

# Anger-Aggression vs. Impulsive-Sensation seeking: Which one is a better predictor for speeding? A meta-analysis



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## Abstract

The purpose of this review was to analyze the relationships of both Anger-Aggression and Impulsive-Sensation Seeking with Speeding. Research studies included in online databases (e.g. PsycINFO, EBSCO) were considered for selection. Inclusion criteria for the studies were a) to measure anger, aggression, impulsivity and/or sensation seeking, b) to measure speeding and c) to provide the zero-order correlation between them. Using a random effect model, we found a small but significant effect for the relation between anger-aggression and speeding ( $r = .12$  [.06 - .18],  $Z = 3.85$ ,  $p < .001$ ). We identified a stronger effect for the relation between impulsive-sensation seeking and speeding, but still of low magnitude ( $r = .23$  [.16 - .30],  $Z = 6.54$ ,  $p < .001$ ). The only significant moderator was the type of driver. Specifically, both relations were non significant for professional drivers ( $r = .02$ ,  $p = .720$  for anger-aggression and  $r = -.004$ ,  $p = .958$  for impulsive-sensation seeking). Overall, Impulsive-Sensation Seeking presented a stronger association with Speeding than Anger-Aggression.

## Speeding's predictors

### Anger-Aggression

- A meta-analysis confirmed the relation between anger and aggressive driving, at a moderate magnitude of .39 (Bogdan et al., 2016). Another meta-analysis also confirmed the associations between driving anger and driving outcomes (Zhang et al., 2016). Namely, it showed that driving anger correlated at a magnitude of .31, .24 and .18 with aggressive driving, risky driving and errors, respectively.

### Impulsive-Sensation Seeking

- A recent meta-analysis has confirmed the associations between SS and driving outcomes (Zhang et al., 2019). Specifically, positive correlations ranging between .22 and .24 were identified with risky driving, errors and aggressive driving. SS was also positively related to received tickets (.19) and accident involvement (.08).
- These meta-analyses did not attempt to isolate the association with speeding, but rather focused on the higher-order classes of risky and aggressive driving. Moreover, it was not the objective of these meta-analyses to compare different predictors of dangerous driving, but rather to focus on the relations of single constructs.

## Literature search and Eligibility criteria

- The search strategy was based on three sources: (1) systematic database search, (2) screening the references of the existent systematic reviews and meta-analyses regarding risky driving and (3) contacting the main authors of published eligible articles.
- The systematic search was carried out in March 2019 (without a lower time limit) through the EBSCOhost interface and interrogated the following databases: *Academic Search Complete*; *Academic Search Premier*; *Central & Eastern European Academic Source*; *Criminal Justice Abstracts with Full Text*; *Environment Complete*; *Psychology and Behavioral Sciences Collection*; *PsycINFO*.
- In order to be included in the analyses, studies had to meet the following three main criteria:
  - to include a valid operationalization for at least one individual difference variable from the categories of Anger-Aggression or Impulsive-Sensation Seeking;
  - to measure speeding behavior or preferred speed regardless of operationalization (e.g. self-report, objective in simulator or based on GPS data, number of speeding violations, etc.);
  - to be a correlational study and test the bivariate associations between the variables of interest or to be a comparative study and to look at differences regarding Anger-Aggression or Impulsive-Sensation Seeking between individuals who engage in speeding behaviors and those who comply to speed limits.
- 21 studies were considered eligible for inclusion in the present meta-analysis, providing 27 independent samples.

## Main Results

| Individual difference variable | <i>k</i>                           | <i>N</i> | <i>r</i> | 95%CI (LL, UL) | <i>Z</i> | <i>p</i> | <i>Q</i> ( <i>df</i> ) | <i>I</i> <sup>2</sup> | 95% prediction interval (LL, UL) | <i>I</i> <sup>2</sup> |
|--------------------------------|------------------------------------|----------|----------|----------------|----------|----------|------------------------|-----------------------|----------------------------------|-----------------------|
| Impulsive-Sensation Seeking    | 23 (a)                             | 10060    | .23      | (.16, .29)     | 6.54     | <.001    | 226.53 (22)**          | .02                   | (-.09, .51)                      | 90.29%                |
|                                | 15 (b)                             | 7621     | .28      | (.19, .36)     | 6.34     | <.001    | 177.03 (14)**          | .03                   | (-.08, .58)                      | 92.09%                |
| Anger-Aggression               | 12 (c)                             | 3832     | .12      | (.06, .18)     | 3.85     | <.001    | 26.43 (11)**           | .01                   | (-.05, .28)                      | 58.38%                |
|                                | 4 (d)                              | 1393     | .11      | (.04, .18)     | 2.95     | .003     | 4.77 (3)               | .01                   | (-.14, .35)                      | 37.20%                |
| a vs. b                        | $Q_{between} (I) = 5.98, p = .014$ |          |          |                |          |          |                        |                       |                                  |                       |
| b vs. c                        | $Q_{between} (I) = 9.38, p = .002$ |          |          |                |          |          |                        |                       |                                  |                       |
| b vs. d                        | $Q_{between} (I) = 9.37, p = .002$ |          |          |                |          |          |                        |                       |                                  |                       |

Notes. a – the entire sample of studies which reported data on impulsive-sensation seeking and speeding; b – the sample of studies which measured only impulsive-sensation seeking; c – the entire sample of studies which reported data on anger-aggression and speeding; d – the sample of studies which measured only anger-aggression; *I*<sup>2</sup> – is expressed in Fisher's Z units. \*\* $p < .01$

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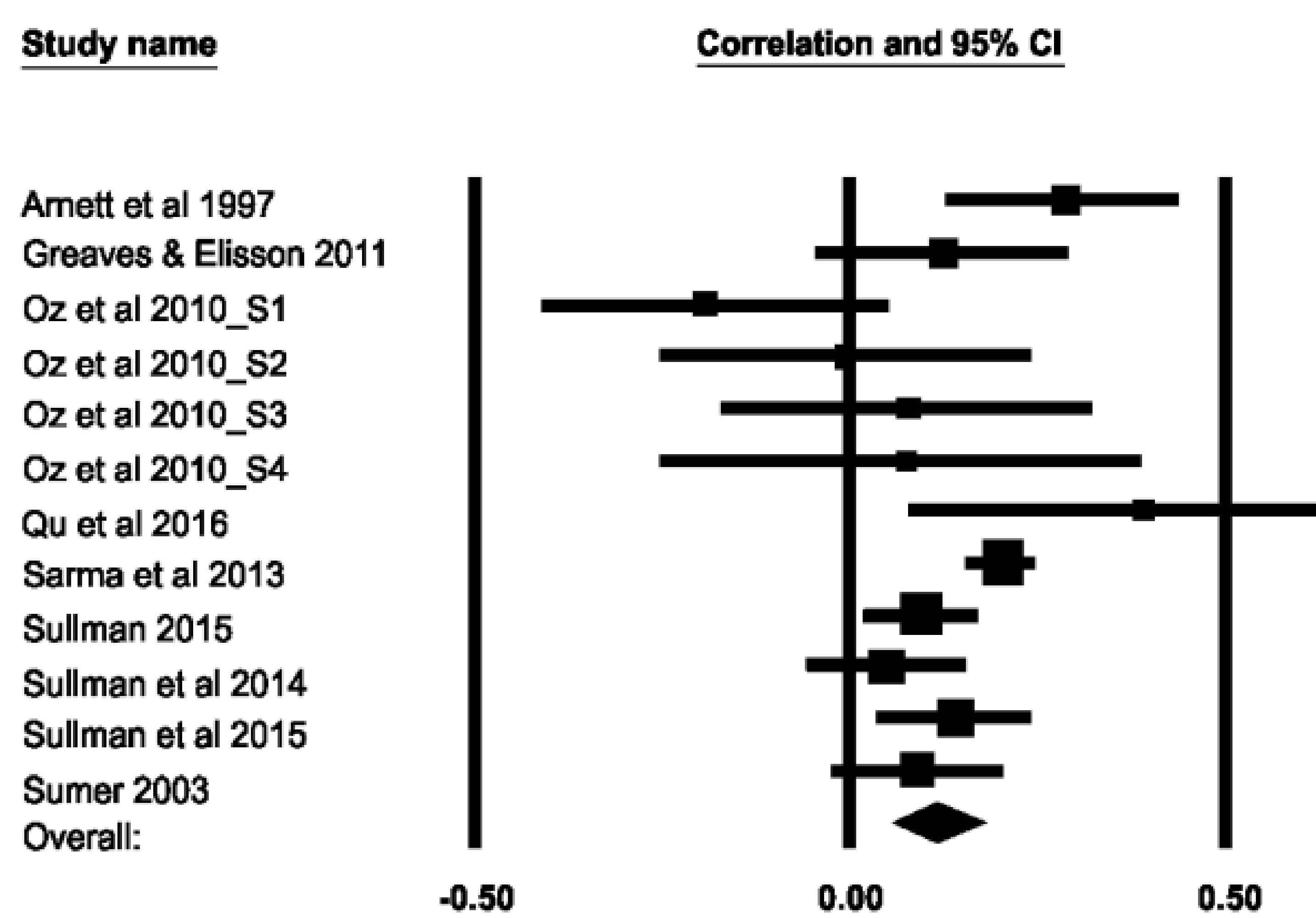


## Results for each Driver type

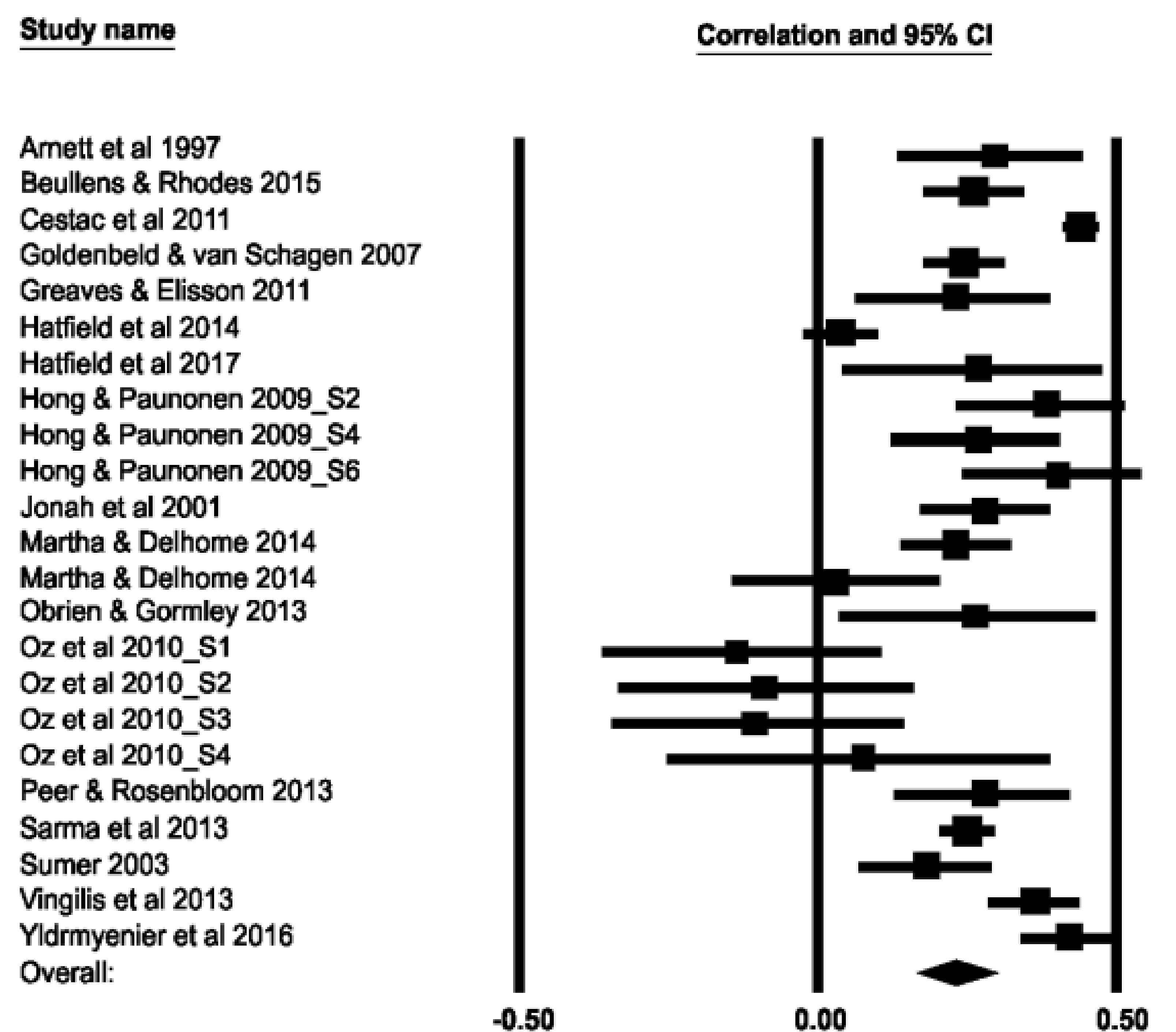
| Individual difference variable | Level of the moderator | <i>k</i> | <i>N</i> | <i>r</i> | 95%CI (LL, UL) | <i>Z</i> | <i>p</i> | <i>Q</i> ( <i>df</i> ) | <i>I</i> <sup>2</sup> | 95% prediction interval (LL, UL) | <i>p</i> <sup>2</sup> |
|--------------------------------|------------------------|----------|----------|----------|----------------|----------|----------|------------------------|-----------------------|----------------------------------|-----------------------|
| Impulsive–Sensation Seeking    | Professional drivers   | 4        | 491      | -.01     | (-.16, .15)    | -0.05    | .958     | 10.02 (3)*             | .03                   | (-.65, .64)                      | 70.06%                |
|                                | Young drivers          | 11       | 5062     | .31      | (.23, .38)     | 7.39     | <.001    | 51.47 (10)**           | .01                   | (.04, .53)                       | 80.57%                |
|                                | General population     | 8        | 4507     | .23      | (.14, .32)     | 4.93     | <.001    | 57.83 (7)**            | .02                   | (-.08, .51)                      | 87.89%                |
| Anger–Aggression               | Professional drivers   | 4        | 491      | .02      | (-.09, .14)    | 0.39     | .700     | 4.55 (3)               | .01                   | (-.38, .41)                      | 34.07%                |
|                                | General population†    | 7        | 3202     | .14      | (.07, .20)     | 4.15     | <.001    | 12.86 (6)*             | .01                   | (-.03, .29)                      | 53.34%                |

Notes. †for anger-aggression, the general population category also included the only study on young drivers. \**p* < .05; \*\**p* < .01

### Anger-Aggression



### Impulsive-Sensation Seeking



## Summary of Results and Main Findings

### Main effects

- Impulsive-Sensation Seeking had a significant association with speeding behavior:  $r = .23$ , 95% CI [.16, .29],  $p < .001$ .
- In the case of Anger-Aggression, the effect was also significant but weaker:  $r = .12$ , 95% CI [.06, .18],  $p < .001$ .
- In order to draw a more definite conclusion concerning the differences between our main effects, we conducted the following comparisons:
  - Speeding's correlation with Impulsive-Sensation Seeking pooled from the entire sample of effects ( $k = 23$ ) versus Speeding's correlation with Anger-Aggression based only on the non-overlapping studies (a vs. d,  $k = 4$ ;  $Q = 5.98$ ,  $p = .014$ );
  - the correlation of Impulsive-Sensation Seeking obtained only from non-overlapping studies ( $k = 15$ ) with the one for Anger-Aggression based on all existent effects (b vs. c,  $k = 12$ ;  $Q = 9.38$ ,  $p = .002$ );
  - the two relations pooled only from the non-overlapping studies (b vs. d;  $Q = 9.37$ ,  $p = .002$ ).
- All three comparisons revealed significant between-groups differences. Hence, we can assert that Impulsive-Sensation Seeking presented a significantly stronger association with Speeding than Anger-Aggression.

### Moderator analysis

- The meta-regression results revealed that type of driver ( $Q(2) = 12.40$ ,  $p = .002$ ) and gender composition of the samples ( $Q(1) = 4.67$ ,  $p = .031$ ) were significant covariates of the effects on Impulsive-Sensation Seeking.
- In the case of professional drivers, the correlation was almost null ( $r = -.004$ ,  $p = .958$ ) and significantly smaller than the one for the general population ( $r = .233$ ,  $p < .001$ ) and young drivers ( $r = .306$ ,  $p < .001$ ). The difference was not significant between the latter two.
- It also appears that the higher the percentage of male participants in the samples, the lower the association between Imp-SS and Speeding (coefficient =  $-.003$ ,  $p = .030$ ). Since the studies with high compositions of male participants were also the ones on professional drivers, we tested a meta-regression model controlling for the latter moderator. This time, only the type of driver covariate remained statistically significant, while the male composition did not (coefficient =  $-0.00$ ,  $p = .914$ ).
- For the relation between Anger-Aggression and Speeding, only the type of driver acted as a significant covariate ( $Q(1) = 3.82$ ,  $p = .050$ ). The effect on professional drivers was not significant ( $r = .02$ ,  $p = .720$ ) as compared to the one on general population ( $r = .15$ ,  $p < .001$ ).

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