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Effects of gender, sex-stereotype conformity, age and internalization on risk-taking among
adolescent pedestrians

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Sex-stereotype conformity and internalisation on pedestrian risk taking

Running head: Sex-stereotype conformity and internalisation on pedestrian risk taking

Effects of gender, sex-stereotype conformity, age and internalization on risk-taking among adolescent pedestrians

Summary

The objective of this study is to explore the effects of sex-stereotype conformity and the internalization of traffic rules on risk-taking among adolescent pedestrians. Sex-stereotype conformity, danger perception, internalization of traffic rules and risky behaviors self-reported by 278 adolescent pedestrians (130 boys and 148 girls) aged 12 to 16 were measured. The results show an effect of sex-stereotype conformity on the internalization of traffic rules and risky behavior. Furthermore, the results show an effect of internalizing traffic rules on the risky pedestrian behaviors. Thus, it appears that, more than biological sex, it is the level of masculinity and the level of internalization of the rules that explain gender differences in risk-taking among adolescent pedestrians.

Keywords: gender – sex-stereotype conformity – risk-taking – pedestrian – internalization – adolescent

1. Introduction

Gender differences are well known in accidentology and manifest themselves very early on in different types of accidents. A UNICEF report (2001) thus showed that, in OECD countries, boys between the ages of 1 and 14 have a 70% greater probability than girls of dying in an accident. The difference between the sexes increases further until it reaches a maximum among adults of 8 men killed for 2 women between the ages of 15 and 59 (Assailly, 2001).

Sex-stereotype conformity and internalisation on pedestrian risk taking

This differential is not unique to France and can be found in all countries. Boys have more frequent accidents (Baker et al., 1992; Rivara & Mueller, 1987) and more serious accidents (Rivara et al., 1982) than girls, and risk exposure does not appear to be the only explanatory variable (Routledge et al., 1996; Waylen & McKenna, 2002). This phenomenon can notably be explained by greater risk-taking among boys (Byrnes et al., 1999; Coppens & Gentry, 1991; Morrongiello & Dawber, 1999).

Numerous psychologists indeed ascribe the male-female difference in risk-taking to gender roles and gender stereotypes (Byrnes et al., 1999; d'Acremont & Van der Linden, 2006; Rowe et al., 2004), which can be defined as the set of beliefs about what it means to be a male or a female in terms of physical appearance, attitudes, interests, psychological traits, social relationships and occupations (Ashmore et al., 1986; Deaux & Lewis, 1984; Huston, 1983, 1985). In particular, gender stereotypes about risk-taking characterize it as a typically masculine type of behavior (Bem, 1981; Morrongiello & Hogg, 2004). This interpretation is consistent with gender norms about risk-taking (Yagil, 1998). Recognizing certain female-stereotyped traits in oneself, however, does not mean seeing oneself as having all the components of femininity, nor even not recognizing in oneself certain masculine traits (Bem, 1974, 1981). Thus, conformity to gender stereotypes can explain why males and females differ in risk-taking, but also help to understand differences in male groups and female groups in risk-taking. It was not until recently that the effects of sex-stereotype conformity were taken into account in explaining differences between males and females in the area of risk. Recent studies have demonstrated that sex stereotypes are more predictive of risk-taking than gender (Raithel, 2003).

It has thus been shown that strong conformity to masculine stereotypes – whether the individual is a man or a woman – tends to increase risk-taking, in sports (Cazenave et al., 2003), in driving (Özkan & Lajunen, 2006) and risk-taking in general (Raithel, 2003).

Sex-stereotype conformity and internalisation on pedestrian risk taking

For some authors, gender only predicts traffic accidents in that it influences traffic violations (Lawton et al., 1997).

Indeed, research on adults has brought out gender differences in compliance with traffic rules. Dangerous behaviors and involvement in accidents among adult drivers were shown to be more often due to rule-breaking in males than in females (Harré et al., 1996; Simon & Corbett, 1996; Yagil, 1998). Moreover, previous studies have shown that male pedestrians violate more rules than female pedestrians do (Moyano Diaz, 2002; Rosenbloom et al., 2004; Yagil, 2000). But traffic behaviors are also likely to be influenced by attitudes toward rules. Regarding attitudes toward laws and violations, Tyler (1990) argued that there were two different types of motives in obeying the law. Instrumental motives are related to the gains and losses involved in compliance and non-compliance with the law; compliance with the law is linked to external forces. Normative motives result from internalization of the law and a feeling of obligation to obey the law in accordance with personal values.

Concerning compliance with traffic rules, Yagil (1998) found that male drivers expressed a lower level of normative motives to comply with traffic laws than did female drivers. Then, females seem to have internalized traffic rules more than males. How can this gender difference in rule internalization be explained?

Internalization is the process by which individuals acquire social values and prescriptions from external sources and transform these into personal attributes, values and self-regulated behaviors (Grolnick et al., 1997). Structural-developmental theory (Colby & Kohlberg, 1987; Kohlberg, 1966; Piaget, 1932) and social theory (Baumrind, 1978; Baumrind, 1989, 1991; Brody & Shaffer, 1982; Grusec & Goodnow, 1994; Hoffman, 1983) of internalization have explained mechanisms which drive internalization process. Nevertheless, social domain theory (Nucci & Turiel, 1978; Smetana, 1997; Turiel, 1983, 1998) has pointed out that

Sex-stereotype conformity and internalisation on pedestrian risk taking

differential social interactions with different classes of rules, events and actions lead individuals to build different domains of social knowledge. Thus, four domains of social knowledge where behaviors and rules are related have been differentiated (Nucci, 1981; Nucci & Santiago Nucci, 1982; Tisak & Turiel, 1984, 1988; Turiel, 1983):

the moral domain, made up of actions which compromise the physical and psychological well-being of others (hitting, stealing, mocking); the conventional domain, focusing on behaviors ensuring the cohesion of the group and its functioning and subject to the presence of an authority (gender roles, school rules); the personal domain including actions left to each individual's free choice (tastes, friends); the prudential domain centered around behaviors relative to one's own physical and psychological well-being (hygiene, protection).

Rules that lie within the moral and prudential domains – relative to one's own well-being and that of others – form a set of internalized rules that are hard for an individual to transgress (Smetana, 1985, 1999; Tisak & Turiel, 1984). Studies on antisocial behaviors have shown the relationship between delinquent behaviors and the lack of internalization among young people (Tavecchio et al., 1999).

Furthermore, research has shown the relationship between risk-taking among adolescents and the categorization of social knowledge on drug consumption (Nucci et al., 1991) and on various types of risky behavior (Kuther & Higgins-D'Alessandro, 2000). In both cases, adolescents involved in risky behaviors tend to classify this type of behavior in the personal or conventional domains, whereas adolescents who are not involved classify these behaviors in the prudential and moral domains. Thus, internalization, through its effect on conformity with rules, can influence risk-taking.

The aim of this study is to explain gender differences in risk-taking among adolescent pedestrians, using sex-stereotype conformity and internalization of traffic rules. Research has shown that males take more risks and conform less to traffic rules than females do; it also

Sex-stereotype conformity and internalisation on pedestrian risk taking

shows that conformity among females appears to be due to a greater internalization of traffic rules. The theory of social domains explains that this internalization is linked to the classification of rules as being part of the moral and prudential domains; moreover, research has shown that individuals who take risks preferentially classify the behaviors they engage in as being in the personal and conventional domains.

Given the research results, we assume that gender differences in risk-taking are due to the differences in the internalization of traffic rules. Moreover, given the results of research on the relationships between gender stereotypes and risk-taking, we state the hypothesis that the greater risk-taking among masculine individuals is due to a weaker internalization of traffic rules. In short, we suppose that sex-stereotype conformity, through the internalization of rules, has an influence on the propensity to take risks as a pedestrian. Experimental protocol was carried out among adolescents for testing this hypothesis.

2. Method

2.1 Participants

Two hundred and seventy-eight adolescents (130 boys and 148 girls) recruited at two middle schools, divided into 2 school levels: 7th grade (n = 130, 60 boys, 70 girls, M = 12.17 years old, SD = .53, min = 11 years 3 months, max = 14 years) and 10th grade (n = 148, 70 boys, 78 girls, M = 15.29 years old, SD = .69, min = 14 years 4 months, max = 17 years) assigned to four age groups: under 12 years (N=75, 38 boys, 37 girls), 12-13 years (N=64, 28 boys, 36 girls), 13-15 years (N = 74, 31 boys, 43 girls) and over 15 years (N=65, 33 boys, 32 girls) took part in this study. The sample was made up of adolescents whose fathers were middle-management staff or white-collar workers for 38%, blue-collar or equivalent workers (15.5%) and artisans or shopkeepers (15%). Fifteen percent of the children were unable to tell us what their father's profession was.

2.2 Tools

2.2.1 Pedestrian behavior

Two of the four scales of the Road User's Behaviors Perception Scales (RUBPS) (Granié, 2008) was used to measure the young person's behavior when faced with pedestrian risks related to what is prohibited or to danger. Each scale of RUBPS contains the same 14 items presenting risky pedestrian behaviors. The items differentiate among pedestrian behaviors that are non-dangerous transgressions (e.g., "to cross at pedestrian red light when there is no car") and dangerous behaviors without transgression (e.g., "to cross without looking because you're late"). The items come from the tool designed by Elliott and Baughan (2003, 2004) and earlier research on pedestrians (Granié & Espiau, 2006). The order of the items varies within each level.

The self-reported behaviors scale (RUBS) measures the frequency with which the individual claims to have this behavior, from 1 = never to 5 = very often.

In the danger perception scale (RUDPS), the individual is asked to evaluate the perceived level of danger for each situation, from 1 = not at all dangerous to 5 = very dangerous.

2.2.2 Gender identity

The second part is a short version for adolescents of the Bem Sex Role Inventory (BSRI) by Bem (1974), validated in French (Fontayne et al., 2000). This questionnaire is used to measure sex-stereotype conformity through 18 items that the individual must rate on a seven-point scale depending on whether the item defines him/her more or less (from 1: "never true" to 7: "always true"). Ten items determine the femininity scale and 8 items determine the masculinity scale.

2.2.3 Internalization of traffic rules by domains

This tool, designed to measure the internalization of rules in relation to the 4 domains of social knowledge, is based on the procedure called the Social Values Inventory, developed by Nucci, Guerra & Lee (1991) to measure the categorization in moral domains of drug use among adolescents. While a certain number of studies have been carried out on classification in moral domains, most tools use the research interview procedure comprising open questions (Nucci & Smetana, 1996; Smetana & Asquith, 1994), sometimes based on scenarios involving a child's transgression of a rule relative to a certain moral domain (Tisak & Turiel, 1984; Yau & Smetana, 2003). The study by Nucci, Guerra & Lee (1991) is the only one, to the best of our knowledge, that deals with the categorization and internalization of rules by social domain in the form of preconstructed response modes, these modes being very similar to the arguments used in the open responses given in interviews, making it possible to categorize them for the different domains.

Unlike the tool developed by Nucci *et al.* (1991), this tool only has a single scale called the scale of internalization by domain. The items comprising the scale of internalization by domain include the 14 items comprising the scales of pedestrian risk perception to which we added eight prototypical behaviors: two in the moral domain (e.g., "to hit another pupil outside of the school"), two in the conventional domain (e.g., "to call a teacher by his (her) first name"), two in the personal domain (e.g., "to wear clothes that your parents dislike"), one in the acceptable prudential domain (e.g., "to go outside in T-shirt when it's cold") and one in the unacceptable prudential domain (e.g., "to often refuse to eat").

The order of the items was set up so that prototypical items and the risk-taking items alternate with each other and the order of the pedestrian items is different from those in the two scales of pedestrian risk perception.

Sex-stereotype conformity and internalisation on pedestrian risk taking

The individuals were asked to classify behaviors in terms of acceptability, “if there were no laws, no rules, no social condemnation” concerning this behavior. The rule governing the behavior is considered to be internalized if the individual avoids the behavior even if there is no external reprobation (Turiel, 1998). There are 5 response modes, which include the 4 moral domains with a further refinement to the prudential category, as done by Nucci *et al.* (1991):

- perfectly acceptable, whether or not a rule exists (personal domain);
- totally acceptable because there is no rule (socio-conventional domain);
- acceptable but foolish, because it is not good for the child (acceptable prudential domain);
- unacceptable, because it is not good for the child (unacceptable prudential domain, internalization);
- unacceptable, because it could harm someone else (moral domain, internalization).

The child’s responses were scored from 1 point for the personal domain to 5 points for the moral domain (4 points are assigned to an “unacceptable prudential” response and 3 points to an “acceptable prudential” response). The total for the responses on this level give an “internalization by domain” score: a high level of internalization corresponds to a greater categorization in the moral and prudential domains with internalization of the rule; while a lower level of morality corresponds to a greater categorization in the personal and conventional domains with a lack of internalization of the rule.

2.3 Procedure

The questionnaires were passed out by the experimenters among the adolescents in the classroom for a collective answering session. Each item was read orally by one of the experimenters with a timeout to give the answer. Further explanations were given for certain items at the request of the adolescents. The answering session lasted 30 to 45 minutes.

2.4 Data analysis

Calculation of Cronbach's alpha for the level of masculinity ($\alpha = .73$) and the level of femininity ($\alpha = .84$) demonstrated the homogeneity of these two levels, thus enabling us to calculate an overall score for each of them.

Given that the goal of this study was to detect differential effects of male and female sex-stereotype conformity on risk-taking, the masculinity and femininity scores were kept separate instead of being combined into a gender-category membership (Bem, 1974, 1981). Thus, we used these two scores directly (Özkan & Lajunen, 2006). This prevented any loss of information.

Cronbach's alphas for the level of risk-taking ($\alpha = .88$), the level of danger perception ($\alpha = .88$) and the level of internalization by domain ($\alpha = .86$) were good. A high score for the internalization scale means that the individual has internalized a certain number of traffic rules and rather tends to classify them in the moral and prudential domains. A low score for this scale corresponds to a weaker level of internalization and means that the individual rather tends to categorize traffic rules in the conventional and personal domains.

3. Results

3.1 Gender identity

A series of means comparisons was carried out on the effects of gender, school level and age group on the adolescents' level of masculinity and femininity (table 1). The t-tests showed that the girls had a significantly higher score than the boys concerning feminine stereotype conformity ($t(276) = -6.57, p < .0001$). The boys had a masculine stereotype conformity score significantly higher than the girls ($t(276) = 5.37, p < .0001$). The Student's *t* did not show any significant effect of the school level on masculine sex-stereotype conformity ($t(276) = 1.1, ns$)

Sex-stereotype conformity and internalisation on pedestrian risk taking

or on feminine sex-stereotype conformity ($t(276) = .74$, ns). ANOVA carried out on the effect of age (4 groups) on sex-stereotype conformity did not show any age effect on masculine sex stereotypes among boys ($F < 1$) nor among girls ($F < 1$). Likewise, no age effect was observed on feminine sex stereotypes among boys ($F(3, 126) = 1.10$, ns) nor among girls ($F < 1$).

3.2 Risk-taking

A series of means comparisons was carried out on the effects of gender, school level and age group on the level of risky pedestrian behaviors declared by the adolescents.

Student's *t* test showed a significant difference between the two school levels on self-reported pedestrian behaviors ($t(276) = -4.44$, $p < .0001$): the "10th grade" children taken significantly more pedestrian risks than the "7th grade" children (cf. table 2).

ANOVA carried out on the effects of gender (2) and age (4) on risk-taking (table 2) showed that age ($F(3,270) = 5.74$, $p = .001$) and gender ($F(1,270) = 22.38$, $p = .0001$) had an effect on risk-taking and that the interaction between age and gender also had an effect on risk-taking ($F(3,270) = 2.62$, $p = .05$). Post-hoc Bonferroni tests on the effect of age showed that the significant difference lied between individuals under the age of 13 and individuals over the age of 13. Indeed, only individuals who are 12/13 years old and individuals who are 13/15 years old are significantly differentiated ($p < .05$). Thus, risk-taking was higher among boys and the adolescent older than 13, but risk-taking especially increased with age among girls.

A positive correlation is observed between masculinity and pedestrian risk-taking ($r = .24$, $n = 278$, $p = .0001$) and a negative correlation between femininity and pedestrian risk-taken ($r = -.30$, $n = 278$, $p = .0001$). Thus, a high masculinity score was associated with a high level of risk-taking whereas a high femininity score was associated with a low level of risk-taking.

3.3 Danger perception

A series of means comparisons was carried out on the effects of gender, school level and age group on the level of danger perception among adolescents (table 2).

The ANOVA on the effects of age (4 groups) on the level of danger perception did not show any significant effect of age on danger perception ($F(3,274) = 1.10$, ns). The ANOVA on the effects of gender (2) and school level (2) on danger perception showed an effect of gender ($F(1,274) = 8.65$, $p = .004$), school level ($F(1,274) = 4.27$, $p < .05$) and the interaction between school level and gender on danger perception ($F(1,274) = 4.14$, $p < .05$). Individuals in the “7th grade” school level thus have a greater perception of danger than individuals in “10th grade” (table 4). Girls have a significantly higher level of danger perception than boys. But danger perception decreased with age among girls whereas it remains stable among boys (table 2).

The correlation matrix between masculinity, femininity and danger perception showed a significant negative correlation between the masculinity score and danger perception, $r = -.12$, $n = 278$, $p < .05$, and a significant positive correlation between the femininity score and danger perception, $r = .32$, $n = 278$, $p < .001$. Thus, the more the individual conformed to masculine stereotypes, the less he/she perceived danger; the more the individual conformed to feminine stereotypes, the more he/she perceived danger.

3.4 Internalization by domain

A series of means comparisons was carried out on the effects of gender, school level and age group on the level of internalization by domain among adolescents.

The t-test on the effects of the school level (2 modes) on the internalization score is significant, $t(276) = 3.15$, $p < .005$. 7th grade children have an internalization by domain score that is higher than 10th grade children (table 2).

Sex-stereotype conformity and internalisation on pedestrian risk taking

The ANOVA on the effects of gender (2) and age (4) on internalization by domain shows that age ($F(3,270) = 3.32, p = .02$) and gender ($F(1,270) = 15.75, p = .0001$) have an effect on internalization by domain, and that the interaction between age and gender on internalization by domain formed a trend ($F(3,270) = 2.52, p = .06$). Girls have a higher level of internalization by domain than boys (table 2). Post-hoc Bonferroni tests on the effects of age show a significant difference between individuals aged 12/13 and those aged 13/15; corresponding to a switch in the trend between 12 and 15 years of age. Thus, internalization by domain changed with age and was stronger among girls, but the difference between girls and boys in internalization by domain tended to decrease with age (table 2).

The correlation matrix between the masculinity score, the femininity score and the internalization by domain score showed a significant negative correlation between masculinity and internalization ($r = -.15, n = 278, p = .01$) and a significant positive correlation between the femininity score and the internalization by domain score ($r = .36, n = 278, p = .0001$). Thus, the higher the individual's masculinity score, the lower his/her internalization by domain score. On the other hand, the higher the individual's femininity score, the higher his/her internalization domain score.

The regression analysis on the effects of age, gender, femininity, masculinity and danger perception on internalization by domain showed that the model is significant, with $F(5,272) = 33.32, p < .0001$. This model explained 37% of the variance and showed that the femininity score and the danger perception score played a role in reinforcing the level of internalization by domain (cf. table 3). Age, gender and level of masculinity are not predictors of internalization.

Sex-stereotype conformity and internalisation on pedestrian risk taking

3.5 Predictive factors for risk-taking among adolescents

The regression analysis on the effects of age, gender, femininity, masculinity, danger perception and internalization by domain on risk-taking behavior showed that the model is significant, with $F(6,271) = 27.88, p < .0001$. This model explained 37% of the variance. The masculinity score and age have a reinforcing effect on risk-taking, whereas the scores for internalization by domain and danger perception have an inhibiting effect on risk-taking. The level of femininity and gender are not predictors of the risk-taking score (table 4).

4. Discussion

The aim of this study is to explain gender differences in risk-taking among adolescent pedestrians, using sex-stereotype conformity and internalization of traffic rules. The results indicate that gender differences in risk-taking can indeed be explained by gender differences in internalization by domain. To our knowledge, this is the first study to document the internalization of traffic rules by adolescents (Granié, 2007), and few studies have directly examined adult motives for compliance with road safety laws (Yagil, 1998, 2000).

Thus, the results show that masculine sex-stereotype conformity lead to a weaker internalization of traffic rules and that masculinity and internalization are good predictors of the risky behaviors declared by adolescents as pedestrians: our hypothesis is supported by the results.

Moreover, masculine stereotype conformity turns out to be a better predictor of risk-taking than biological sex, thus confirming other research (Raithel, 2003). Being a boy or a girl does not predict the self-reported level of risk-taking; recognizing oneself as masculine, i.e. manifesting behaviors and personality traits that society attributes to the male sex, rather predicts risky pedestrian behaviors. In this, the results of this study confirm that the male-female difference in risk-taking may in part be attributed to the gender-role defining the

Sex-stereotype conformity and internalisation on pedestrian risk taking

behavior expected from men in Western societies (Byrnes *et al.*, 1999; d'Acremont & Van der Linden, 2006; Rowe, Maughan & Goodman, 2004).

Furthermore, the results of this research also show an effect of age and school level on risk-taking and on the internalization of traffic rules and an effect of school level on danger perception: self-reported risk-taking behavior is greater and the internalization of pedestrian rules is lower in 13-15 year-olds than in 12-13; danger perception drops significantly between the 7th grade and the 10th grade. Other research pointed to the same increase in risk-taking around 12-13 years of age (Elliott & Baughan, 2004). For adolescent pedestrian, this age effect is consistent with the results of previous research showing that, as age increases, adolescents pay less and less attention to traffic dangers (System Three, 1998). These results may in part be related to the increase in exposure to traffic among young adolescents without adult supervision (Campbell & Keegan, 2000; Lynam & Harland, 1992). This increase in experience appears to go hand-in-hand with a feeling of skill and control of the situation at hand, leading to a decrease in attention to danger (Tolmie *et al.*, 2006).

Concerning the age difference in internalization concomitant to the difference in risk-taking, these results can be compared with the explanation given by Yagil (1998) for the low level of normative motives among the most violation-prone individuals. Thus, for Yagil (1998), the individual's adoption of violation-prone behavior leads him/her, by seeking consistency and reduced cognitive dissonance (Festinger, 1957), to see the rule as illogical or outdated. This representation of the rule lies within the conventional domain of the social knowledge domains described by the social domain theory (Turiel, 1998). Thus, adoption of riskier behaviors by adolescents as their independent travel increases could lead both to a decrease in internalization, related to a search for consistency and a view of traffic rules as purely conventional, and to a decrease in danger perception associated with these behaviors.

Sex-stereotype conformity and internalisation on pedestrian risk taking

The results also show an effect of gender and sex-stereotype conformity on the internalization by domain of risky pedestrian behaviors. To the best of our knowledge, this is the first study demonstrating the relationships between internalization by domain and gender identity. Girls tend more than boys to internalize rules related to risky pedestrian behaviors, thus confirming the results found by Yagil (1998) on gender differences in normative motives among drivers faced with rules. Furthermore, danger perception and femininity are more meaningful factors for the internalization of pedestrian rules than gender or age. It may be said that feminine stereotype conformity, with the greater consideration for others (through empathy, sympathy or compassion) and the inhibition of risky behaviors that this entails, added to greater danger perception, could explain a greater internalization of the rules.

Lastly, the results show that the internalization of pedestrian rules is a good predictive factor for pedestrian risk-taking. This confirms, for traffic risks, the results obtained by Nucci *et al.* (1991) on the consumption of psychoactive substances and by Kuther & Higgins-D'Alessandro (2000) on antisocial behaviors and risky sexual behaviors. The internalization of rules, i.e. transforming social rules into self-regulated behaviors, may partially explain adolescents' behaviors when faced with risks in several domains.

In educational terms, it appears that, to be effective in preventing risky behavior, we should work to encourage "committed compliance" (Kochanska & Aksan, 1995), which is a matter of internalization, rather than "contextual compliance", - i.e. submission to demands due to the presence of an authority figure, with no sincere commitment -, which is not associated with the internalization of norms (Kochanska, 2002) and lies more in the conventional domain (Turiel, 1998). Then, communication mode used in road safety education and prevention must be questioned on what it induced in moral internalization.

Statements of rules, references to external authority and some types of sanction, known in educational practice as power assertion, fails to communicate the reasons for the rule or

Sex-stereotype conformity and internalisation on pedestrian risk taking

prohibition and do not focus the individual on the effects of the actions for others' or self's welfare. Then, power assertion may successfully induce short-term contextual compliance and may inform child understanding of social conventions, because they provide information about expected regularities in the social environment, including the presence of rules and the expectations of authority. Nevertheless, power assertion does not facilitate moral development and internalization (Kuczynski, 1984).

On the contrary, reasoning, and in particular other-oriented reasoning (Hoffman, 1970), is associated with greater moral internalization and the development of concern for others (Zahn-Waxler & Chapman, 1982). Thus, Kuczynski (1982) has found that statements focusing on actions' consequences for others are more effective in promoting resistance to temptations and committed compliance than are appeals regarding the consequences of antisocial behaviour for the self. Given the results of this present research, other-oriented values socially associated with the feminine gender-role could be a way for promoting internalization of social values leading to self-regulated behavior and committed conformity.

References

- Ashmore, R. D., Del Boca, F. K., & Wahlers, A. J., 1986. Gender stereotypes. In: R. D. Ashmore & F. K. Del Boca (Eds.). *The social psychology of female-male relations: a critical analysis of central concepts*, New York, Academic Press, pp.
- Assailly, J.-P., 2001. *La mortalité chez les jeunes*, Paris, Que sais-je? P.U.F.
- Baker, S. P., O'Neill, B., & Ginsburg, M. J., 1992. *The injury fact book*, New York, Oxford University Press.
- Baumrind, D., 1978. Parental disciplinary patterns and social competence in children. *Youth and Society* 9(239-276).
- Baumrind, D., 1989. Rearing competent children. In: W. Damon (Ed.), *Child development today and tomorrow*, San Francisco, Jossey-Bass, pp. 349-378.
- Baumrind, D., 1991. The influence of parenting style on adolescent competence and substance use. *Journal of Early Adolescence* 11(1), 56-95.

Sex-stereotype conformity and internalisation on pedestrian risk taking

- Bem, S. L., 1974. The measurement of psychological androgyny. *Journal of consulting and clinical psychology* 42, 155-162.
- Bem, S. L., 1981. Gender schema theory: a cognitive account of sex-typing. *Psychological Review* 88, 354-364.
- Brody, G. H., & Shaffer, D. R., 1982. Contributions of parents and peers to children's moral socialization. *Development Review* 2, 31-75.
- Byrnes, J. P., Miller, D. C., & Schafer, W. D., 1999. Gender differences in risk taking: a meta-analysis. *Psychological Bulletin* 125(3), 367-383.
- Campbell, R., & Keegan, S., 2000. Child Road Safety: Focus on 14-16 year olds: Qualitative research presentation summary, Prepared for COI and DETR.
- Cazenave, N., Le Scanff, C., & Woodman, T., 2003. Spécificité de la prise de risque chez les femmes. Communication 10e Congrès de l'Association des Chercheurs en Activités Physiques et Sportives (ACAPS), Toulouse.
- Colby, A., & Kohlberg, L., 1987. The measurement of moral judgment (Vols. 1-2). New York, Cambridge University Press.
- Coppens, N., & Gentry, L., 1991. Video analysis of play-ground injury-risk situations. *Research in Nursing and Health* 14, 129-136.
- d'Acremont, M., & Van der Linden, M., 2006. Gender differences in two decision-making tasks in a community sample of adolescents. *International Journal of Behavioral Development* 30(4), 352-358.
- Deaux, K., & Lewis, L. L., 1984. Structure of gender stereotypes: interrelations among components and gender labels. *Journal of Personality and Social Psychology* 46(5), 991-1004.
- Elliott, M. A., & Baughan, C. J., 2003. Adolescent road user behaviour: a survey of 11-16 year olds. TRL Report 561, Londres, Department for Transport.
- Elliott, M. A., & Baughan, C. J., 2004. Developing a self-report method for investigating adolescent road user behavior. *Transportation Research Part F: Traffic Psychology and Behaviour* 7(6), 373-393.
- Festinger, L., 1957. *A Theory of Cognitive Dissonance*, Evanston, Ill., Row, Peterson.
- Fontayne, P., Sarrazin, P., & Famose, J.-P., 2000. The Bem Sex-Role Inventory: validation of a short-version for French teenagers. *European Review of Applied Psychology* 50(4), 405-417.

Sex-stereotype conformity and internalisation on pedestrian risk taking

- Granié, M. A., 2007. Gender differences in preschool children's declared and behavioral compliance with pedestrian rules. *Transportation Research Part F: Traffic Psychology and Behaviour* 10(5), 371-382.
- Granié, M. A., 2008. Effet du sexe et du genre sur la perception des comportements piétons chez l'adulte. *Recherche - Transports - Sécurité* soumis.
- Granié, M. A., & Espiau, G., 2006, 22-23 juin. Exploration des différences de sexe dans l'évaluation du danger et de la transgression des règles routières. Communication affichée au Colloque International "Allégorie du genre. Evolution des images de féminité et de masculinité", Université Paris 10 Nanterre.
- Grolnick, W. S., Deci, E. L., & Ryan, R. M., 1997. Internalization within the family: the self-determination theory perspective. In: J. E. Grusec & L. Kuczynski (Eds.). *Parenting and children's internalization of values*, New York, John Wiley, pp. 135-161.
- Grusec, J., & Goodnow, J. J., 1994. Impact of parental discipline methods on the child's internalization of values: a reconceptualization of current points of view. *Developmental Psychology* 30(1), 4-19.
- Harré, N., Field, J., & Kirkwood, B., 1996. Gender differences and areas of common concern in the driving behaviors and attitudes of adolescents. *Journal of Safety Research* 27(3), 163-173.
- Hoffman, M. L., 1970. Moral Development. In: P. Mussen (Ed.), *Carmichael's manual of child psychology*, New-York, Wiley, pp. 261-300.
- Hoffman, M. L., 1983. Affective and cognitive process in moral internalization. In: E. T. Higgins, D. N. Ruble & W. W. Hartup (Eds.). *Social cognition and social development: a sociocultural perspective*, Cambridge, Cambridge University Press, pp. 236-274.
- Huston, A., 1983. Sex-typing. In: P. H. Mussen (Ed.), *Handbook of Child Psychology*, New-York, Wiley, pp.
- Huston, A., 1985. The development of sex-typing: themes from recent research. *Developmental Review* 5, 1-17.
- Kochanska, G., 2002. Committed compliance, moral self and internalization: a mediational model. *Developmental Psychology* 38, 339-351.
- Kochanska, G., & Aksan, N., 1995. Mother-child mutually positive affect, the quality of child compliance to requests and prohibitions, and maternal control as correlates of early internalization. *Child Development* 66, 236-254.

Sex-stereotype conformity and internalisation on pedestrian risk taking

- Kohlberg, L., 1966. A cognitive developmental analysis of children's sex-role concepts and attitudes. In: E. E. Maccoby (Ed.), *The development of sex differences*, Stanford, Stanford University Press, pp.
- Kuczynski, L., 1982. Intensity and orientation reasoning: motivational determinants of children's compliance to verbal rationales. *Journal of Experimental Child Psychology* 34, 357-370.
- Kuczynski, L., 1984. Socialization goals and mother-child interaction: strategies for long-term and short term compliance. *Developmental Psychology* 20, 1061-1073.
- Kuther, T. L., & Higgins-D'Alessandro, A. N. N., 2000. Bridging the gap between moral reasoning and adolescent engagement in risky behavior. *Journal of Adolescence* 23(4), 409-422.
- Lawton, R., Parker, D., Stradling, S., & Manstead, A. S. R., 1997. Predicting road traffic accidents: the role of social deviance and violations. *British Journal of Psychology* 88, 249-262.
- Lynam, D., & Harland, D., 1992. Child pedestrian safety in the UK. Communication VTI/FERSI Conference, Berlin.
- Morrongiello, B. A., & Dawber, T., 1999. Parental influences on toddlers' injury-risk behaviors: are sons and daughters socialized differently? *Journal of Applied Developmental Psychology* 20(2), 227-251.
- Morrongiello, B. A., & Hogg, K., 2004. Mother's reactions to children misbehaving in ways that can lead to injury: implications for gender differences in children risk taking and injuries. *Sex Roles* 50(1-2), 103-118.
- Moyano Diaz, E., 2002. Theory of planned behavior and pedestrians' intentions to violate traffic regulations. *Transportation Research Part F: Traffic Psychology and Behaviour* 5(3), 169-175.
- Nucci, L., 1981. Conceptions of personal issues: a domain distinct from moral and societal concepts. *Child Development* 52, 114-121.
- Nucci, L., & Smetana, J. G., 1996. Mothers' concepts of young children's areas of personal freedom. *Child Development* 67, 1870-1886.
- Nucci, L., & Turiel, E., 1978. Social interactions and the development of social concepts in preschool children. *Child Development* 49, 400-407.
- Nucci, L. P., Guerra, N., & Lee, J., 1991. Adolescent judgments of the personal, prudential, and normative aspects of drug usage. *Developmental Psychology* 27(5), 841-848.

Sex-stereotype conformity and internalisation on pedestrian risk taking

- Nucci, L. P., & Santiago Nucci, M., 1982. Children's responses to moral and social conventional transgressions in free-play settings. *Child Development* 53, 1337-1342.
- Özkan, T., & Lajunen, T., 2006. What causes the differences in driving between young men and women? The effects of gender roles and sex on young drivers' driving behaviour and self-assessment of skills. *Transportation Research Part F: Traffic Psychology and Behaviour* 9, 269-277.
- Piaget, J., 1932. *The Moral Judgment of the Child*, London, Kegan Paul, Trench, Trubner and Co.
- Raithel, J., 2003. Risikobezogenes Verhalten und Geschlechtsrollenorientierung im Jugendalter [Risk-taking behavior and gender role orientation in adolescents]. *Zeitschrift für Gesundheitspsychologie* 11(1), 21-28.
- Rivara, F. P., Bergman, A. B., LoGerfo, J., & Weiss, M., 1982. Epidemiology of childhood injury II: sex differences in injury rates. *Developmental and Behavioral Pediatrics* 16, 362-370.
- Rivara, F. P., & Mueller, B. A., 1987. The epidemiology and causes of childhood injury. *Journal of Social Issues* 43, 13-32.
- Rosenbloom, T., Nemrodov, D., & Barkan, H., 2004. For heaven's sake follow the rules: pedestrians' behavior in an ultra-orthodox and a non-orthodox city. *Transportation Research Part F: Traffic Psychology and Behaviour* 7(6), 395-404.
- Routledge, D. A., Repetto-Wright, R., & Howarth, C. I., 1996. The exposure of young children to accident risk as pedestrians. *Injury Prevention* 2(2), 150-161.
- Rowe, R., Maughan, B., & Goodman, R. M., 2004. Childhood psychiatric disorder and unintentional injury: findings from a national cohort study. *Journal of Pediatric Psychology* 29(2), 119-130.
- Simon, F., & Corbett, C., 1996. Road traffic offending, stress, age, and accident history among male and female drivers. *Ergonomics* 39, 757-780.
- Smetana, J. G., 1985. Preschool children conceptions of transgressions: effects of varying moral and conventional domain-related attributes. *Developmental Psychology* 21(1), 18-29.
- Smetana, J. G., 1997. Parenting and the development of social understanding reconceptualized: a social domain analysis. In: J. Grusec & L. Kuczynski (Eds.). *Parenting and children's internalization of values: a handbook of contemporary theory*, New-York, Wiley, pp. 162-192.

Sex-stereotype conformity and internalisation on pedestrian risk taking

- Smetana, J. G., 1999. The role of parents in moral development: a social domain analysis. *Journal of Moral Education* 28, 311-321.
- Smetana, J. G., & Asquith, P., 1994. Adolescents' and parents' conception of parental authority and adolescent autonomy. *Child Development* 65, 1147-1162.
- System Three, 1998. The young teenager and road safety: A qualitative study., The Scottish Office Central Research Unit. Edinburgh, The Stationery Office.
- Tavecchio, L. W. C., Stams, G. J. J. M., Brugman, D., & Thomeer-Bouwens, M. A. E., 1999. Moral judgement and delinquency in homeless youth. *Journal of Moral Education* 28, 63-79.
- Tisak, M. S., & Turiel, E., 1984. Children's conceptions of moral and prudential rules. *Child Development* 55, 1030-1039.
- Tisak, M. S., & Turiel, E., 1988. Variation in seriousness of transgressions and children's moral and conventional concepts. *Developmental Psychology* 24(3), 352-357.
- Tolmie, A. K., Thomson, J. A., O'Connor, R., Foot, H. C., Karagiannidou, E., Banks, M., O'Donnell, C., & Sarvary, P., 2006. The role of skills, attitudes and perceived behavioural control in the pedestrian decision-making of adolescents aged 11-15 years, London, Department for Transport.
- Turiel, E., 1983. *The development of social knowledge: morality and convention*, Cambridge, Cambridge University Press.
- Turiel, E., 1998. The development of morality. In: N. Eisenberg (Ed.), *Handbook of Child Psychology*, New York, Wiley, pp. 863-932.
- Tyler, T., 1990. *Why people obey the law*, New Haven, Yale University Press.
- UNICEF, 2001. A league table of child deaths by injury in rich nations. Innocenti report card n°2, Florence, UNICEF Innocenti Research Centre.
- Waylen, A., & McKenna, F., 2002. Cradle attitudes - grave consequences. The development of gender differences in risky attitudes and behaviour in road use, Reading University, Foundation for Road Safety Research.
- Yagil, D., 1998. Gender and age-related differences in attitudes toward traffic laws and traffic violations. *Transportation Research Part F: Traffic Psychology and Behaviour* 1, 123-135.
- Yagil, D., 2000. Beliefs, motives and situational factors related to pedestrians' self-reported behavior at signal-controlled crossings. *Transportation Research Part F: Traffic Psychology and Behaviour* 3(1), 1-13.

Sex-stereotype conformity and internalisation on pedestrian risk taking

Yau, J., & Smetana, J. G., 2003. Conceptions of moral, social-conventional, and personal events among chinese preschoolers in Hong Kong. *Child Development* 74(3), 647-658.

Zahn-Waxler, C., & Chapman, M., 1982. Immediate antecedents of caretakers' methods of discipline. *Child Psychiatry and Human Development* 12, 179-192.

Sex-stereotype conformity and internalisation on pedestrian risk taking

Table 1. Means (standard deviation) for masculinity and femininity scores for each gender group, each school level and each age group

	Gender group		School level		Age group			
	Boys	Girls	7 th grade	10 th grade	Under 12	12-13	13-15	Over 15
Masculinity	39.75 (8.89)	34.05 (8.76)	36.14 (9.35)	37.36 (9.14)	35.61 (9.84)	36.52 (9.23)	36.42 (8.60)	38.51 (9.26)
Femininity	45.60 (12.04)	54.01 (9.28)	49.60 (11.85)	50.62 (10.97)	48.39 (12.78)	50.00 (10.65)	51.24 (11.62)	50.78 (10.30)

Table 2. Mean (and standard deviation) of the risk-taking score, danger perception score and internalization by domain score for each sex group, age group and school level

		Risk-taking	Danger perception	Internalization by domain
Sex group	Male	41,06 (12,40)	46,52 (12,64)	66,17 (14,28)
	Female	34,49 (11,05)	50,56 (9,61)	72,30 (11,52)
Age group	Under 12	35,08 (12,47)	48,99 (13,27)	69,39 (13,40)
	12-13	34,42 (11,91)	50,14 (11,37)	72,70 (13,88)
	13-15	40,19 (11,29)	48,88 (10,50)	66,12 (13,60)
	Over 15	40,54 (11,75)	46,63 (9,40)	70,05 (11,14)
School level	7 th grade	34,64 (12,03)	50,01 (12,34)	71,74 (13,93)
	10 th grade	40,90 (11,40)	47,15 (9,78)	66,82 (11,88)

Sex-stereotype conformity and internalisation on pedestrian risk taking

Table 3. Summary of the regression analysis of the effects of danger perception, masculinity, femininity, age and gender on internalization by domain

Predictor	Standardized beta coefficients	t	Significance
Danger	.504	9.843	.000
Masculine	-.068	-1.322	ns
Feminine	.177	3.258	.001
Age	-.009	-.184	ns
Gender	.056	1.027	ns

Table 4. Summary of the linear regression analysis of the effects of internalization, danger perception, masculinity, femininity, age and gender on risk-taking

Predictor	Standardized betas	t	Significance
Age	.17	3.55	.0001
Internalization	-.33	-5.47	.0001
Danger	-.19	-3.23	.001
Masculine	.12	2.38	.02
Feminine	-.10	-1.85	ns
Gender	-.08	-1.56	ns