feel if their sibling made a long journey and he/she did probably not see him/her again. Then they answered five items developed for this study: "My personal life would get worse", "My health would get worse", "It would be the worst thing that could happen to me", "I could not bear this situation", and "It would be like losing part of myself", $\alpha = .91$. After that participants were asked to imagine how they would feel if their sibling died and completed the same five items, $\alpha = .92$.

Willingness to fight for the sibling was assessed by means of three items adapted from Swann, Gómez, Seyle, Morales, and Huici (2009): "I would fight someone

physically threatening my sibling", "I would fight someone insulting ot making fun of my sibling", and "Hurting other people is acceptable if it means protecting my sibling", $\alpha = .92$.

Willingness to die for the sibling was assessed by means of one item adapted from Swann et al. (2009): "I would sacrifice my life if it saved my sibling's life".

Results

We first conducted a factorial analysis with oblimin rotation including all the items to determine whether all of them loaded on the corresponding factors. This analysis yielded four factors. The five items of imagined loss of the sibling related to a journey and the five items of imagined loss related to the sibling's death loaded on the first factor (loadings > .76). Therefore, we collapsed all these items into a single scale labelled as imagined loss of the sibling (imagined loss from now on), $\alpha = .94$. The three items of willigness to fight loaded on the second factor (loadings > .88). The items of perceived similarity loaded on the third factor (loadings > .74), whereas the items of identity fusion loaded on the fourth factor (loadings > .73). Since the item measuring willingness to die presented high crossloadings in the first factor (imagined loss, loading = .58), the second factor (willingness to fight, loading = .46) and the fourth factor (fusion, loading = .60), it was analyzed separately.

Descriptive statistics and correlations

As Table 1 shows, all variables correlated positively among them. Fusion correlated with the outcome measures more strongly than perceived similarity.

[Insert Table 1 about here]

Regression analyses

We conducted three hierarchical regressions on the potential mediator (imagined loss) and dependent variables (willlingness to fight and willlingness to die for the

sibling). Control variables were included in the first step (Model 1): gender (-1 female, 1 male), gender similarity (-1 different gender, 1 same gender), age, difference in age in absolute value, and birth order (-1 small sibling, 1 old sibling). In the second step (Model 2) we added fusion with sibling to the model. In the third step (Model 3) we added perceived similarity with the sibling to the model. Since previous research revealed gender effects on willingness to fight and die (e.g., Vázquez et al., 2017), in the fourth and last step (Model 4) we included the interactions of fusion and similarity with gender.

To control for the clustering of siblings within a pair, we also used the generalized estimating equations (GEE) procedure of IBM SPSS Statistics 24. Results are similar to the results obtained with hierarchical multiple regressions.

Imagined loss. The regression on imagined loss yielded effects of fusion, similarity, age and gender (see Table 2). The younger the participant, the stronger the fusion and the higher the perceived similarity with one's sibling, participants reported more negative consequences of losing their sibling. However, the effect of fusion was stronger than the effect of similarity. As compared to Model 1, the value of R^2 increased significantly from .06 to .41 after fusion was included (Model 2), $\Delta R^2 = 0.35$, $p < .001$. The introduction of similarity (Model 3) barely improved the value of R^2 to .43, $\Delta R^2 = 0.02$, $p = .003$. The addition of the interactions between gender and fusion and gender and similarity (Model 4) did not increase the value of R^2, $p = .163$. Females reported more difficulty to overcome the loss of their sibling than males, $F(1, 238) = 14.82$, $p = .001$, $\eta^2_p = .06$, *M*s = 6.92 vs. 6.22, *SD*s = 2.25 vs. 2.39.

[Insert Table 2 about here]

Willingness to fight for the sibling. The regression on willingness to fight for the sibling yielded significant effects of age and fusion (see Table 2). The effects of

similarity and gender were only marginal (*p*s = .051 and .055, respectively). The younger the participant and the stronger the fusion with one's sibling, participants were more willing to fight for their sibling. As compared to Model 1, the value of R^2 increased significantly from .04 to .14 after fusion was included (Model 2), $\Delta R^2 = 0.11$, $p < .001$. The introduction of similarity (Model 3) only improved the value of R^2 to .15, $\Delta R^2 = 0.01$, $p = .082$. The addition of the interactions between gender and fusion and gender and similarity (Model 4) did not increase the value of R^2, $p = .360$. Males reported slightly more willingness to fight for the sibling than females, $F(1, 238) = 3.71$, $p = .055$, $\eta^2_p = .01$, *M*s = 5.64 vs. 4.73, *SD*s = 2.96 vs. 3.17.

Willingness to die for the sibling. The regression on willingness to die for the sibling yielded significant effects of age, fusion and the interaction between fusion and gender (see Table 2). The younger the participant and the stronger the fusion with one's sibling, participants were more willing to sacrifice themselves for their sibling. However, the effect of fusion was stronger for females, $B = 0.78$, $t(238) = 7.77$, $p < .001$, than for males, $B = 0.37$, $t(238) = 3.15$, $p = .002$. As compared to Model 1, the value of R^2 increased significantly from .06 to .29 after fusion was included (Model 2), $\Delta R^2 = 0.23$, $p < .001$. The introduction of similarity (Model 3) did not modify the value of R^2, $p = .488$. The addition of the interactions between gender and fusion and gender and similarity (Model 4) barely improved the value of R^2 to .30, $\Delta R^2 = 0.02$, $p = .031$.

Mediational analysis

To test our hypothesis that imagined loss would mediate the effect of fusion on willingness to fight and to die for him/her, we conducted path analyses with R in the Lavaan package. Figure 1 shows the estimated model for the hypothesized path of identity fusion to willingness to fight and to die for the sibling through imagined loss.

Results revealed that both the indirect effects depicted in the figure were significant (the confidence intervals did not contain zero).

[Insert Figure 1 about here]

Discussion

Identity fusion has consistently been shown to motivate endorsement of extreme pro-group behavior (Gómez, Brooks, et al., 2011; Swann et al., 2009, 2015; Swann, Gómez, et al., 2014). Fusion is strongly associated with familial ties (Buhrmester et al., 2015; Swann, Buhrmester, et al., 2014), consistent with the hypothesis that the fusion mechanism evolved at least in part as a result of kin selection (Whitehouse & Lanman, 2014). Recently, Vázquez et al. (2015) provided preliminary evidence that fusion features strongly in relations among siblings and is associated with endorsement of extreme behavior. However, that exploratory study did not delve into the underlying mechanisms explaining the effects. In the present study we replicate and extend previous findings by identifying a mediator process that leads strongly fused individuals to endorse fighting and dying for their sibling. Additionally, the effects of fusion were controlled for a powerful predictor of family investment, perceived psychological similarity with the sibling.

Regarding identity fusion theory, the present research provided additional evidence that fusion develops in the familial realm and motivates pro-sibling behavior in the same way that fusion with a group motivates pro-group behavior. These results are convergent with previous studies in that they reveal a significant relation between identity fusion and endorsement of extreme behavior. The stronger the feeling of fusion with sibling, the higher the willingness to fight and die for him/her appears to be. Nevertheless, the most important contribution of this manuscript is the exploration of an interpersonal mediator mechanism that links fusion with sibling to endorsement of

extreme behavior on his/her behalf. Specifically, we found that the association between fusion and endorsement of fighting and dying for the sibling was mediated by the imagined consequences of losing the sibling.

As compared to weakly fused, strongly fused participants imagined more negative consequences following the eventual loss of their sibling due to a long journey or to death. Furthermore, these imagined negative consequences mediated the relation between fusion and willingness to fight and die for the sibling. These results fall in line with previous findings indicating that strongly fused persons see other group members as irreplaceable (Swann et al., 2012; Swann, Gómez, et al., 2014) and suggest that fusion might be a useful factor to improve our understanding of interpersonal relationships and bereavement. Future research should determine whether imagined loss mediates as well the impact of fusion with a group on extreme behavior for its members.

Our findings are also relevant to the literature about family investment and altruism. We checked whether perceived similarity with the sibling -a factor that is related to cooperation (Krupp, Debruine, & Barclay, 2008), altruism (Bressan, Colarelli, & Cavalieri, 2009; Rushton, 1989) and intensity of bereavement after the loss of a relative (Littefield & Rushton, 1986)— was associated with endorsement of extreme behavior for him/her to the same extent that identity fusion. Our results indicate that perceived psychological similarity is not as strongly associated with willingness to fight and die for the sibling and with the mediator mechanism as identity fusion is. Furthermore, when both variables were considered as predictors of willingness to fight and die for the sibling, only the effect of fusion was influential.

The reason for the superiority of fusion over similarity to predict endorsement of self-sacrifice for the sibling might lie on the nature of both processes. Identity fusion

entails a visceral, highly emotional connection to other members of a group or dyad. When strongly fused persons believe that members of their group are imperiled, they experience the same emotional reaction as if they were personally imperiled and consequently feel a deontological impulse to help fellow group members in need (Swann, Gómez et al., 2014). Although related to interpersonal attraction (Byrne, 1971), perceived similarity apparently is not as influential as to cause such effect.

These results suggest that feeling fused with the sibling goes beyond perceived similarity and stimulates the willingness to help and sacrifice for him/her. The relation between identity fusion and similarity was significant but not extremely high. As a matter of fact, identity fusion is based on the recognition and appreciation of distinctiveness (Swann et al., 2012), which might also explain the stronger influence of identity fusion as compared with similarity. Our measure of similarity was focused on psychological aspects. Future studies should determine whether physical similarity exerts similar or different effects.

Finally, we note some limitations of this work. First, we did not collect information about control variables such as number, gender or age of overall siblings, parental divorce and cohabitation, which might impact sibling ties. Second, a longitudinal study would be more appropriate to draw conclusions about the relations between fusion, willingness to fight and die for the sibling and the mediator mechanism. Nevertheless, based on previous research the predicted path from fusion to behavioral intentions are more plausible than the alternatives. Third, all participants had to imagine the loss of their sibling, which should also influence the responses to the fight and die scale. However, only experimental studies with a control condition could clarify such influence. A fourth shortcoming refers to the main outcome measure, which is not real extreme behavior but reported willingness to endorse such behavior. Obviously,

extreme behavior and sacrifices cannot be assessed in laboratory studies. However, future research should rely on reported past extreme behavior and/or examine modest sacrifices as a proxy for more extreme actions. Fifth, fusion and similarity are not the only potential drivers of altruistic behavior towards siblings. Previously identified factors include emotional closeness (Korchmaros & Kenny, 2001), empathy (de Waal, 2008) and normative obligation (Gans & Silverstein, 2006; Rossi & Rossi, 1990).

Previous research has shown that fusion is strongly associated with familial ties and this is consistent with the hypothesis that the fusion mechanism evolved by kin selection. These are among the first studies showing how identity fusion motivates the willingness to help and protect genetic relatives, specifically siblings. Given the broad range of evidence that highly fused individuals are willing to fight and die for each other, understanding the mediators between fusion and self-sacrifice is important not only scientifically but to address problems of suicide terrorism and intergroup conflict in an increasingly violent world.

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Table 1.

Descriptive statistics and correlations

	M	*SD*	1	2	3	4	5
1. Fusion with the sibling	5.78	2.35	-				
2. Perceived psychological similarity with the sibling	5.13	2.21	.40**	-			
3. Imagined loss of the sibling	6.63	2.33	.61**	.38**	-		
4. Fight for the sibling	5.11	3.11	.35**	.23**	.38**	-	
5. Die for the sibling	6.77	3.09	.50**	.23**	.56**	.40**	-

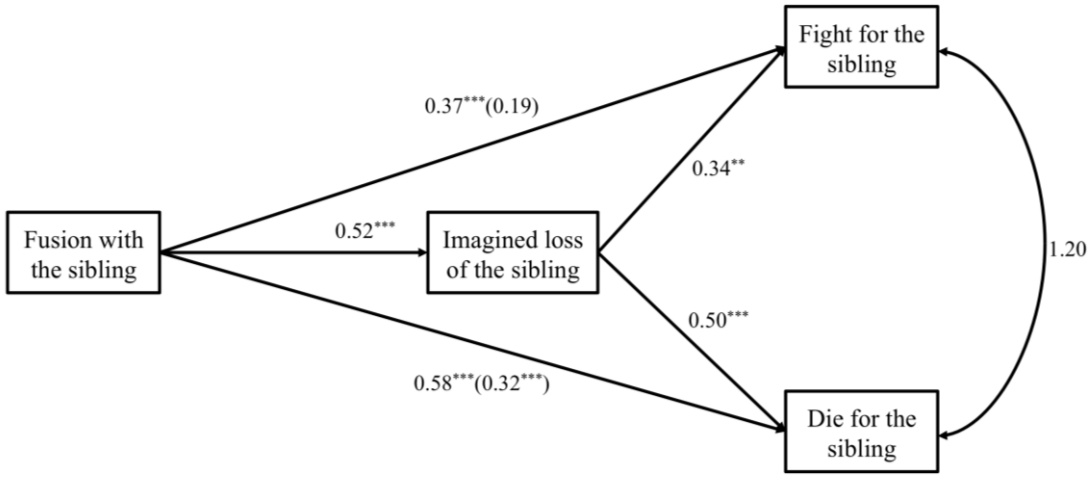
Note: ** $p < .01$

Table 2.
Regression analyses on the outcome measures

	Imagined loss of the sibling			Fight for the sibling			Die for the sibling		
Predictors	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
Block 1									
Gender	-0.44***	0.12	-.19	0.36	0.19	.12	-0.04	0.17	-.01
Gender similarity	0.72	0.11	.03	-0.04	0.19	-.01	0.02	0.17	.01
Age	-0.04**	0.01	-.16	-0.05*	0.02	-.15	-0.08***	0.02	-.24
Age difference	-0.03	0.03	-.04	-0.06	0.06	-.07	-0.02	0.05	-.02
Birth order	0.00	0.12	.00	0.06	0.19	.02	0.10	0.17	.03
Block 2									
Fusion	0.52***	0.05	.53	0.37***	0.09	.28	0.58***	0.08	.44
Block 3									
Similarity	.18**	0.06	.17	0.18	0.09	.13	0.07	0.08	.05
Block 4									
Fusion x Gender	-0.75	0.05	-.07	-0.07	0.09	-0.05	-0.20**	0.08	-.16
Similarity x Gender	0.10	0.06	.09	0.13	0.09	0.09	0.11	0.08	.08
R^2	.44			.15			.31		

Note: **$p < .01$; ***$p < .001$.

Figure caption

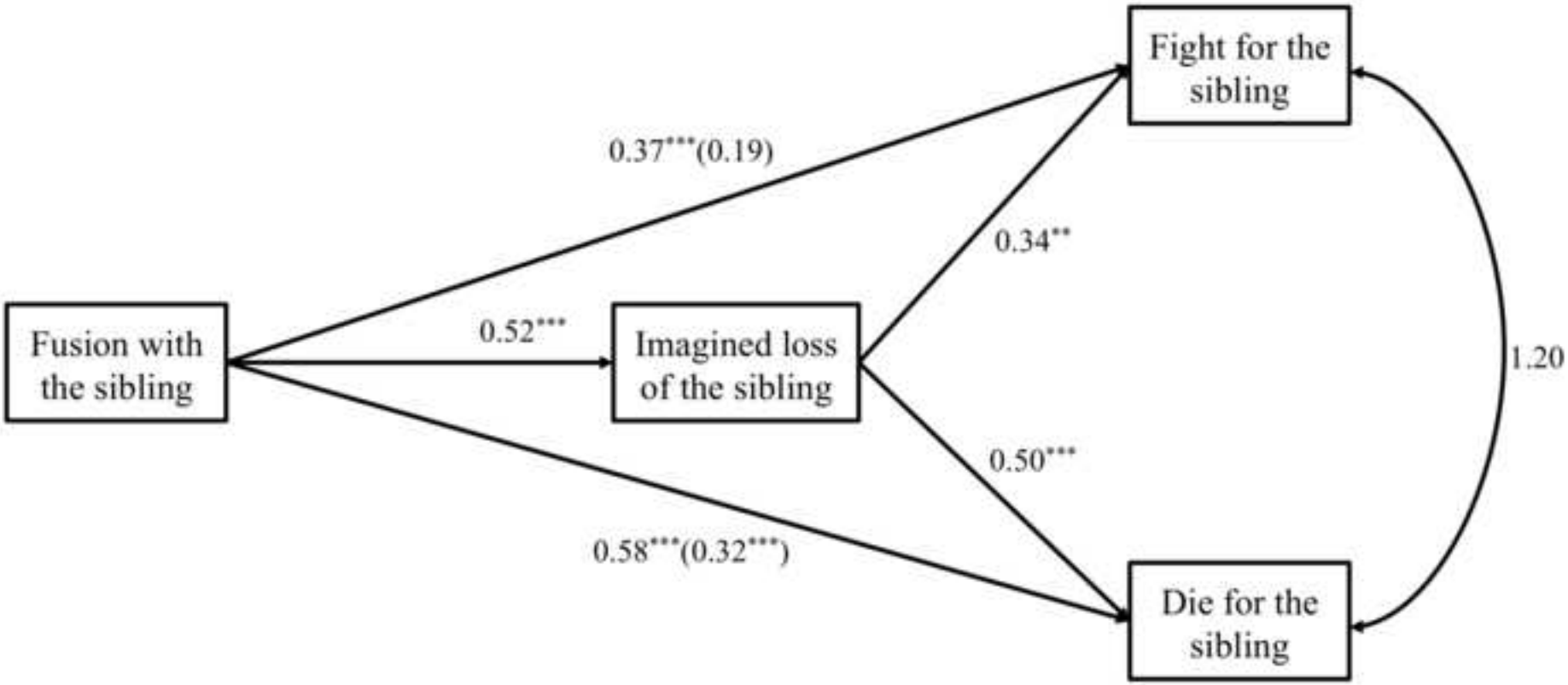


Indirect effect of fight for the sibling: $B = 0.18$, $p = .001$, 95% CI [0.070, 0.289]

Indirect effect of die for the sibling: $B = 0.26$, $p < .001$, 95% CI [0.156, 0.362]

Figure 1. Indirect effect of fusion with the sibling on the willingness to fight and to die for the sibling via imagined loss

Figure



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